Fundamentals on Interpreting NHTS Data

“If you torture the data long enough, nature will confess.”

Ronald Coase – 1991 Nobel Prize in Economics

“If you torture the data long enough you can make it confess to anything.”

Alan Pisarski – No Nobel Prizes
Simple Recipe for Using NHTS Data

1. Start with:
   - Sound theory or hypothesis
   - NHTS data
   - Other data as available

2. Add other data as necessary and available

3. Blend with Statistical package or various analytical tools

4. Evaluate Results
   - Confirm with other survey, count or field data
   - Review MOEs (*margins of error*) and MORs (*measures of relevance*)

5. Serve with good graphics and compelling story
Social and Economic Interactions Create Demand for Travel

Growth in
- Income
- Knowledge

Specialization in
- Employment
- Consumption
- Social Relationships
- Time Use

Growth in
- Person Travel
- Commerce
- Communication
1969 - First NHTS

Population (millions) 203
15,000 households surveyed
In home interviews
Person miles traveled (trillion) 1.40

Vehicles/100 people 52
Gas /gallon $0.35
New house $15,550
Income per year $8,550
New car $3,270
1977 - SECOND NHTS

Population (millions) 216
18,000 households surveyed
In home interviews
Person miles traveled (trillion) 1.62

Vehicles/100 people 68
Gas /gallon $0.65
New house $49,300
Income per year $15,000
BMW 320i $7,990

First Star Wars Released

Elvis Died?

Alaska Pipeline Opens

Fiber optics deployed for telephone communications

Department of Energy Created

Apple Computer Incorporated
### 1983 - Third NHTS

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
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<tbody>
<tr>
<td>Population (millions)</td>
<td>234</td>
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<tr>
<td>6,500 households surveyed</td>
<td></td>
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<tr>
<td>In home interviews</td>
<td></td>
</tr>
<tr>
<td>Person miles traveled (trillions)</td>
<td>1.59</td>
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<tr>
<td>Vehicles/100 people</td>
<td>70</td>
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<tr>
<td>Gas /gallon</td>
<td>$0.79</td>
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<tr>
<td>New house</td>
<td>$82,600</td>
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<tr>
<td>Income per year</td>
<td>$21,070</td>
</tr>
<tr>
<td>Dodge RAM 50 Truck</td>
<td>$5,665</td>
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**ARPANET officially changes to use the Internet Protocol, creating the Internet**

**Microsoft Word and Lotus 1-2-3 first released.**

First mobile phones introduced to public by Motorola

Modern Minivan Introduced

Michael Jackson does Moon Walk

McNuggets Introduced

Top Seller Ford Escort
1990 - FOURTH NHTS

Population (millions) 249
18,000 + 4,300 add-on Households
Computer Assisted Telephone Interview
Person miles traveled (trillions) 2.03

Vehicles/100 people 76
Gas /gallon $1.34
New house $123,000
Income per year $28,960
Isuzu Rodeo $12,4900
### 1995 - FIFTH NHTS

- **Population (millions):** 262
- **21,000 +21,000 add on households**
- **Mail out with CATI**
- **Person miles traveled (trillions):** 3.11

<table>
<thead>
<tr>
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<tr>
<td>Vehicles/100 people</td>
<td>77</td>
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<tr>
<td>Gas /gallon</td>
<td>$1.09</td>
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<tr>
<td>New house</td>
<td>$113,150</td>
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<tr>
<td>Income per year</td>
<td>$35,900</td>
</tr>
<tr>
<td>New car</td>
<td>$15,500</td>
</tr>
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</table>

- **Play Station Released in U.S.**
- **1995 Honda Civic, Most Commonly Stolen Car in 2007**
- **DVD, Optical Disc Storage Media Announced.**
- **55 MPH Speed Limit Imposed In 1973/1974 is Ended**
2001 - SIXTH NHTS

Population (millions) 281
26,000 + 44,000 add-on households
Two-stage CATI
Person miles traveled (trillions) 3.52

Vehicles/100 people 82
Gas/gallon $1.46
New house $136,150
Income per year $42,350
New car $27,958

Satellite Radio Begins

September 11

Segway Introduced to Revolutionize Transportation?

Academy Award Winning Movie dealt with drugs not cars
2008-09 - SEVENTH NHTS

Population (millions) 305
25,000 + 125,000 add-on households
Two-stage CATI
Person miles traveled (trillions) 3.30

Vehicles/100 people 80
Gas/gallon $3.39
New house $238,880
Income per year $40,523
New car $28,715

The top three Internet searches in 2008:
1. Britney Spears
2. World Wrestling Entertainment
3. Obama

Automakers Beg for Washington Aid

Richest Nations Agree to Halve Greenhouse Gas

Facebook Passes 100 Million Users

Richest Nations Agree to Halve Greenhouse Gas
2014 - NHTS

Population (millions) 323
Person VMT (trillion) .23

Vehicles/100 people 8
Gas /Gallon $0.79
New house $165,000
Income per year $38,000
New Car NA

President Signs Transportation Reauthorization Bill LATE-TEA

Apple iphone 7G iOS 8
Personal Teleportation App
<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
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<tbody>
<tr>
<td>Population (millions)</td>
<td>323</td>
</tr>
<tr>
<td>Person VMT (trillion)</td>
<td>.23</td>
</tr>
<tr>
<td>Vehicles/100 people</td>
<td>8</td>
</tr>
<tr>
<td>Gas /Gallon</td>
<td>$0.79</td>
</tr>
<tr>
<td>New house</td>
<td>$165,000</td>
</tr>
<tr>
<td>Income per year</td>
<td>$38,000</td>
</tr>
<tr>
<td>New Car</td>
<td>NA</td>
</tr>
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</table>
Apple iPhone 7G iOS 8

Personal Teleportation App

Press to Transport

President Signs Transportation Reauthorization Bill

LATE-TEA

Population (millions)
323

Person VMT (trillion)
.23

Vehicles/100 people
8

Gas/Gallon
$0.79

New house
$165,000

Income per year
$38,000

New Car NA

2014 - NHTS
Travel Trends

VMT in Millions

VMT per Person

PMT/VMT

Travel Time per Capita
1. Pop $\times$ Trip Rate $\times$ Trip Length $\times$ Vehicle Share = Vehicle Miles of Travel

2. Pop $\times$ Time in SOV Travel $\times$ Speed = Vehicle Miles of Travel

3. $\% \Delta$ Population $+ \frac{1}{3} \times \% \Delta$ Personal Income = $\% \Delta$ Vehicle Miles of Travel
Trip Rate and Length

Annual Trips per Person 5+

Trip Length


1067 1054 1371 1568 1449 1385

9.47 8.68 9.29 10.78 9.52


0 500 1000 1500 2000 2500

0 5 10 15 20
NPTS and NHTS Work Trip Walking Mode Shares

Percent Walking to Work

- Work Trip "Usual Mode"
- Work Trip Actual Mode

- Walk is 10.95% of all trips in 2008

Year | Walking Mode Shares
---|---
1969 | 5.00%
1977 | 4.60%
1983 | 4.50%
1983 | 4.10%
1990 | 4.00%
1990 | 3.70%
1995 | 2.60%
1995 | 2.30%
2001 | 2.92%
2001 | 2.81%
2008 | 3.03%
2008 | 2.82%
2008 | 2.81%
Census/ACS Work Trip Percent Walking Mode Share

Percent Walking to Work

10.40% 7.40% 5.60% 3.90% 2.90% 2.86% 0% 2% 4% 6% 8% 10% 12%


2009 ACS
Vