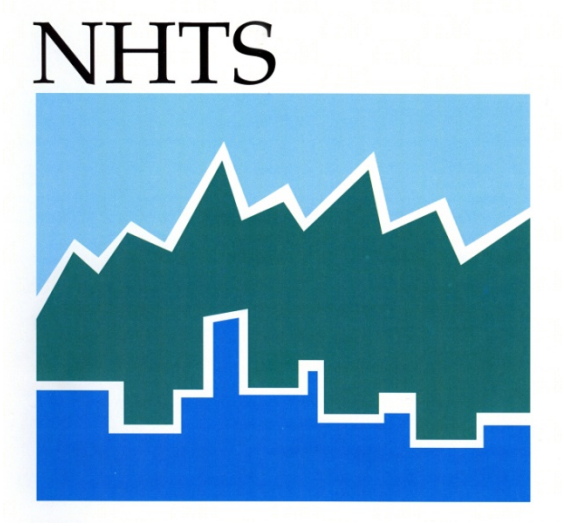

NATIONAL HOUSEHOLD TRAVEL SURVEY

Compendium of Uses

(June 2011 through December 2012)

Last Updated June 2012

Introduction

This compendium contains various uses and applications of the National Household Travel Survey (NHTS) data used in transportation planning and research from June 2011 through December 2012. Published papers and reports that cite the use of NHTS data were selected using the Transportation Research Board (TRB) Annual Meeting Online Portal http://amonline.trb.org/ and Google Alerts, notification emails sent by Google when new search results matched predetermined search terms pertaining to NHTS data. The key word and search engine terms used in both online sources were the **National Household Travel Survey** and **NHTS**.

The research papers were grouped into 10 categories that were created based on the subject areas and index terms identified in each abstract as well as category titles used in previous NHTS compendium databases. The categories are as follows:

1. Bicycle and Pedestrian Studies
2. Energy Consumption
3. Gas Tax and Fee Scenarios
4. Public Transportation
5. Policy and Mobility
6. Special Populations
7. Survey Design, Methodology and Other Applications
8. Traffic Safety
9. Travel Behavior
10. Trend Analysis and Market Segmentation

A one-page description of each paper is provided which includes the title, authors, publication date, abstract, subject areas and index terms, and availability.

Research papers and articles in this document cover a diverse range of topics in the areas of transportation, health, safety, environment, and engineering and were published in various journals including, but not limited to, the American Journal of Public Health, the International Journal of Behavioral Nutrition and Physical Activity, and the National Center for Transit Research. Several papers were also submitted by researchers and graduate students for presentation and publication to the Transportation Research Board 91st Annual Meeting and can be found in the 2012 TRB Annual Meeting Compendium of Papers.

Please note as of June 2012, this compendium consists of approximately 70 research papers and articles. This document will be updated on an on-going basis with newly published papers that cite NHTS data. For information about adding a research paper to the NHTS compendium, please contact Danielle Gray at Danielle.gray.ctr@dot.gov.

Publications from June 2011 through December 2012 that cite the use of the National Household Travel Survey

CATEGORY	TITLE	AUTHOR	PAGE
Bicycle and Pedestrian Studies	Applying a Vehicle-Miles of Travel Calculation Methodology to a County-Wide of Bicycle and Pedestrian Miles of Travel	Jonathan Dowds and James Sullivan	1
Bicycle and Pedestrian Studies	Bicycle Ownership in the U.S: Empirical Analysis of Regional Differences	Michael Maness	2
Bicycle and Pedestrian Studies	Examining Trip Generation and Pedestrian Behavior in Washington, DC	Jacquelyn Renée Schneider	3
Bicycle and Pedestrian Studies	How Common is Pedestrian Travel To, From, and Within Shopping Districts?	Robert J. Schneider, Swati Pande	4
Bicycle and Pedestrian Studies	More than Just Exercise: Walking in Today's Cities	Andrew Mondschein	5
Bicycle and Pedestrian Studies	Predicting Bicycle Mode Choice for Trips to/from/within Mixed Use Developments	Gail Meakins and, Reid Ewing	6
Bicycle and Pedestrian Studies	To Bike or Not To Bike: Seasonal Factors For Bicycle Commuting	Justine Sears, Brian S. Flynn, Lisa Aultman-Hall, and Greg S. Dana	7
Bicycle and Pedestrian Studies	Variability and seasonality of active transportation in USA: evidence from the 2001 NHTS	Yong Yang**,** Ana V Diez Roux, and C. Raymond Bingham	8
Bicycle and Pedestrian Studies	Active Travel in Germany and the U.S. Contributions of Daily Walking and Cycling to Physical Activity	Ralph Buehler, John Pucher, Dafna Merom, and Adrian Bauman	9
Bicycle and Pedestrian Studies	Walking and Cycling in the United States, 2001–2009: Evidence From the National Household Travel Surveys	John Pucher, Ralph Buehler, Dafna Merom, and Adrian Bauman	10

BICYCLE AND PEDESTRIAN STUDIES

Title: Applying a Vehicle-Miles of Travel Calculation Methodology to a County-Wide of Bicycle and Pedestrian Miles of Travel

Author(s): Jonathan Dowds and James Sullivan

Publication date: August 1, 2011

Abstract: Vehicle miles of travel are widely used in transportation planning, policy and research. In spite of the growing recognition of the importance of non-motorized travel, comparable estimates of bicycle and pedestrian miles of travel (BPMT) are rarely calculated largely due to the difficulty and expense of manually collecting bicycle and pedestrian (BP) counts. This paper uses a set of BP counts at 29 locations in Chittenden County Vermont, including three sites with more than a full year of counts, to explore the barriers to calculating reliable estimates of BPMT. Adjustment factors for converting single-day BP volumes into annual average daily BP volumes are calculated using the methodology in the Traffic Monitoring Guide (1) as well as a variation on this method that uses cluster analysis of weather patterns rather than calendar months to determine the seasonal adjustment periods. Finally, these adjustment factors are applied to four sets of BP network link classification systems resulting in eight estimates of BPMT and these estimates are compared to results from the 2009 National Household Travel Survey. The estimates based on adjustment factors ranged from 73.8 million to 295.8 million BPMT per year, far higher than the estimate of 31.5 million BPMT which is reached when only the NHTS data is used. The wide range of estimates produced demonstrates the need for more widespread BP data collection and further refinement and validation of BP link classification systems.

Subject areas and index terms: VMT, non-motorized travel, pedestrian and bicycle counts

Availability: 2012 TRB Paper Submittal

Title: Bicycle Ownership in the U.S: Empirical Analysis of Regional Differences

Author(s): Michael Maness

Publication date: November 15, 2011

Abstract: Bicycle ownership is an important metric in non-motorized travel behavior. Bicycle ownership has been shown be correlated with recreational activity, propensity to travel by bicycle, and injury rates. Thus bicycle ownership may have farther reaching effects on public health, congestion, energy usage, recreation facility demand, and infrastructure investment. This paper proposes to analyze bicycle ownership on a national scale using the 2001 National Household Travel Survey. Three ordinal logit models were created which analyzed general trends in household bicycle ownership, regional effects at a micro household scale, and regional and city effects at a macro scale. This analysis showed that larger households owned more bicycles and that educated, higher income households were more likely to own bicycles. Minority households were less likely to own bicycles as well as households in rural areas. Women contributed to bicycle ownership but to a lesser degree than men. Children greatly contributed to bicycle ownership, especially between the ages of 10 and 15. Adult bicycle ownership peaked at middle age and declined rapidly beyond age 55. Divisional and city effects were also found to exist which suggest that local infrastructure investment as well as cycling culture may contribute to bicycle ownership. Further research into the behavioral causes of many of these effects is suggested.

Subject areas and index terms: non-motorized travel, bicycle travel, travel behavior, bicycle ownership

Availability: 2012 TRB paper submittal

Title: Examining Trip Generation and Pedestrian Behavior in Washington, DC

Author(s): Jacquelyn Renée Schneider

Publication date: November 18, 2011

Abstract: Many factors influence travel in general – geography, socio-demographic and attitudes toward travel. In this paper, I explore the effects of demographic characteristics on travel behavior in Washington D.C. Using 2009 National Household Travel Survey (NHTS) data, I examine overall trip generation and investigate pedestrian behavior using race, income and age demographics. I also compare U.S. Census data and the NHTS sample coverage for the District and make inferences regarding overall transportation mode choice. Using single-factor analysis of variance, I examine the effect of demographics on trip generation, pedestrian distance and trip duration. Additional analysis is provided to form a deeper understanding of the statistical findings relating to race, income and age. This research determines that whites, those from high-income households and middle-aged respondents make more trips than nonwhites, lower income households and younger age groups. Contrary to planning literature, for pedestrian trips, the data supports that whites travel farther distances than non-whites. Similarly, the data suggests that non-whites and respondents from middle-income households take longer walking trips. Income and age did not affect pedestrian travel distances with statistical significance.

Subject areas and index terms: travel behavior, trip generation, pedestrian behavior

Availability: 2012 TRB paper submittal

Title: How Common is Pedestrian Travel To, From, and Within Shopping Districts?

Author(s): Robert J. Schneider, Swati Pande

Publication date: November 2011

Abstract: Growing interest in sustainable transportation systems and livable communities has created a need for more complete measures of pedestrian travel. Yet, many performance measures do not account for short pedestrian movements, such as walking between stores in a shopping district, walking from a street parking space to a building entrance, or walking from a bus stop to home. This study uses a 2009 intercept survey and the 2009 National Household Travel Survey to quantify pedestrian travel to, from, and within San Francisco Bay Area shopping districts. Overall, walking was the primary travel mode for 21% of intercept survey and 10% of NHTS tours with stops in these shopping districts. However, detailed analysis of pedestrian movements showed that walking was common on respondent tours (52% of intercept survey tours included some walking) and that walking was used on the majority of trips within these shopping districts (65% of intercept survey trips and 71% of NHTS trips within the shopping districts were made by walking). In general, Urban Core and Suburban Main Street shopping districts had higher levels of pedestrian activity than Suburban Thoroughfare and Suburban Shopping Center shopping districts. The detailed analysis in this paper provides a more complete picture of pedestrian activity than is commonly shown by national and regional household survey summaries.

Subject areas and index terms: travel behavior, pedestrian, survey, mode share, measurement, shopping district

Availability: 2012 TRB paper submittal

Title: More than Just Exercise: Walking in Today's Cities

Author(s): Andrew Mondschein

Publication date: August 1, 2011

Abstract: Transportation planners, policymakers, urban designers, and activists have expended considerable effort over the past few decades promoting walking as one of several alternatives to driving. More recently, the public health benefit of a physically active population, including a population that walks more often, has become another reason to encourage walking. Amongst all of this excitement about walking, there has so far been little exploration of the role walking plays in people's lives and cities' welfare. One little understood aspect of walking is its appeal beyond simple "derived demand" travel choice frameworks. Though we might intuitively know that people walk for more than just to get from A to B, there's been little to explain what people gain from walking beyond its potential health benefit. An investigation of pedestrian behavior using the 2009 National Household Travel Survey suggests that the reasons that people choose to walk vary considerably across place and class, and that walking in urban areas may best be explained by a dual conceptualization of walking as the mode of last resort and a highly-prized urban amenity. This seemingly self-contradictory dual role suggests that policies that want to encourage walking across a broad swath of the population will need to overcome barriers rooted in everyday lifestyles just as much as in the quality of the built environment.

Subject areas and index terms: walking, travel choice

Availability: 2012 TRB paper submittal

Title: Predicting Bicycle Mode Choice for Trips to/from/within Mixed Use Developments

Author(s): Gail Meakins and Reid Ewing

Publication date: N/A

Abstract: The purpose of this study is to present a methodology for predicting the bike mode share for mixed-use developments (MXDs). Datasets were generated using household travel surveys and GIS databases for 239 mixed-use developments in six large and diverse metropolitan regions. Hierarchical modeling was used to estimate the likelihood of bike trips to/from/within mixed-use developments in terms of the 7D variables (density, diversity, design, destination accessibility, distance to transit, development scale, and demographics). MXDs with dense concentrations of population and jobs, balanced land uses, and dense urban street networks generate a greater share of bicycle trips. Bicycling facility planning, traffic impact assessment, climate action planning, and health impact assessment are possible areas of application.

Subject areas and index terms: mixed-use development, bicycling, mode choice, 7Ds

Availability: 2012 TRB paper submittal

Title: To Bike or Not To Bike: Seasonal Factors For Bicycle Commuting

Author(s): Justine Sears, Brian S. Flynn, Lisa Aultman-Hall, and Greg S. Dana

Publication date: N/A

Abstract: The objective of this research was to assess the impact of weather on commuting to work by bicycle among a panel of working adults in northern communities. Our participants commuted at least two miles each way and bike commuted more than twice annually. Transportation mode was recorded for four seven-day periods in 2009-2010 (each period in one of four seasons. Mode, personal characteristics, and commute length were linked to location- and time-specific weather conditions, and daylight hours on commuting days. Analyses focused on the effects of season, weather and other factors to develop binary models for commuting by bicycle. The likelihood of bike commuting increased 3% with every 1ºF increase in morning temperature and decreased by 5% with a 1mph increase in wind speed. Likelihood of biking to work was more than double on days with no morning precipitation. There was no discernible effect of hours of daylight, although study participants cited this as a barrier in the baseline survey. Distance to work negatively affected bike commuting likelihood and men were nearly twice as likely as women to bike commute on a given day. Separate models for men and women, suggested that men and women respond similarly to adverse weather conditions, although some effects were difficult to identify among women due to a smaller sample size. An appreciable portion of participants biked to work throughout the year in a variety of weather conditions suggesting that a northern climate may not necessarily preclude year-round bike commuting. Multi-modal commuting was prevalent among our sample: on 20% of the days participants reported biking to work, they reported getting home via another mode. Helping cyclists learn to deal safely with cold and dark conditions and facilitation of multi-modal bicycle commuting may promote wider use of bicycle commuting and serve to extend the northern bicycle commute season.

Subject areas and index terms: bicycle travel, travel behavior, bicycle commuting

Availability: 2012 TRB paper submittal

Title: Variability and seasonality of active transportation in USA: evidence from the 2001 NHTS

Author(s): Yong Yang**,** Ana V Diez Roux, and C. Raymond Bingham

Publication date: September 14, 2011

Abstract:

Background

Active transportation including walking and bicycling is an important source of physical activity. Promoting active transportation is a challenge for the fields of public health and transportation. Descriptive data on the predictors of active transportation, including seasonal patterns in active transportation in the US as a whole, is needed to inform interventions and policies.

Methods

This study analyzed monthly variation in active transportation for the US using National Household Travel Survey 2001 data. For each age group of children, adolescents, adults and elderly, logistic regression models were used to identify predictors of the odds of active transportation including gender, race/ethnicity, household income level, geographical region, urbanization level, and month.

Results

The probability of engaging in active transportation was generally higher for children and adolescents than for adults and the elderly. Active transportation was greater in the lower income groups (except in the elderly), was lower in the South than in other regions of the US, and was greater in areas with higher urbanization. The percentage of people using active transportation exhibited clear seasonal patterns: high during summer months and low during winter months. Children and adolescents were more sensitive to seasonality than other age groups. Women, non-Caucasians, persons with lower household income, who resided in the Midwest or Northeast, and who lived in more urbanized areas had greater seasonal variation.

Conclusions

These descriptive results suggest that interventions and policies that target the promotion of active transportation need to consider socio-demographic factors and seasonality.

Subject areas and index terms: Active transportation; seasonality; NHTS

Availability: International Journal of Behavioral Nutrition and Physical Activity http://www.ijbnpa.org/content/8/1/96/abstract

Title: Active Travel in Germany and the U.S. Contributions of Daily Walking and Cycling to Physical Activity

Author(s): Ralph Buehler, PhD, John Pucher, PhD, Dafna Merom, PhD, Adrian Bauman, PhD

Publication date: 2011

Abstract:

Background: Travel surveys in Europe and the U.S. show large differences in the proportion of walking and cycling trips without considering implications for physical activity.

Purpose: This study estimates differences between Germany and the U.S. over time in population levels of daily walking and cycling at different health-enhancing thresholds across sociodemographic groups.

Methods: Uniquely comparable national travel surveys for the U.S. (NHTS 2001 and 2009) and Germany (MiD 2002 and 2008) were used to calculate the number, duration, and distance of active trips per capita. The population-weighted person and trip files for each survey were merged to calculate population levels of any walking/cycling, walking/cycling 30 minutes/day, and achieving 30 minutes in bouts of at least 10 minutes. Logistic regression models controlled for the influence of socioeconomic variables. Data were analyzed in 2010.

Results: Between 2001/2002 and 2008/2009, the proportion of "any walking" was stable in the U.S. (18.5%) but increased in Germany from 36.5% to 42.3%. The proportion of "any cycling" in the U.S. remained at 1.8% but increased in Germany from 12.1% to 14.1%. In 2008/2009, the proportion of "30 minutes of walking and cycling" in Germany was 21.2% and 7.8%, respectively, compared to 7.7% and 1.0% in the U.S. There is much less variation in active travel among socioeconomic groups in Germany than in the U.S. German women, children, and seniors walk and cycle much more than their counterparts in the U.S.

Conclusions: The high prevalence of active travel in Germany shows that daily walking and cycling can help a large proportion of the population to meet recommended physical activity levels.

Subject areas and index terms: active travel, walking, cycling, Germany

Availability: American Journal of Preventive Medicine 2011; 41(3):241–250)

Title: Walking and Cycling in the United States, 2001–2009: Evidence From the National Household Travel Surveys

Author(s): John Pucher, PhD, Ralph Buehler, PhD, Dafna Merom, PhD, and Adrian Bauman, PhD

Publication date: May 5, 2011

Abstract:

Objectives. To assess changes in walking and cycling in the United States between 2001 and 2009.

Methods. The 2001 and 2009 National Household Travel Surveys were used to compute the frequency, duration, and distance of walking and cycling per capita. The population-weighted person and trip files were merged to calculate the prevalence of any walking and cycling and of walking and cycling at least 30 minutes per day.

Results. The average American made 17 more walk trips in 2009 than in 2001, covering 9 more miles per year, compared with only 2 more bike trips, and 5 more miles cycling. At the population level, the prevalence of "any walking" remained unchanged (about 18%), whereas walking at least 30 minutes per day increased from 7.2% to 8.0%. The prevalence of "any cycling" and cycling 30 minutes per day remained unchanged (1.7% and 0.9%, respectively).,Active travel declined for women, children, and seniors, but increased among men, the middle aged, employed, well-educated, and persons without a car.

Conclusions. Walking increased slightly, whereas cycling levels stagnated, and the overall prevalence of active travel remained low. Improved infrastructure for walking and cycling must be combined with programs to encourage active travel among more groups, especially children, seniors, and women.

Subject areas and index terms: Walking, cycling, and active travel

Availability: American Journal of Public Health 10.2105/AJPH.2010.300067

ENERGY CONSUMPTION

Title: The Development of a Decision Tool for Greenhouse Gas Emissions Reduction Strategies: The Role of NHTS Data in GreenSTEP Model Development

Author(s): Kelly J. Clifton and Brian J. Gregor

Publication date: July 2011

Abstract: The National Household Travel Survey provides important information for the development of local and regional modeling to support decision making related to climate change and sustainability goals. This paper documents the use of NHTS data in the development of The Greenhouse gas Statewide Transportation Emissions Planning model (GreenSTEP), a model that forecasts estimates of greenhouse gas (GHG) emissions at the county and urbanized area levels. The model was developed in response to an initial request from Oregon's Global Warming Commission and subsequent climate change legislation (OR Senate Bill 1059) mandating the development of a statewide transportation strategy for reducing transportation sector GHG emissions. The model was developed to be sensitive to a broad number of policy variables and other factors that were not addressed in existing models. Moreover, GreenSTEP needed to provide household-level responses to these policy levers while at the same time, providing forecast output for a large number of scenario options within reasonable computer run time. Lacking a local and current source of information about individuals, households, and their vehicle ownership patterns and travel behavior, GreenSTEP made use of the information in the national sample of the 2001 NHTS to estimate several model modules. Specifically, the NHTS data were useful in developing modules of: a) land use characteristics, b) vehicle ownership, c) vehicle use (Daily Vehicle Miles Traveled – DVMT), d) impacts of vehicle travel costs on DVMT, e) lightweight vehicle model (bicycles, mopeds, electric bikes, etc.), and f) vehicle fleet models (type and age). The NHTS data were particularly important for modeling the adoption and usage of (limited-range) electric vehicles, as they enabled estimates of trip length distributions. These modules work in a larger modeling framework to produce fuel consumption and GHG emissions for passenger vehicles, including household vehicles, bus, train and trucks. The paper will highlight the utility of the NHTS data for this modeling framework, the modifications and augmentation necessary, the limitations, and the potential for wider dissemination and use of this tool, given that the initial estimation was done with a national sample. Opportunities for the NHTS to address greenhouse gas emissions in future surveys will also be discussed.

Subject areas and index terms
National Household Travel Survey, greenhouse gas emissions, emissions models

Availability: TRB 2012 paper submittal

Title: Time-dependent plug-in hybrid electric vehicle charging based on national driving patterns and demographics

Author(s): Jarod C. Kelly, Jason S. MacDonald, Gregory A. Keoleian

Publication date: March 3, 2012

Abstract: Plug-in hybrid electric vehicles (PHEVs) are one promising technology for addressing concerns around petroleum consumption, energy security and greenhouse gas emissions. However, there is much uncertainty in the impact that PHEVs can have on energy consumption and related emissions, as they are dependent on vehicle technology, driving patterns, and charging behavior. A methodology is used to simulate PHEV charging and gasoline consumption based on driving pattern data in USDOT's National Household Travel Survey. The method uses information from each trip taken by approximately 170,000 vehicles to track their battery state of charge throughout the day, and to determine the timing and quantity of electricity and gasoline consumption for a fleet of PHEVs. Scenarios were developed to examine the effects of charging location, charging rate, time of charging and battery size. Additionally, demographic information was examined to see how driver and household characteristics influence consumption patterns. Results showed that a compact vehicle with a 10.4 kW h useable battery (approximately a 42 mile [68 km] all electric range) travels between 62.5% and 75.7% on battery electricity, depending on charging scenario. The percent of travel driven electrically (Utility Factor, UF) in a baseline charging scenario increased from 64.3% using 2001 NHTS data to 66.7% using 2009 data. The average UF was 63.5% for males and 72.9% for females and in both cases they are highly sensitive to age. Vehicle charging load profiles across charging scenarios and demographics show a varying effect on summertime peak load, which can be useful for PHEV market segmentation and electric utility planning.

Subject areas and index terms: hybrid electric vehicles, emissions, energy consumption, driving patterns, demographics

Availability: http://www.sciencedirect.com/science/article/pii/S0306261912000931

Title: The Impact of Center City Economic and Cultural Vibrancy on Greenhouse Gas Emissions From Transportation

Author(s): Matthew J. Holian and Matthew E. Kahn

Publication date: February 12, 2012

Abstract: Urban planners and scholars have focused a great deal of attention on understanding the relationship between the built-environment and transportation behavior. However other aspects of the urban environment, including the vibrancy and quality of life of urban areas, have received little attention. This report seeks to close this gap, by analyzing the effect of both land use and urban vibrancy on transportation patterns. Analysis of data from a variety of sources suggests that in addition to the built-environment, the vibrancy of the urban environment also affects transportation behavior. Moreover, vibrancy affects land-use patterns. By integrating objective measures of center city quality of life into transportation choice models, our new statistical results inform public policy. We discuss specific public policy options for reducing greenhouse gas emissions and increasing public transit use.

Subject areas and index terms: Urban transportation (Afn), Exhaust gases (Jfgsge), Land use planning (Epdum) , Public transit (Aet).

Availability: http://www.sjsu.edu/faculty/matthew.holian/vibrancy.pdf

Title: Prediction Performance of Carbon Dioxide (CO2) Emissions Models Incorporating Land Use, Trip, Socioeconomic, and Demographic Characteristics

Author(s): Judith L. Mwakalonge, Judy A. Perkins, and Saidi Siuhi

Publication date: November 2011

Abstract: This study investigated the relationship between CO2 emissions with land use, trip characteristics, socioeconomic, and demographic characteristics for two time-periods (2001 and 2009). A carbon dioxide (CO2) emissions model was formulated and estimated using disaggregate travel data incorporating land use, socioeconomic, and demographic characteristics for both total and five common trip purposes. Further, the study investigated the predictive performance of all models in their estimation data and a different dataset for 2001 models. The study results show that the increase in urbanization reduces CO2 emissions and the increase in population density decreases CO2 emissions. Specifically, on average, urban trips produced relatively less amount of CO2 compared to rural trips. Of all the vehicle types, sport utility and recreational vehicles were found to have higher impact on CO2 emissions than other vehicles. In addition, automobile/car/station wagon were found to have the lowest effect on CO2 emissions compared to other vehicle types. Despite of the increase in vehicle fuel efficiency and use of alternative fuels, the 2001 models were able to explain CO2 emissions in the 2009 dataset satisfactorily.

Subject areas and index terms: carbon dioxide emissions, land use, population density, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: Do Mobility-Based Performance Measures Reflect Emissions Trends?

Author(s): Alexander Y. Bigazzi and Miguel A. Figliozzi

Publication date: January 2012

Abstract: Given the commonly assumed association between traffic congestion and emissions, this paper addresses the question of whether mobility-based performance measures are associated with emissions performance measures. We address two facets of the roadway congestion-emissions relationship by investigating: (a) whether congestion performance measures are good indicators of trends in roadway emissions and (b) what transportation performance measures are better suited to portray macroscopic trends in emissions. In order to answer these research questions we estimate macroscopic transportation and emissions performance measures at metropolitan and corridor levels. Comparing several measures, we calculate the correlation between transportation performance measures and emissions. We also present an analytical framework to understand emissions trends as a function of mobility and travel demand variables. Results show that Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT) are key factors to understanding emissions trends. Mobility measures (such as travel speed and delay) and related congestion measures (such as percent of travel in congestion) are only weakly correlated with emissions.

Subject areas and index terms: performance measures, congestion, emissions, travel demand, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: Optimal Design and Allocation of Electrified Vehicles and Dedicated Charging Infrastructure for Minimum Greenhouse Gas Emissions

Author(s): Elizabeth Traut, Chris Hendrickson, Erica Klampfl, Yimin Liu, and Jeremy J. Michalek

Publication date: January 25, 2011

Abstract: Electrified vehicles, including plug-in hybrid electric vehicles (PHEVs) and battery electric vehicles (BEVs), have the potential to reduce greenhouse gas (GHG) emissions from personal transportation by shifting energy demand from gasoline to electricity. GHG reduction potential depends on vehicle design, adoption, driving and charging patterns, charging infrastructure, and electricity generation mix. We construct an optimization model to study these factors by determining optimal design of conventional vehicles (CVs), hybrid electric vehicles (HEVs), PHEVs, and BEVs and optimal allocation of vehicle designs and charging infrastructure in the fleet for minimum lifecycle GHG emissions over a range of scenarios. We focus on vehicles with similar size and acceleration to a Toyota Prius under urban EPA driving conditions. We find that under today's U.S. average grid mix, the vehicle fleet allocated for minimum GHG emissions includes HEVs and PHEVs with ~30 miles (48 km) of electric range. Allocating only CVs, HEVs, PHEVs, or BEVs will produce 86%, 1%, 0%, or 13+% more life cycle GHG emissions, respectively. Unlike BEVs, PHEVs do consume some gasoline; however, PHEVs can power a large portion of vehicle miles on electrical energy while accommodating infrequent long trips without need for a large battery pack, with its corresponding production and weight implications. Availability of workplace charging for 90% of vehicles optimistically reduces optimized GHG emissions by 0.5%. Under decarbonized grid scenarios, larger battery packs are more competitive and reduce life cycle GHG emissions significantly. Future work will relax modeling assumptions and address life cycle cost and cost-effectiveness of GHG reductions.

Subject areas and index terms
Environment, Energy Consumption, Electrified vehicles, Electric vehicles, Plug-in hybrid vehicles, Hybrid vehicles, United States, 2001 National Household Travel Survey, Greenhouse gas emissions, Vehicle charging infrastructure

Availability: TRB-11-3484 in the Transportation Research Board 90th Annual Meeting Compendium of Papers DVD or Transportation Research Board 90th Annual Meeting Online: http://amonline.trb.org/

Title: Estimating and Modeling Soak Time Distributions with the 2009 National Household Travel Survey Data

Author(s): Lei Zhang, Xiaojie Cong, Xiang He, and Chenfeng Xiong

Publication date: July 5, 2011

Abstract: Vehicle soak time is defined as the duration of time a vehicle's engine is at rest prior to being started. The distribution of soak time is a key input for mobile-source emission models, such as the EPA MOVES. This paper estimates various soak time distributions, and develops statistical models of those distributions. The data source is the National Household Travel Surveys (NHTS) in 2009, which contains information about person and vehicle trips in a 24-hour period for all sampled households. When the weights are introduced, the total vehicle trips for the national level are 467,505,568. We first develop a comprehensive methodology for extracting vehicle soak time distribution information from NHTS data files including the day trip file, person file, vehicle file and household file. The obtained soak time information is then employed in the development of a series of statistical models that can directly provide inputs to mobile-source emission models. Vehicle emission rates are heavily influenced by soak time distributions due to their impact on vehicle start emissions and evaporative emissions. Since the distribution and duration of soak periods preceding the first vehicle start of day is quite different from those of soak periods preceding non-first starts, we analyze these two types of soak period with separate models. Results show that time of day, day of week, trip purpose, vehicle type, gas price, metropolitan statistical area size and several interaction variables have significant impacts on soak time durations.

A model analyzing the start mode fraction is built with logistic regression methods. The model rho-squared is 0.88 based on more than 0.41 million observations. Again, time of day, trip purpose, day of week and their interactions are found to be the main factors explaining the differences between soak periods prior to first start and those of non-first starts. Following the start mode fraction model, a statistical model on non-first start soak time durations is also established. After fitting the data with several parametric distributions, the generalized Gamma model is chosen for its superior goodness of fit. This model enables emission modelers and analysts to predict soak time distributions based on several demographic, socioeconomic and travel behavior characteristics. The impact of fuel price on soak time is also considered in the model.

Subject areas and index terms: soak time, vehicle emissions, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: Assessing Energy Impact of Plug-In Hybrid Electric Vehicles: Significance of Daily Distance Variation over Time and Among Drivers

Author(s): Zhenhong Lin and David L. Greene

Publication date: February 6, 2012

Abstract: Accurate assessment of the impact of plug-in hybrid electric vehicles (PHEVs) on petroleum and electricity consumption is a necessary step toward effective policies. Variations in daily vehicle miles traveled (VMT) over time and among drivers affect PHEV energy impact, but the significance is not well understood. This paper uses a graphical illustration, a mathematical derivation, and an empirical study to examine the cause and significance of such an effect. The first two methods reveal that ignoring daily variation in VMT always causes underestimation of petroleum consumption and overestimation of electricity consumption by PHEVs; both biases increase as the assumed PHEV charge-depleting (CD) range moves closer to the average daily VMT. The empirical analysis based on national travel survey data shows that the assumption of uniform daily VMT over time and among drivers causes nearly 68% underestimation of expected petroleum use and nearly 48% overestimation of expected electricity use by PHEVs with a 40-mi CD range (PHEV40s). Also for PHEV40s, consideration of daily variation in VMT over time but not among drivers—similar to the way the utility factor curve is derived in SAE Standard SAE J2841—causes underestimation of expected petroleum use by more than 24% and overestimation of expected electricity use by about 17%. Underestimation of petroleum use and overestimation of electricity use increase with larger-battery PHEVs.

Subject areas and index terms: plug-in hybrid electric vehicles, PHEVs, VMT, electricity consumption, petroleum consumption

Availability: Transportation Research Record: Journal of the Transportation Research Board, No. 2252, Transportation Research Board of the National Academies, Washington, D.C., 2011, pp. 99–106. DOI: 10.3141/2252-13 http://trb.metapress.com/content/0215331762j34028/

Title: The Vermont Transportation Energy Report

Author(s): Justine Sears and Karen Glitman

Publication date: August 2011

Abstract: N/A

Subject areas and index terms: transportation energy, policy, Vermont, travel behavior, vehicle expenditures

Availability: University of Vermont Transportation Research Center, UVM TRC Report #11-007
http://www.uvm.edu/~transctr/research/trc_reports/UVM-TRC-11-007.pdf

Title: The Impact of Residential Density on Vehicle Usage and Fuel Consumption: Evidence from National Samples

Author(s): Jinwon Kim and David Brownstone

Publication date: April 23, 2012

Abstract: This paper investigates the impact of residential density on household vehicle usage and fuel consumption. We estimate a simultaneous equations system to account for the potential residential self-selection problem. While most previous studies focus on a specific region, this paper uses national samples from the 2001 National Household Travel Survey. The estimation results indicate that residential density has a statistically significant but economically modest influence on vehicle usage, which is similar to that in previous studies. However, the joint effect of the contextual density measure (density in the context of its surrounding area) and residential density on vehicle usage is quantitatively larger than the sole effect of residential density. Moving a household from a suburban to an urban area reduces household annual mileage by 18%. We also find that a lower neighborhood residential density induces consumer choices toward less fuel-efficient vehicles, which confirms the finding in Brownstone and Golob (2009).

Subject areas and index terms: Household vehicle choice, simultaneous equations systems, residential density

Availability: University of California, Irvine
http://sites.uci.edu/jinwonkim/files/2012/05/paper_0423.pdf

Title: The Impact Of Center City Economic And Cultural Vibrancy On Greenhouse Gas Emissions From Transportation

Author(s): Matthew J. Holian, Ph.D. and Matthew E. Kahn, Ph.D.

Publication date: March 2012

Abstract: Urban planners and scholars have focused a great deal of attention on understanding the relationship between the built environment and transportation behavior. However, other aspects of the urban environment – including the vibrancy and quality of life in urban areas – have received little attention. This report seeks to close this gap by analyzing the effects of both land-use and urban vibrancy on transportation patterns. Analysis of data from a variety of sources suggests that in addition to the built-environment, the vibrancy of the urban environment also affects transportation behavior. Moreover, vibrancy affects land-use patterns. By integrating objective measures of center-city quality of life into transportation choice models, our new statistical results inform public policy. We discuss specific public policy options for reducing greenhouse gas emissions and increasing public transit use.

Subject areas and index terms: Urban transportation, Exhaust gases, Land-use planning, Public transit.

Availability: Mineta Transportation Institute CA-MTI-12-1002

GAS TAX AND FEE SCENARIOS

Title: Equity Evaluation of Vehicle Miles Traveled Fees in Texas

Author(s): Lisa Larsen, Mark Burris, David Pearson, Patricia Ellis

Publication date: November 14, 2011

Abstract: The Texas state gas tax has been 20.0 cents per gallon since 1991, and the federal gas tax has been 18.4 cents per gallon since 1993. The gas tax is not only stagnant, but depreciating in value due to inflation. Thus, damage is being done to the infrastructure but the money needed to maintain and improve roadways is not being adequately generated. One proposed alternative to the gas tax is the creation of a vehicle miles traveled (VMT) fee; with equity being a crucial issue to consider. This research used Texas data from the 2009 National Household Travel Survey (NHTS) to consider the equity impacts surrounding four VMT fee scenarios. Data were filtered and weighted to reflect results representative of Texas vehicle-owning households in 2008. Each scenario was run both statically and dynamically under the assumption that the VMT fee would replace the state gas tax. Based on quantitative measures, the vertical equity of all of the proposed VMT fee scenarios and the current state gas tax were very similar. In terms of horizontal equity, Scenario 4 was designed to be inherently horizontally equitable; charging different rates for travel on urban roadways and rural roadways corresponding to funding needs associated with that roadway type. Scenario 3, which favors fuel-efficient vehicles, was found to be the least horizontally equitable scenario—causing rural households to contribute the highest percentage of revenue of all scenarios considered. All other scenarios were found to be more horizontally equitable than the current state gas tax.

Subject areas and index terms: VMT fee, gas tax

Availability: 2012 TRB paper submittal

POLICY AND MOBILITY

Title: Policy and Design Considerations for Accommodating Low-Speed Vehicles and Golf Carts in Community Transportation Networks

Author: Jana Lynott, Amanda Taylor Poncy, Hannah Twaddell

Publication Date: September 2011

Abstract: N/A

Subject areas and index terms: low-speed vehicles, golf carts

Availability: AARP Public Policy Institute

http://www.aarp.org/home-garden/transportation/info-09-2011/insight-54.html

PUBLIC TRANSPORTATION

Title: An Assessment of Public Transportation Market Using NHTS Data

Author(s): Xuehao Chu

Publication date: March 16, 2012

This study assesses a range of public transit markets for Florida and the U.S. as a whole. Data from the 2009 National Household Travel Survey are used. The public transit markets are defined with trip purpose and seven personal, household, and travel characteristics of persons in these transit markets, including driver status, immigration status, existence of medical conditions that make it difficult to travel out of the home, household income, vehicle availability, race and ethnicity, and monthly frequency of transit use. Based on an approach of cross tabulations, this study assesses these transit markets from five perspectives:

1. Market Size - how the overall transit market is distributed across these transit sub-markets.

2. Modal Share - how people within each transit market travel using various modes, including transit.

3. Attitudes - how people within each transit market feel about a set of transportation issues.

4. Socio-Demographics - personal, household, location, and travel characteristics of transit markets.

5. Trip Characteristics - transit-specific and general trip characteristics of transit markets.

The assessment for Florida is limited to the first three perspectives due to sample size issues. The results presented are useful to operating agencies for strategic planning and to other government bodies for developing policies and funding programs for improving mobility of those who are transportation and economically disadvantaged and for improving the transportation system in general.

Subject areas and index terms: Public transit, National Household Travel Survey, Person-trips, Modes, Trip Purposes

Availability: National Center for Transit Research - **http://www.nctr.usf.edu/2012/03/an-assessment-of-public-transportation-markets-using-nhts-data/**

SPECIAL POPULATIONS

Title: Senior population's transportation preferences to access health care services– Insights from the 2009 National Household Travel Survey (NHTS)

Author(s): Xiaohong Pan

Publication date: November 2011

Abstract: Population aging is now progressing rapidly in the U.S., which brings significant social and economic challenges to each and every stakeholder in the society. As seniors age, their health care needs surge and they more likely need alternative means of transportation. Considering the increasing burden of population aging that lays on the U.S. health care system, it is important to improve seniors' transportation access to health care services. However, before planners and policy makers can provide any appropriate and effective assistance, it is crucial to first understand seniors' transportation preferences to access health care services. Utilizing the most recent National Household Travel Survey (2009 NHTS) data, this paper examines how different socio-demographic, spatial, and transportation attributes affect seniors' transportation choices to access health care services. The study results indicate that, many seniors are still driving, and they prefer auto travel than public transportation; increasing density alone might not be a powerful and effective strategy to change seniors' travel mode choices, at least not for the current generation; mode choice of health care trips are inelastic to some transportation attributes, such as travel distance. In addition, the results suggest that, although improving traditional public transportation is important, helping seniors, especially those live in suburban and rural area, to travel using their preferred means is essential as well.

Subject areas and index terms: Senior Population, Travel Behavior, Health Care Services, National Household Travel Survey (NHTS)

Availability: 2012 TRB paper submittal # 12-3251

Title: Integrating Parental Attitudes in Research on Children's Active School Commuting: Evidence from a Community School Travel Survey

Author(s): Yizhao Yang, and Ezra Markowitz

Publication date: N/A

Abstract: Current active school travel research emphasizes travel distance and neighborhood walkability as major environmental conditions affecting the occurrences of children walking or biking to school. The impacts of how parental travel attitudes on children's school travel behavior remain understudied. This paper outlines a conceptual framework that incorporates the relationships of attitudes, environment conditions, and children's walking or biking to school. The framework recognizes the predictive power that attitudinal factors have for children's walking or biking to school; it also highlights the moderating effects of parental travel attitudes on the predictive power of some environment conditions. Using data (1197 cases) from a school travel survey conducted in a mid-sized school district in Oregon, this paper reports that parental attitudes toward walking/biking to school and car-use are significant explanatory variables in models predicting occurrence of children walking or biking to school when important environmental variables are controlled for. The analysis also reveals that important built environment variables – school-travel distance and neighborhood walkability – exhibit varying levels of impacts on the probability of children walking or biking to school when parents demonstrate different attitudes toward active school commuting and car-use. The paper discusses implications of the research findings for the challenges facing Safe Routes to School Programs, and explores approaches that can make these programs more effective.

Subject areas and index terms: Active School Commuting, Travel Attitude, Safe Routes to School Program, Built Environment, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: Immobility Levels and Mobility Preferences among Elderly in the United States: Evidence from the 2009 National Household Travel Survey (NHTS)

Author(s): Sujan Sikder and Abdul Rawoof Pinjari (corresponding author)

Publication date: N/A

Abstract: Transportation mobility is critically important to the well-being of the elderly population. Using data from the 2009 National Household Travel Survey, this paper proposes a metric to measure immobility among elderly over different time frames. Specifically, short-term immobility is defined as immobility over a single day, while long-term immobility refers to immobility over a week, and medium-term immobility lies in between. In addition, long-term immobile elderly are divided into two mobility-preference groups based on whether they prefer going out of home or not. Using this immobility metric, and respondent-stated mobility preferences, descriptive analysis and discrete choice models are used to analyze the correlates of immobility among American elderly. African American elderly are found to be more likely to be long-term immobile compared to those from other racial groups. Such racial differences are not readily apparent in immobility over shorter time frames. This result explains why most previous studies did not find any racial differences in elderly mobility - due to shorter time frames of analysis. Presence of another elderly companion in the household is found to have a significant positive influence on a persons' mobility. Medical conditions may impose physical constraints on the ability to travel but do not seem to curb the desire for mobility among elderly. However, in ability to drive is associated with a strong preference against going out of home, suggesting that auto-centric land-use transportation system can potentially curb the desire of non-driving elderly to travel out of home.

Subject areas and index terms: mobility, immobility levels, elderly mobility, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: U.S. School Travel 2009: An Assessment of Trends

Author(s): McDonald, N., A. Brown, L. Marchetti, and M. Pedroso

Publication Date: 2011

Abstract:

Background

The White House Task Force on Childhood Obesity has set a goal of increasing walking and biking to school by 50% within 5 years. Meeting the goal requires a detailed understanding of the current patterns of school travel.

Purpose

To document nationally representative estimates of the amount of school travel and the modes used to access school in 2009 and compare these levels with 1969, 1995, and 2001.

Methods

The National Household Travel Survey collected data on the travel patterns of 150,147 households in 2008 and 2009. Analyses, conducted in 2010, documented the time, vehicle miles traveled, and modes used by American students to reach school. A binary logit model assessed the influence of trip, child, and household characteristics on the decision to walk to school.

Results

In 2009, 12.7% of K–8 students usually walked or biked to school compared with 47.7% in 1969. Rates of walking and biking to school were higher on the trip home from school in each survey year. During the morning peak period, school travel accounted for 5%–7% of vehicle miles traveled in 2009 and 10%–14% of all private vehicles on the road.

Conclusions

There have been sharp increases in driving children to school since 1969 and corresponding decreases in walking to school. This increase is particularly evident in the number of vehicle trips generated by parents dropping children at school and teens driving themselves. The NHTS survey provides a unique opportunity to monitor these trends in the future.

Subject areas and index terms: travel behavior, walk to school, bike to school

Availability: McDonald, N., A. Brown, L. Marchetti, M. Pedroso. 2011. U.S. School Travel 2009: An Assessment of Trends. *American Journal of Preventive Medicine* 41(2): 146-151.

http://dx.doi.org/10.1016/j.amepre.2011.04.006

Title: Automobile Ownership and Travel of the Poor: Evidence from the 2009 National Household Travel Survey

Author(s): Evelyn Blumenberg (Corresponding Author), and Gregory Pierce

Publication date: November 14, 2011

Abstract: Income—or the lack of it—influences household transportation decisions and the ways in which individuals travel. Low-income households are less likely to own cars and more likely to travel by modes other than the automobile. Less is known, however, about the specific determinants of travel among the poor, which is the purpose of this analysis. In this study we, first, use data from the 2009 National Household Travel Survey to examine the relationship between income and automobile ownership and the role of automobile ownership in explaining personal miles traveled. We then examine whether these determinants vary by income group. We find that low-income adults rapidly convert rising income into additional mobility, at faster rates than for higher-income adults. Further, automobile ownership increases personal miles traveled for all adults; however, it is particularly influential in increasing the travel of low-income adults. Households accrue greater marginal benefits by moving from zero to one vehicle rather than by purchasing additional vehicles when they already own a vehicle. The findings underscore the importance of automobile ownership to the mobility of low-income households and suggest an important role for policy in facilitating low-income auto ownership.

Subject areas and index terms: automobile ownership, person miles traveled, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: Investigating the Impacts of Policy on School Travel

Author(s): Jessica Ann Van Ristell

Publication date: November 2011

Abstract: Millions of children travel to and from school each day as part of their daily routine. A large percentage of children make this journey by car, and the numbers are steadily rising and this is leading to many environmental and health implications for children.

The current economic climate has persuaded the British Government to look again at policies relating to all school travel funding to highlight areas where savings and cuts can be made. This is interesting because the home-to-school transport provision policy has been in place since the Education Act 1944 and this policy costs local authorities in England over £1 billion a year. Therefore, the focus of this thesis is threefold.

Firstly, it seeks to determine the main issues within school travel and reports on the views of current professionals in the school travel industry. Structured in-depth interviews were carried out with 16 UK and US school travel experts. The questions focused on the current stakeholders of school travel, issues regarding school travel, bus use in school travel, and the challenges faced by transport planners to ensure school pupils have a safe and pleasant journey to school. Secondly this thesis quantifies the traffic and environmental impacts of the school choice policy in England. It achieves this by analysing School Census data from 2009 from the Department for Education. Multinomial logit modelling and mixed multinomial logit modelling are used to illustrate the current travel behaviour of English children in their journey to school and examine how there can be a significant reduction in vehicle miles travelled, CO2 emissions and fuel consumption if the 'school choice' policy is removed. The results suggest that if all children attended their nearest school, this would result in reductions in their personal mobility, vehicle miles travelled and CO2 emissions.

Finally, this thesis examines the policies relating to the funding criteria of home-to-school public school transport provision. Specifically, the paper employs a multilevel modelling technique to develop a series of relationships between bus usage by school and the level of spending by local education authorities on home-to-school bus travel provision while controlling for other factors such as school quality, land-use patterns and various proxies for household incomes. The results suggest that there is a significant effect of funding on the total school-level bus passenger mileage for primary (aged less than 11), secondary (aged 11 to 16) and Post 16 schools.

Subject area and index terms: school travel, travel behavior

Availability:
http://www.staff.lboro.ac.uk/~cvmpe/img/Jessica_van_Ristell_thesis_final_version.pdf

Title: Travel by University Students in Virginia. Is This Travel Different from Travel by the General Population?

Author(s): Asad Khattak, Xin Wang, Sanghoon Son, Paul Agnello

Publication date: November 2011

Abstract: To improve regional travel demand models, transportation engineers and planners want to represent subpopulations appropriately. A key segment of the population is university students, and their behavior is neither well understood nor well represented in travel demand models. Furthermore, universities provide a unique context for behavioral research because they are livable, are friendly to alternative travel modes, have a higher density than other contexts, and offer mixed travel modes. This study collected and analyzed data on the travel behavior of university students. With the use of an Internet-based survey instrument, the study collected data on travel behavior, sociodemographics, and context variables at four major universities in Virginia. This paper provides information about the design and implementation of the survey, the instrument structure, and a descriptive analysis of students' personal and travel characteristics. The results indicated that the sociodemographics and travel behavior of university students were different from those of the general population. Moreover, differences in travel behavior were found between students living on campus and students living off campus and between students attending urban campuses and those attending suburban campuses. The insights gained from this study serve as a basis for further such surveys and help provide an understanding of travel behavior in and around university campuses.

Subject areas and index terms: school travel, travel behavior, Virginia, socio-demographics, university students, urban campuses

Availability: http://trb.metapress.com/content/j5x85k643q87r0m1/

Title: Rural Veteran Access to Healthcare Services: Investigating the Role of Information and Communication Technologies in Overcoming Spatial Barriers

Author(s): Benjamin L. Schooley, MBA, PhD; Thomas A. Horan, PhD; Pamela W. Lee, PhD; and Priscilla A. West, MPH

Publication date: N/A

Abstract: This multimethod pilot study examined patient and practitioner perspectives on the influence of spatial barriers to healthcare access and the role of health information technology in overcoming these barriers. The study included a survey administered to patients attending a Department of Veterans Affairs (VA) health visit, and a focus group with VA care providers.

Descriptive results and focus group findings are presented. Spatial distance is a significant factor for many rural veterans when seeking healthcare. For this sample of rural veterans, a range of telephone, computer, and Internet technologies may become more important for accessing care as Internet access becomes more ubiquitous and as younger veterans begin using the VA health system. The focus group highlighted the negative impact of distance, economic considerations, geographic barriers, and specific medical conditions on access to care. Lack of adequate technology infrastructure was seen as an obstacle to utilization. This study discusses the need to consider distance, travel modes, age, and information technology infrastructure and adoption when designing health information technology to care for rural patients.

Subject areas and index terms: rural, veterans, technology, healthcare, transportation, access

Availability: Perspectives in Health Information Management (Spring 2010): 1-20

Title: Has The Time Come For An Older Driver Vehicle?

Author(s): David W. Eby and Lisa J. Molnar

Publication date: February 2012

Abstract: The population of the world is growing older. As people grow older they are more likely to experience declines that can make operating a personal automobile more difficult. Once driving abilities begin to decline, older adults are often faced with decreased mobility. Due to the preference for and pervasiveness of the personal automobile for satisfying mobility needs, there is a global necessity to keep older adults driving for as long as they can safely do so. In this report we explore the question: Has the time come for an older driver vehicle? Great gains in safe mobility could be made by designing automobiles that take into account, and help overcome, some of the deficits in abilities common in older people. The report begins by providing a background and rationale for an older driver vehicle, including discussions of relevant trends, age-related declines in functional abilities, and the adverse consequences of decreased mobility. The next section discusses research and issues related to vehicle design and advanced technology with respect to older drivers. The next section explores crashworthiness issues and the unique requirements for older adults. The following section discusses the many issues related to marketing a vehicle that has been designed for older drivers. The report concludes that there is a clear global opportunity to improve the safety, mobility, and quality of life of older adults by designing vehicles and vehicle technologies that help overcome common age-related deficits. The marketing of these vehicles to older consumers, however, will be challenging and will likely require further market research. The development of vehicle design features, new automotive technologies, and crashworthiness systems in the future should be guided by both knowledge of the effects of frailty/fragility of the elderly on crash outcomes, as well as knowledge of common drivingrelated declines in psychomotor, visual, and cognitive abilities. Design strategies that allow for some degree of customization may be particularly beneficial. It is clear that training and education efforts for using new vehicle features will need to be improved.

Subject areas and index terms: older adults, vehicle design, crashworthiness, marketing

Availability: University of Michigan, Sustainable Worldwide Transportation - Report No. UMTRI-2012-5

Title: Travel Behavior of Hispanic Immigrants of Southern California – Impact Analysis of Future Growth based on Parcel-Based Sketch Planning Model

Author(s): Hsi-Hwa Hu, Ph.D. and Simon Choi, Ph.D.

Publication date: October 2011

Abstract: N/A

Subject areas and index terms: immigrants, Hispanic immigrants, 2009 National Household Travel Survey, travel behavior, Southern California

Availability: http://onlinepubs.trb.org/onlinepubs/conferences/2012/4thITM/Papers-A/0117-000117.pdf

SURVEY DESIGN, METHODOLOGY, AND OTHER APPLICATIONS

Title: An Evaluation of Key Design Elements of the Front Range Travel Counts Long Distance Survey

Author(s): Stacey Bricka and Erik Sabina

Publication date: November 10, 2011

Abstract: This paper documents an evaluation of two key design aspects of a long distance survey conducted as part of the 2009-2012 Front Range Travel Counts effort. The Front Range Travel Counts project is a cooperative effort across four adjacent Colorado metropolitan regions to document travel behavior within and across regions. The effort included household, commercial vehicle, and external station surveys.

Consistent with state-of-the-practice in the U.S., the long distance survey was administered as a supplement to the household survey sample. Respondents were asked to record all trips made to a location 50-miles or more from home during the two-week period prior to the 24-hour travel day. Households reporting no long distance travel were asked to report details of their most recent long distance trip, regardless of when it occurred.

The analysis in this paper focuses on two design aspects: (1) the selection of a 2-week recall period, with the request for a "most recent trip" from those who reported zero long distance trips and (2) the definition of a long distance trip. The results suggest that future surveys should use a longer recall period. In addition, the practice of asking for "most recent trip" from only respondents who reported zero long distance trips within the recall travel period should be expanded to ask that question of all respondents. Finally, the definition as used resulted in the capture of shorter-distance trips, suggesting refinement is needed.

Subject areas and index terms: National Household Travel Survey, long distance survey

Availability: Submitted to 2012 TRB for presentation and consideration for publication. Paper # 12-3096

Title: National Household Travel Survey Add-On Program: Experience of Stakeholders and Best Practices for Maximizing Program Benefits

Author(s): Stephanie S. Ivey, (Corresponding Author), Daniel A. Badoe, Stephen Edwards

Publication date: November 1, 2011

Abstract: The National Household Travel Survey (NHTS) is conducted by the Federal Highway Administration (FHWA) every 5 to 7 years to determine the travel characteristics of the American public. In 1990, the FHWA began offering the add-on program, which allows State Departments of Transportation (DOT) and Metropolitan Planning Organizations (MPO) to purchase additional sample data for their local area. In the 2009 NHTS, Tennessee Department of Transportation (TDOT) purchased add-on sample data for the state that will be used by both TDOT and MPOs in Tennessee. To derive the most benefit from the data, TDOT sponsored a study to determine how add-on samples have been used by previous add-on program participants and lessons learned in these applications, and to identify best practices for maximizing program benefits. A literature review along with Internet and phone surveys were used to ascertain this information. The major findings of the study include, first, add-on participants find the program to be a cost-effective way of obtaining data that is consistent at the local, state, and national levels. Second, the data have been used in a wide variety of transportation planning applications. Third, there have been challenges, but the majority can be addressed through greater communication between add-on participants and FHWA, particularly during the survey planning phase. Finally, a set of best practices for improving the add-on experience is outlined.

Subject areas and index terms: survey methodology, add-on sample data, best practices, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: Using GPS Data Collected in Households Travel Surveys to Assess Physical Activity

Author(s): Michelle Lee, Anthony Fucci, Paul Lorenc, and William Bachman

Publication date: November 2011

Abstract: Transportation planners have an increasing interest in identifying transportation investment solutions that encourage healthy living. Once the domain of health professionals, physical activity studies are being considered by transportation agencies. The use of Global Positioning System (GPS) data collection in tandem with traditional travel survey methods and physical activity studies has become commonplace in each discipline over the past decade as researchers and practitioners seek technology solutions to address issues associated with increasing respondent burden and decreasing response rates. GPS technology used as a passive, objective measure of both travel and physical activity results in the collection of highly accurate, incredibly detailed data that could never be supported by self-report survey methods. The level of detail provided by GPS, while incapable of identifying some instances of physical activity, provides an accurate and useful assessment of active transport. Agencies wishing to encourage healthy living can use research results regarding active transport to evaluate the effectiveness of certain transportation investments. To demonstrate, GPS travel data from the Massachusetts Statewide Travel Survey are used to identify and evaluate segments of active transport. The GPS travel data is then used to evaluate whether the presence of transit options near home, work and/or school locations have a positive impact on health.

Subject areas and index terms: data collection, GPS, household travel surveys, survey methods, physical activity, National Household Travel Survey

Availability: 2012 TRB paper submittal #12-3805

Title: Studying Patterns of Use Transport Modes Through Data Mining: An Application to the US National Household Travel Survey Dataset

Author(s): Marco Diana

Publication date: November 8, 2011

Abstract: Travel-related data collection activities require high amounts of financial and human resources to be successfully carried out. In a context where the available resources are scarce, there is a need to exploit the information that is hidden in these dataset, to increase their added value and gain support among decision makers not to discontinue such efforts. The present research assesses the use of a data mining technique, Association Analysis, to better understand the patterns of mode uses from the 2009 U.S. National Household Travel Survey. Only variables related to self reported levels of use of the different transportation means are considered, along with those useful to the socioeconomic characterization of the respondents. It has been possible to mine association rules that potentially show in economic terms a substitution effect between cars and public transportation, whereas such effect was not observed between public transportation and non-motorized modes (bike, feet). This is a policy relevant finding, since transit marketing should be targeted to car drivers rather than to bikers or walkers to really improve the environmental performances of any transportation system. Modal diversion from car to transit is seldom observed in practice, given the competitive advantage of private modes that has been extensively discussed in the literature. However, if we control for such factor, then our results suggest that modal diversion should mainly occur from cars to transit, rather than from non-motorized modes to transit.

Subject areas and index terms: Association rules, frequent item sets, data mining, mode levels of use, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: Effectiveness of Bayesian Updating Attributes in Data Transferability Applications

Author(s): Taha H. Rashidi (Corresponding Author), Joshua Auld, Abolfazl (Kouros) Mohammadian

Publication date: NA

Abstract: This paper presents the findings from an analysis of several Bayesian updating scenarios in the context of data transferability. Bayesian updating has been recognized as having great potential for use in the transportation field, especially in the simulation of travel demand and other transportation-related data. For local areas where comprehensive data collection is too costly and infeasible, Bayesian updating can be used to synthesize travel demand data in a process generally referred to as data transferability. Bayesian updating has been occasionally employed for transferring travel data; however, various aspects and disadvantages of its use have been insufficiently studied. This work addresses some issues regarding Bayesian updating techniques in data transferability, including a comparison of the use of conjugate and nonconjugate formulations in the updating models, their relative effectiveness, and the impacts of the quality of the prior information on the final results. The study shows that in general, updating small local samples of travel attribute data with prior information from national data sources provides an improved estimate of local travel attributes when compared to using the local sample only. However, it was found in this study that the inclusion of all the available historical data in the prior distributions does not necessarily improve the quality of the updating results. Therefore, a careful analysis of the applicability of the prior information to the desired context is necessary when using a Bayesian updating formulation. The National Household Travel Survey 2001 (NHTS) and the Nationwide Personal Transportation Survey 1995 (NPTS) are utilized for the demonstration exercises in this study.

Subject areas and index terms: Bayesian updating, Conjugate distributions, Non-conjugate distributions, Informative prior distribution, National Household Travel Survey

Availability: 2012 TRB presentation and paper submittal

Title: Are Cell Phones Samples Needed for Studies of Walking Activity?

Author(s): Ugo Lachapelle, Marc D. Weiner, and Robert B. Noland

Publication date: N/A

Abstract: The growth in cell-phone-only households represents a challenge for the collection of survey data. Cell phone-only households have distinct socio-demographic characteristics, which may result in different travel behavior. To explore those differences, as well to investigate the impact of including a cell phone component in active transportation research, a representative sample of New Jersey households was surveyed with a random-digit dialing survey that included 1,200 completed interviews (800 based on a statewide landline sample, 400 from a landline oversample of Jersey City) and 311 statewide cell-phone interviews, of which 80 were cell-phone-only respondents. The survey explored walking behavior and perceived characteristics of the pedestrian environment. Socio-demographic characteristics, the frequency of walking and home location characteristics are compared using Chi-square tests of significance between sample pairs as well as multivariate analysis (ordered probit). Cell-phone-only respondents were typically younger and poorer, with a greater proportion of renters, carless households and minorities. It was found that cell-only households walked more frequently, but this was due to their distinct socio-demographic characteristics, not their cell phone use *per se*. The implication for any analysis of rates or trends in walking (and probably other travel behavior) is that cell-only households must be included via cell-phone sample supplementing a landline sample. However, multivariate analysis of the correlates of walking may not be overly biased if socio-demographics relevant to cell-phone only respondents are collected and included in analysis.

Subject areas and index terms: survey; cell phones; mobile phones; wireless; random digit dial; landlines; physical activity; travel; active transportation; demographics.

Availability: 2012 TRB paper submittal

Title: An Efficient Automatic Approach for Variable Selection to Visualize 2009 National Household Travel Survey Data

Author(s): Qifeng Lu, Bingsong Fang, and Xiaoli Han

Publication date: November 15, 2011

Abstract: To maximize the utility and relevance of the 2009 National Household Travel Survey data program to the user community, a geospatial data visualization tool is being developed at Federal Highway Administration to provide support in data dissemination reporting for easy access to indicators of travel behavior, or measure variables. 20 key measure variables are manually selected with domain knowledge. The performance of such a measure variable is affected by a set of relevant variables representing the characteristics of traveling persons, their households, and their vehicles in the survey. Due to the large number of variables and significant amount of data, it is extremely difficult to allow users to conveniently understand and capture the key relevant variables to these measure variables. Therefore, it is necessary to adopt an automatic and efficient approach to effectively select key variables based on their importance or impacts to the corresponding measure variable, and present these key relevant variables in the visualization tool for users to explore the impacts of these variables to the corresponding measure variable. This paper introduces the Information Gain method from machine learning field into transportation field to automatically and efficiently select key relevant variables for a given measure variable. Major findings through the application of Information Gain are intuitive and consistent with domain knowledge and were validated by domain experts, and other findings that are not intuitive to domain experts but have strong relations to the corresponding measure variables are also identified, and they are invaluable findings to travel behavior analysts and modelers. All findings are beneficial to policy makers, planners, and travel behavior modelers to explore the relationship between these key variables and the corresponding measure variable of interest for decision making.

Subject areas and index terms: Information Gain, geospatial data, visualization tool, travel behavior

Availability: 2012 TRB paper submittal

Title: U.S. National Household Travel Survey Used to Validate Exposure Estimates by the Quasi-Induced Exposure Technique

Author(s): Xinguo Jiang, Yanjun Qiu, and Richard W. Lyles

Publication date: January 27, 2012

Abstract: Unlike exogenous estimates of exposure to risk such as vehicle miles of travel, number of registered vehicles, and number of licensed drivers, quasi-induced (Q-I) exposure has not received adequate vetting. A criticism of Q-I is that its underlying assumptions are not convincingly validated or verified, partially because the risk estimates of Q-I have not been sufficiently compared with the more conventional techniques. The 2009 National Household Travel Survey data were used to derive annual vehicle miles traveled, disaggregated by characteristics of interest (age and gender). Comparisons were developed at different disaggregation levels between the vehicle miles traveled and the relative exposure calculated with Q-I. The main findings of the exercises follow: (*a*) statistical results suggest that the exposure estimates for 15 age groups and driver gender are in good agreement with the corresponding annual vehicle miles traveled and thus the induced exposure estimates are deemed to be reasonably representative of the driving population and (*b*) the validation study revealed that data disaggregation improves the homogeneity of age and gender distributions (reduced data irregularities caused by the aggregated distributions). The comparisons confirm that Q-I is a promising and powerful tool for estimating exposure in safety analysis.

Subject areas and index terms: Vehicle miles travelled, VMT, registered vehicles, licensed drivers, quasi-induced exposure, National Household Travel Survey

Availability: http://trb.metapress.com/content/11437643527t612r/fulltext.pdf

TRAFFIC SAFETY

Title: Temporal Modeling of Highway of Highway Crash Severity

Author(s): James Mooradian, John N. Ivan, Nalini Ravishanker, and Shan Hu

Publication date: N/A

Abstract: This paper describes analysis using ordinal logistic regression to uncover temporal patterns in the severity level (fatal, serious injury, minor injury, slight injury or no injury) for persons involved in highway crashes in Connecticut. Existing state sources provide data describing the time and weather conditions for each crash and the vehicles and persons involved over the time period from 1995 to 2008 as well as the traffic volumes and the characteristics of the roads on which these crashes occurred. Controlling for characteristics known to be related to severity, e.g., age, crash type, and road characteristics, statistical modeling enables us to predict the probability of an individual to have a specific severity outcome if he/she is involved in a crash. Specifically, this paper investigates overall, long-term, time dependant and seasonal trends in senior drivers and travelers (65 years and over). This study also accounts for special conditions in data distribution and modeling in order to point to significant impacts on public health and safety as seniors become a larger portion of the population. Findings indicate an overall increase in increased crash severity probability for seniors, as well as a distinct seasonal trend. Other time-dependant trends in the data were visible, but not significant.

Subject areas and index terms: Senior safety, Highway safety, Injury severity, Ordinal responses, Partial Proportional Odds, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: Vulnerability of Female Drivers Involved in Motor Vehicle Crashes An Analysis of US Population at Risk

Author(s): Dipan Bose, PhD; Maria Segui-Gomez, ScD, MD, MPH; Jeff R. Crandall, PhD

Publication date: January 30, 2012

Abstract: Objectives. Motor vehicle trauma has been effectively reduced over the past decades; however, it is unclear whether the benefits are equally realized by the vehicle users of either sex. With increases in the number of female drivers involved in fatal crashes and similarity in driving patterns and risk behavior, we sought to evaluate if advances in occupant safety technology provide equal injury protection for drivers of either sex involved in a serious or fatal crash.

Methods. We performed a retrospective cohort study with national crash data between 1998 and 2008 to determine the role of driver sex as a predictor of injury outcome when involved in a crash.

Results. The odds for a belt-restrained female driver to sustain severe injuries were 47% (95% confidence interval=28%, 70%) higher than those for a beltrestrained male driver involved in a comparable crash.

Conclusions. To address the sex-specific disparity demonstrated in this study, health policies and vehicle regulations must focus on effective safety designs specifically tailored toward the female population for equity in injury reduction.

Subject areas and index terms: female drivers, fatalities, car crash, driving patterns, risk behavior

Availability: American Journal of Public Health. 2011;101(12):2368-2373

http://www.medscape.com/viewarticle/757187

Title: I-70 Dedicated Truck Lanes Feasibility Study, Phase 2 Final Report, 2011

Author(s): CDM Smith, HNTB, Bernardin Lochmueller & Assoc., American Transportation Research Institute and John Gentle & Assoc. for the Illinois Department of Transportation, Indiana Department of Transportation, Missouri Department of Transportation, Ohio Department of Transportation and the Federal Highway Administration

Publication date: June 2011

Abstract: The I-70 Dedicated Truck Lanes (DTLs) Feasibility Study was conducted as part of the United States Department of Transportation's Corridors of the Future program. Through that program, the Federal Highway Administration provided matching funding for a coalition of four states (Indiana, Missouri, Ohio and Illinois) to conduct a two-phase feasibility study to determine the need, cost, risk, financing options and practicality to develop DTLs on the I-70 Corridor as a unified facility.

The NHTS was used to understand long distance passenger travel patterns using the I-70 corridor. The study found that DTLs are expected to reduce truck/car conflict crashes by more than 95 percent; reduce crashes in the general purpose lanes by 50 percent; reduce total annual crashes by one third; and reduce fatal crashes by two-thirds. Dedicated Truck Lanes provide increases in corridor travel reliability. When compared to the No-Build Scenario, DTLs provide six times more benefit in travel time, operations and crash rates than adding the general purpose lanes that are currently included in each of the Coalition member state's Long Range Transportation Plans. In the No-Build Scenario, 70 percent of the corridor is anticipated to be congested in 2045. With DTLs, half of this expected congestion in general purpose lanes will be eliminated, while 97 percent of DTLs will be uncongested in 2045. The I-70 DTL Study concluded that DTLs on I-70 would generate approximately $36 billion in economic output and 258,000 job years from tolling, construction, operation and maintenance and travel efficiencies.

Subject areas and index terms: dedicated truck lanes, I-70

Availability: http://www.i70dtl.org

TRAVEL BEHAVIOR

Title: The Impacts of Children on the Activity-Travel Patterns of Adults

Author(s): Lin Lin, and Dr. Anne Vernez Moudon

Publication date: November 14, 2011

Abstract: This study provided insights on how individual activity-travel patterns of adults were impacted by whether they lived with children or not. A better understanding of travel behavior of families and households will improve travel demand forecasting and the assessment of emerging transport policies. This cross-sectional study used the 2006 Puget Sound Regional Council Household Activity and Travel Survey data to investigate activity-travel patterns of 7,709 adults living in the Puget Sound Region, Washington. Multilevel regression models with the individual as the first level and the household as a second level were developed. With one-third of the participants living with children, the results showed that individuals who lived with children made 20% more non work trips than those who did not. There was no significant difference between the two groups in terms of size of activity realm. Also, whether individuals lived with children or not was found to be an insignificant variable to predict individuals' automobile dependence. The impact of residential density on parents was no different from that of non parents. Interactions among gender, work status, and whether adults lived with children or not, revealed complex travel patterns according to different population subgroups. Women who worked part time and lived with children made the second highest number of non work trips after women who were unemployed and lived with children. Men who worked part time and lived with children had the largest individual activity realm. Interestingly, men who did not work but lived with children traveled the least.

Subject areas and index terms: activity travel patterns, children, travel behavior, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: Consumers' Perceptions and Use of Electric Vehicle Range: Changes Over Time Through a Lifestyle Learning Process

Author(s): Justin Woodjack, Dahlia Garas, Andy Lentz, Thomas Turrentine, Gil Tal, and Michael Nicholas

Publication date: N/A

Abstract: Popular media and even researchers commonly assume that battery electric vehicle (BEV) ownership will provide consumers less performance and mobility. A common claim is that consumers will have constant worry about the range of their BEV, often termed "range anxiety". BMW converted 450 MINI Coopers to all-electric drive (named the *MINI E*) and leased them to fleets and 235 private households in the Los Angeles and New York/New Jersey regions from Spring 2009 to Spring 2010. Through the course of the one-year lease, UC Davis researchers conducted multiple online surveys, in-person interviews, and administered weeklong driving diaries. This paper explores the reactions of MINI E drivers to the range of the MINI E through the framework of a Lifestyle Learning Process. Over time, MINI E drivers learned how the 104-mile range of the MINI E fit into their lifestyles. Drivers adapted and explored with their MINI E through activities like altering driving behavior (such as speed and trip routes), optimizing charging opportunities, trip planning, and educating themselves on distances to destinations with the help of online and mobile mapping tools. In the course of the UC Davis MINI E Consumer Study, we found evidence suggesting that range was not a major concern among these early adopters. Even with no public charging available to their vehicle, 100 percent of survey respondents stated that BEVs are suitable for daily use. The results of this study will be of interest to policymakers and practitioners interested in expanding the BEV market.

Subject areas and index terms: battery electric vehicle, MINI E, MINI Coopers, driving behavior. National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: Value of Life Cycle in Explaining Trip Making Behavior and Improving Temporal Stability of Trip Generation Models

Author(s): Leta F. Huntsinger, and Dr. Nagui M Rouphail

Publication date: N/A

Abstract: Travel demand models are valuable tools in the transportation planning process; based on sound theory they bring a quantitative element to what is predominantly a political process. The forecasts output from these models guide decision makers in the evaluation and selection of transportation programs and projects. Developing a better understanding of the factors that influence travel behavior, the changes in travel behavior over time, and the variables that best capture these changes may lead to the development of models that are more stable over time, increasing the analyst's confidence in model results and leading to more cost effective investment decisions.

This paper investigates life cycle as one such class of variables. In this context life cycle is defined as the stage at which a family is in at a given point in time as it relates to factors such as the number and age of adults in the household, the presence, number, and age of children, and worker status. Using various statistical tests to evaluate its usefulness, the paper presents evidence to indicate that life cycle has a strong influence on trip making behavior while also improving stability in trip rates over time. These findings suggest that advanced trip generation models that accommodate more independent variables may lead to improved models are more temporally stable and better capture the dynamics that influence trip making.

Subject areas and index terms: trip making behavior, trip generation, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: Travel Demand and Charging Capacity for Electric Vehicles in Rural States: A Vermont Case Study

Author(s): Lisa Aultman-Hall, Justine Sears, Jonathan Dowds, and Paul Hines

Publication date: August 1, 2011

Abstract: As the number of electric vehicles (EVs) increase we must consider not only how this fuel switch may affect electrical power infrastructure but also mobility. Specifically, the suitability and charging requirements of these vehicles may differ in rural areas, where the electrical grid may be less robust and miles driven higher. Although other studies have examined issues of regional power requirements of EVs, none have done so in conjunction with the spatial considerations of travel demand. We use three datasets to forecast the future spatial distribution of EVs, as well as these vehicles' ability to meet current daily travel demand: the National Household Travel Survey (NHTS), geocoded Vermont vehicle fleet data, and an E911 geocoded dataset of every building statewide. We consider spatial patterns in daily travel and home-based tours to identify optimal EV charging locations, as well as any area-types that are unsuited for widespread electric vehicle adoption. We found that hybrid vehicles were more likely to be near other hybrids than conventional vehicles were. This suggestion of clustering of current hybrid vehicles, in both urban and rural areas, suggests that the distribution of future EVs may also cluster in rural areas. Our analysis suggests that between 69 and 84% of the state's vehicles could be replaced by a 40-mile range EV, depending on the availability of workplace charging. Problematic areas for EV adoption may be suburban areas, where both residential density is high (and potential clustering of hybrids), as well as miles driven. Our results suggest EVs are viable for rural mobility demand but require special consideration for power supply and vehicle charging infrastructure.

Subject areas and index terms: electric vehicles, travel behavior, rural, Vermont, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: A Quantile Regression Analysis of the Rebound Effect: Evidence from the 2009 National Household Transportation Survey in the United States

Author(s): Qing Su

Publication date: March 2012

Abstract: This paper applies quantile regression method to measure the rebound effect and differentiate it with respect to demand for mobility using the 2009 National Household Transportation Survey (NHTS). The quantile regression results indicate that the rebound effect varies with the distribution of vehicle miles traveled (VMT), ranging between 0.11 and 0.19. Road network density and population density also play an important role in determining travel demand. Regression results indicate that travelers living in areas with higher road network density travel more miles although this positive impact consistently declines along the VMT distribution. Travelers living in areas with population density of at most 3000 persons per square miles travel more miles than those living in higher density areas. The quantile regression results also indicate that the impact of income is positive but declines consistently along the VMT distribution.

Subject areas and index terms: Rebound effect; Quantile regression; Vehicle miles traveled

Availability: Science Direct website
http://www.sciencedirect.com/science/article/pii/S0301421512001620

Title: How People Use Their Vehicles: Statistics from the 2009 National Household Travel Survey

Author(s) John Krumm

Publication date: April 16, 2012

Abstract: The 2009 U.S. National Household Travel Survey (NHTS) contains detailed data on individual vehicle trips. This paper demonstrates several useful statistics from the NHTS concerning how people use their vehicles, such as how far they drive, where they go, how long they stay, and their sequence of destinations. These statistics, in turn, are potentially useful for vehicle design, vehicle use simulation, navigation algorithms, interpreting GPS data, and the placement of electric vehicle charging stations.

Subject areas and index terms: vehicle trips, National Household Travel Survey

Availability: Microsoft website **http://research.microsoft.com/en-us/um/people/jckrumm/Publications%202012/2012-01-0489%20SAE%20published.pdf**

Title: A Joint Household Level Analysis of Work Arrangement Choices of Individuals

Author(s): Mubassira Khan, Rajesh Paleti, Chandra R. Bhat, and Ram M. Pendyala

Publication date: N/A

Abstract: This paper presents a comprehensive multi-dimensional multivariate binary probit model system capable of simultaneously representing multiple aspects of individual work arrangement decisions, while also accounting for interactions among household members in individual employment related choices. The model system is estimated on a survey sample drawn from the San Francisco Bay Area where a rich set of accessibility measures is available to account for built environment influences on work related decisions. Model results show that a host of demographic, socio-economic, built environment, and attitudinal variables influence individual choices regarding work arrangements; more importantly, the model shows that there is considerable interaction among household members in matters related to employment. The model system can be used to predict employment choices of individuals within larger microsimulation model systems of activity-travel demand.

Subject areas and index terms: work arrangements, labor force participation, household interactions, individual choices, multivariate modeling, activity-travel behavior, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: Workplace Choice Model: Comparison of Spatial Patterns of Commuting in Four Metropolitan Regions

Author(s): Peter Vovsha, Surabhi Gupta, Joel Freedman, Wu Sun, and Vladimir Livshits

Publication date: July 2011

Abstract: The paper analyzes the spatial patterns of commuting in four different metropolitan regions through the estimation of consistent disaggregate workplace location choice models based on household travel survey data. The regions include San Diego, CA; Phoenix, AZ; Tucson, AZ; and Chicago, IL. Each estimated model is included as a component in an activity-based travel model (ABM) developed for each region. The models were validated against aggregate journey-to-work flows based on Census data. The model structure and segmentation are discussed in detail with cross-comparison of the most critical model variables across the regions. In general, it was found that the suggested structure performs well in different regional conditions. The main behavioral findings in terms of differences of commuting patterns relate to income, full-time vs. part-time workers status, gender, and occupation. When segmented by these attributes the workplace choice model replicated the observed flows with a good level of accuracy without any additional calibration or k-factors. However, actual model coefficients proved to be significantly different from region to region, leading one to conclude that models of this type must be re-estimated for each region. Another important behavioral finding with corresponding modeling implications is that the impedance function for commuting is essentially non-linear with respect to trip length with many specific effects that relate to a variable marginal disutility of time and cost in each distance range. This required a non-linear distance-decay function to be introduced to complement the mode choice logsum which has more traditional linear mode utilities in time and cost variables.

Subject areas and index terms: workplace location choice, commuting pattern, work from home, model transferability, National Household Travel Survey

Availability: 2012 TRB paper submittal

Title: Study of Long Distance Interregional Commuting using NHTS Data

Author: Binbin Chen

Publication date: June 2011

Abstract: Interregional commuting refers to commuting trips from one metropolitan area to other metropolitan areas and to non-metro areas. Such commuting trips typically have a distance of at least 50 miles one-way. The recent Census data revealed a growing trend of Interregional commuting in the U.S. during the two-decade period from 1980 to 2000; inter-metropolitan commuting increased at a rate of more than 28%, which was almost three times that of internal metropolitan growth. The phenomenon of interregional long distance commuting is often out of the typical picture depicted by the traditional travel demand models, and challenges the conventional commuting concept. Especially, sometimes interregional commuting is chosen by people in the form of weekly commuting with dual residence. In this case, commuting could represent a new lifestyle, by which people take advantage of new telecommunication techniques, allocate time weekly instead of daily, and will have different needs for transportation.

This project is a preliminary study of a dissertation research which is to study long distance interregional commuting behavior in one of the megaregions in the US, the Texas Triangle Area. A combined cross sectional and longitudinal approach were used. Cross sectionally, the 2009 and the 2001 NHTS data were examined individually. For each time section, long distance commuters were identified and grouped based on their commuting distance. Binary logit models were used to examine factors, such as personal characteristics, household composition, and telecommuting options, which would affect long distance commuting decisions. Longitudinally, the changes of long distance commuting pattern and characteristics during the ten-year period were analyzed.

The study results show that nationwide, the percentage of long distance commuters remains relatively stable from 2001 to 2009 at about 3%. The South Census Region had the highest percentage of long distance commuters in 2009 and on average, long distance commuters in the south region traveled longer than their counterpart did in other regions. The main travel means for long distance commuters was private car; more than 90% of long distance commuters drove private cars to work and more than 80% of them drove alone. Long distance commuters spent more time away from home, leaving home earlier and return home later than normal commuters. Gender, income level and residence locations all affect long distance commuting decisions. Flexible work schedule also encourages people to commute longer distance. The NTHS data show that if a person has options to work at home occasionally, he or she tends to commute long distance. In addition, in Texas, 70% of commutes with distance of 50 miles or longer was interregional, and more than 70% of the long distance commutes in Texas was within the Texas Triangle Area.

Subject areas and index terms: long distance commuting, weekly commuting, megaregions

Availability: Nation/Texas- University of Texas at Austin

Title: A Joint Model of Residential Relocation Choice and Underlying Casual Factors

Author(s): Katherine Kortum, Rajesh Paleti, Chandra R. Bhat, and Ram M. Pendyala

Publication date: November 14, 2011

Abstract: Residential location choice is a key determinant of activity-travel behavior and yet, little is known about the underlying reasons why people choose to move, or not move, residences. Such understanding is critical to being able to model residential location choices over time, and design built environments that people find appealing. This paper attempts to fill this gap by developing a joint model of the choice to move residence and the primary reason for moving (or not moving). The model is estimated on the Florida subsample of the 2009 National Household Travel Survey. Model results shed considerable light on the socio-economic and demographic variables that impact household decision whether to move residence and the primary reason underlying that decision.

Subject areas and index terms: residential location choice, residential move, causal factors, joint model, choice modeling.

Availability: TRB 2012 Paper # 12-3769

Title: What Can We Learn from Analyzing University Student Travel Demand?

Author(s): Xin Wang, Asad J. Khattak, Sanghoon Son

Publication date: Nov. 15, 2011

Abstract: To improve regional travel demand models, transportation engineers and planners desire appropriate representation of sub-populations. University students are a relatively neglected group of the population that are often missed in regional behavioral surveys and are not well represented in travel demand models. Many students attending a university reside, take classes, work, and perform other activities in the university environment, which is often mixed use, alternative mode friendly, higher density, and livable. The purpose of this paper is to understand travel behavior of university students and model associations with their attributes that include personal characteristics, residential location (residing on-campus or off-campus), and academic status. The data used in this study are from a unique internet-based survey (N=1,468) of Old Dominion University, Virginia students. This effort was conducted in 2010 and it was part of the University Travel Survey supplement. Using behavioral data combined with spatial data, rigorous models of automobile and walk/bicycle trip rates are estimated to explore associated factors. Results show that students living on-campus or near-campus are significantly more likely to walk/bicycle and less likely to drive automobiles, indicating the value of living in a campus environment with greater accessibility to activities and a walk/bicycle friendly network. The behavioral models provide helpful information that can be used to better represent the behavior of university students in regional travel demand models and to improve strategic planning.

Subject areas and index terms: travel behavior, travel demand forecasting, university students, survey research, spatial analysis, Poisson and negative binomial models

Availability: TRB 2012 paper submittal

Title: A Nationwide Look at Immigrant Neighborhoods and Travel Mode Choice

Author(s): Michael J. Smart

Publication date: N/A

Abstract: Despite a process of adjustment toward automobile use, previous research has found that immigrants in the United States are more likely to use carpools, take transit, walk, and bicycle than the U.S.-born, even after controlling for relevant variables, and even after long periods in the United States. Others have found a positive effect of living in an immigrant neighborhood on the use of non-auto modes and carpools. These studies have been limited by two important factors: their narrow geographic scope, and their inability to test whether *all* individuals in immigrant neighborhoods experience this "neighborhood effect," or if the effect is limited to immigrants only. This paper improves upon prior research by expanding the geographic scope of the analysis to a U.S.-wide sample using the confidential, geocoded version of the 2001 National Household Travel Survey (NHTS) and the 2000 Census. The combination of these two datasets also allows for a comparison of the strength of the immigrant neighborhood effect on the U.S.- born and the foreign-born. The analysis suggests that *immigrants* within immigrant neighborhoods are far more likely to walk, bicycle, use transit, and carpool than are *non- immigrants* living in immigrant neighborhoods, though both groups are more likely to use these modes than are individuals living in non-immigrant neighborhoods. These findings imply that the "green travel" lessons that many may hope to learn from immigrant neighborhoods cannot be considered from a geographic or spatial perspective only, but that the social ties among immigrants within immigrant neighborhoods may play an important role.

Subject areas and index terms: immigrants, immigrant neighborhoods, travel behavior

Availability: 2012 TRB paper submittal

Title: Another look at VMT: Determinants of vehicle use in two-vehicle households

Author(s): Gulsah Akar and Jean-Michel Guldmann

Publication date: November 12, 2011

Abstract: This study analyses the determinants of vehicle miles traveled (VMT) using data from the 2009 National Household Travel Survey (NHTS). First, total VMT models are estimated across all households. Next, the survey sample is segmented by the number of vehicles owned, and separate models are estimated for each sample segment. Finally, focusing on two vehicle households, a seemingly unrelated regression (SUR) model is formulated to analyze total household VMT and the VMT share of each vehicle. Household increases in income, number of vehicles, workers, adults and children, all lead to higher VMT. Population density and gasoline cost negatively affect VMT. Some of the more interesting findings of the total VMT models are related to telecommuting and vehicle characteristics. The results indicate that having the option to telecommute and owning SUVs, pickup trucks, vans or hybrid vehicles increase VMT. If the driver of a vehicle is female, older, unemployed or does not hold a bachelor's degree, that vehicle's share of the total household VMT decreases. If this vehicle is a SUV, pickup truck, van, or hybrid, it is likely to be used more. These significant effects have important implications for understanding the substitution patterns in multi vehicle households.

Subject areas and index terms: VMT, travel behavior

Availability: TRB 2012

Title: Understanding the Changes of Vehicle Miles Travelled in Response to Fuel Price and Fuel Efficiency for Different Income Groups

Author(s): Tingting Wang and Cynthia Chen

Publication date: July 31, 2011

Abstract: Fuel price is one of the most effective policy tools in regulating travel demand. The effects of fuel price on travel demand for different income groups reveal the choices and constraints they are faced with. The first purpose of this study is to understand these underlying choices and constraints by examining the variation of fuel price elasticity of Vehicle Miles Travelled (VMT) across income groups. In the long run, improvement in fuel efficiency can result in increases in VMT, which is known as the rebound effect; the rebound effect may offset the negative effect of fuel price on VMT. The second purpose of this study is, therefore, to compare the relative magnitudes of the fuel price effect and the rebound effect. A sample of 105,372 households from the 2009 National Household Travel Survey is divided into five income quintiles and a Structural Equations System with VMT and fuel efficiency as endogenous variables is estimated for each quintile. Higher income group shows greater fuel price elasticity than lower income group and the rebound effect is found to be only significant for the lowest income quintile. We discuss that the relative inelasticity of the lower income group is due to that they may be already traveling at a minimum to maintain a functional life and the large rebound effect of the lowest income quintile confirms that their travel demand is far from satiation. These findings emphasize policies aimed at reducing the basic travel needs of lower income groups and meanwhile, increasing their accessibility to other travel options.

Subject areas and index terms: vehicle miles travelled, VMT, fuel price, travel demand

Availability: 2012 TRB paper submittal

Title: Is Usual Share of Commuting Mode Always Greater Than Its Actual Share?

Author(s): Sujan Sikder and Xuehao Chu

Publication date: Feb 21, 2012

Abstract: With data from the 2001 National Household Travel Survey (NHTS), recent research showed that transit's usual share was greater than its actual share for workers in the United States in a variety of commuter markets. A mode's usual share is the percentage of workers who state that they usually use that mode for commuting in a week, whereas the actual share of a mode is the percentage of work trips by that mode by the same workers on a typical work day. This study explores whether this relative relationship between a mode's usual and actual shares holds true for common modes other than transit for the United States. Mathematically, it is determined that this relative relationship cannot hold true for all modes; in other words, the usual share has to be smaller than the actual share for one or more modes other than transit. Empirically, the same 2001 NHTS is used to test this relative relationship for three common modes—the privately owned vehicle (POV), walking, and biking—and for a variety of commuter markets. The empirical results confirm the mathematical conclusion that the relative relationship holds true for biking but not for POV and walking. In addition, the relationship between usual and actual shares is determined not solely by the mode but also by individual commuter markets. Finally, the deviation between usual and actual shares in percentage terms is large for transit and walking, but small for privately operated vehicles and bikes. One direction of future research would be to determine the reasons for these differences in the usual–actual relationship across modes and commuter markets.

Subject areas and index terms: travel behavior, 2001 National Household Travel Survey; Bicycle travel; Commuting; Empirical methods; Modal split; Private passenger vehicles; Public transit; Travel surveys; Walking; Work trips, Data and Information Technology; Highways; Operations and Traffic Management; Pedestrians and Bicyclists; Public Transportation; I70: Traffic and Transport

Availability: http://trb.metapress.com/content/m41716707wpl5336/

Title: Propensity to Telecommute Exploring the National Household Travel Survey

Author(s): Xia Jin, Jingcheng Wu

Publication date: November 16, 2011

Abstract: Telecommuting is the substitution for work at the workplace with work at home or other locations close to home. The interest in telecommuting stems from its potential benefits in trip reduction, congestion mitigation, cost saving for office spaces, increased productivity, and better home-work balance. The factors that influence people's telecommuting behavior were explored by using data from the 1995 Nationwide Personal Transportation Survey and 2001 and 2009 National Household Travel Survey. A comprehensive analysis was undertaken, and the trends over several years were examined. The analysis advances the understanding of the characteristics of workers who telecommute according to detailed categories of telecommuting frequency. The findings are essential as a first step toward estimating and incorporating telecommuting in the travel demand forecasting process.

Subject areas and index terms: telecommute, travel demand forecasting, congestion mitigation

Availability: http://trb.metapress.com/content/d812267744753h57/

Title: Telecommuting, travel behavior and residential location choice: Can telecommuting be an effective policy to reduce travel demand?

Author(s): Pengyu Zhu

Publication date: November 2011

Abstract: Whether telecommuting and personal travel are complements or substitutes is a key question in urban policy analysis. Urban planners and policy makers have proposed telecommuting as part of travel demand management (TDM) programs to reduce street and highway congestion. Based on small samples, several empirical studies have found that telecommuting has a substitution effect (although small) on conventional commuting, and have thus argued that policies promoting telecommuting might be promising in reducing travel.

Using data from the 2001 and 2009 National Household Travel Surveys (NHTS), this study involves two large national samples to try to more accurately identify the impact of telecommuting on personal and household travel patterns. Through a series of empirical tests, this research investigates how telecommuting influences workers' one-way commute trips, daily total work trips and daily non-work trips, how these influences differ across different MSA sizes, and how telecommuting affects household commute trips. The results of these tests suggest that telecommuting has been an important factor in shaping personal and household travel patterns over the 2001–2009 period, and that telecommuting consistently has a complementary effect on not just workers' one-way commute trips, daily total work trips and total non-work trips, but also household total commute trips.

Subject areas and index terms: telecommuting, travel congestion, work trips

Availability: http://gradworks.umi.com/34/78/3478051.html

Title: Evansville Travel Model Update 2011, Model Development and Validation Report

Author(s): Bernardin Lochmueller & Assoc. for the Evansville (IN) Metropolitan Planning Organization

Publication date: May 2012

Abstract: The Evansville (IN) Metropolitan Planning Organization recently completed the development of a hybrid tour-based model. The hybrid framework combines elements of both traditional four-step and more recent activity-based models. Like their activity-based cousins, hybrid models can provide consistency with tours and sensitivity to important planning variables such as gas prices, seniors in the population, mixtures of land uses, walkability measures, etc. However, like their four-step cousins, hybrid models are simpler than full activity-based models and with lower resulting development costs and faster run times.

NHTS Add-On data was merged with a local household survey and used to estimate component behavioral models including models of households vehicle ownership, daily tour and activity generation, tour mode choice, destination choice, trip mode choice and departure time choice. The resulting models offered a far more realistic picture of local travel behavior such as responses to gas prices and the differential behavior of senior travelers.

Subject areas and index terms: hybrid tour-based, travel demand model development

Availability: Contact the Evansville (IN) Metropolitan Planning Organization

Title: Transportation and the New Generation: Why Young People Are Driving Less and What It Means for Transportation Policy

Author(s): Benjamin Davis and Tony Dutzik, Frontier Group and Phineas Baxandall, U.S. PIRG Education Fund

Publication date: April 2012

Abstract: N/A

Subject areas and index terms: policy, young drivers, travel behavior

Availability:
http://www.uspirg.org/sites/pirg/files/reports/Transportation%20%26%20the%20New%20Generation%20vUS_0.pdf

Title: Vermont Travel Model 2010-2011 (Year 3)

Author(s): Jim Sullivan

Publication date: October 2011

Abstract: N/A

Subject areas and index terms: Vermont, travel demand model

Availability: University of Vermont Transportation Research Center, UVM TRC Report # 11-009
http://www.uvm.edu/~transctr/research/trc_reports/UVM-TRC-11-009.pdf

Title: Long-Distance and Rural Travel Transferable Parameters for Statewide Travel Forecasting Models

Author(s): Cambridge Systematics, Inc. with Geostats, Nancy McGuckin, Texas Transportation Institute, University of Maryland, and Whitehouse Group

Publication date: October 7, 2011

Abstract: NCHRP 08-84: Long-distance and rural travel transferable parameters for statewide travel forecasting models NHTS 2009, NHTS 2001 and the American Travel Survey (ATS) were used to examine long-distance and rural travel transferable parameters for statewide travel forecasting models under the NCHRP 08-84 Study. Trip rates, travel party size and average trip length were obtained from both NHTS 2001 and NHTS 2009. The long distance file was used from NHTS 2001 and analysis for NHTS 2009 focused on rural areas.

Subject areas and index terms: statewide travel demand models, rural areas, trip rates, travel party size, trip length

Availability: N/A

Title: NCHRP 08-61 Travel Demand Forecasting: Parameters and Techniques

Author(s): Cambridge Systematics, Inc.

Publication date: N/A

Abstract: NCHRP 08-61: Travel Demand Forecasting: Parameters and Techniques: NHTS 2009 was used to obtain parameters for urban and regional travel demand models for NCHRP 08-61: Travel Demand Forecasting: Parameters and Techniques. These parameters can be used by analysts for urban areas with insufficient local data with which to estimate model parameters, and in areas that have already developed model parameters to check these parameters for reasonableness. Trip rates, average trip lengths, vehicle occupancy and time of day distribution were derived from NHTS 2009 by urban size categories.

Subject areas and index terms: travel demand models, urban areas, trip rates, vehicle occupancy, trip length

Availability: N/A

Title: The Fundamental Law of Road Congestion: Evidence from US Cities

Author(s): Gilles Duranton, University of Toronto and Matthew A. Turner, University of Toronto

Publication date: September 4, 2009

Abstract: We investigate the relationship between interstate highways and highway vehicle kilometers traveled (vkt) in us cities. We find that vkt increases proportionately to highways and identify three important sources for this extra vkt: an increase in driving by current residents; an increase in transportation intensive production activity; and an inflow of new residents. The provision of public transportation has no impact on vkt. We also estimate the aggregate city level demand for vkt and find it to be very elastic. We conclude that an increased provision of roads or public transit is unlikely to relieve congestion and that the current provision of roads exceeds the optimum given the absence of congestion pricing.

Subject areas and index terms: highways, vehicle kilometers traveled, public transport, congestion

Availability: University of Toronto, Department of Economics

TREND ANALYSIS AND MARKET SEGMENTATION

Title: Predicting the Market Potential of Plug-in Electric Vehicles Sing Multiday GPS Data

Author(s): Mobashwir Khan and Kara M. Kockelman

Publication date: N/A

Abstract: Detailed GPS data for a year's worth of travel by 255 households from the Seattle area were used to investigate how plug-in electric vehicle types may affect adoption rates and use levels. The results suggest that a battery-electric vehicle (BEV) with 100 miles of range should meet the needs of 50% of one-vehicle households and 80% of multiple-vehicle households, if those households fully charge their BEVs just once a day and are willing to use a different vehicle or mode of transport just 4 days a year or less (to serve daily travel distances above 100 miles).Moreover, the average one-vehicle household in the Seattle region relies on its vehicle for 23 miles per day and should be able to electrify close to 80% of its miles using a plug-in hybrid electric vehicle (PHEV) with 40-mile all-electric-range. Households owning two or more vehicles can electrify 50 to 70% of their household miles using a PHEV40, depending on how they assign the vehicle across their drivers each day. Cost comparisons between the average single-vehicle household owning a Chevrolet Cruze (regular gasoline vehicle) versus a Chevrolet Volt PHEV suggest that when gas prices are $3.50 per gallon and electricity rates at the U.S. average of 11.2 ct per kWh, the Volt will save the household $535 per year in operating costs. Similarly, the Toyota Prius PHEV, when compared to the Toyota Corolla, will provide an annual savings of $538 per year.

Subject areas and index terms: plug-in electric vehicles, all-electric range, battery-electric vehicles, vehicle use and cost

Availability: 2012 TRB paper submittal

Title: Tracking National Household Vehicle Usage by Type, Age, and Area in Support of Market Assessments for Plug-in Hybrid Electric Vehicles

Author(s): Yan Zhou, Anant Vyas and Danilo Santini

Publication date: N/A

Abstract: This paper examines usage for household vehicles to support assessment of the market potential of plug-in hybrid electric vehicles (PHEVs), which require high usage rates for the technology investment to pay off. According to the 2009 National Household Travel Survey (NHTS), about 40% of household vehicles were not used on the survey travel day [1]. This study analyzed household vehicle use and non-use by vehicle type, age, and area type (metropolitan statistical area [MSA] and non-MSA). Vehicles used on survey day with or without a reported travel time and distance in the survey are considered "vehicles used." All others are referred to as "vehicles not used." We divided the "vehicles not used" into three categories: (1) left at home while using other household vehicles, (2) not used because travelers used other modes, and (3) no household trips. The "vehicle used" category comprises two categories: (1) those with distance and time data and (2) those with no travel data. Within these five categories, vehicles were further subdivided according to four vehicle types: car, van, SUV, and pickup. Each vehicle type was further subdivided in two age groups: 10 years or less (<=10) and more than 10 years (>10). In addition, vehicle usage was compared in both MSAs and non-MSAs and during weekdays and weekends. Results indicate that most vehicles, especially pickups, are not used because the households own and use other vehicles. Moreover, SUVs — especially newer SUVs (<=10 years) — are the most utilized vehicle type and should be considered as the first available vehicle type for new-technology vehicles.

Subject areas and index terms: hybrid electric vehicles, vehicle usage

Availability: 2012 paper submittal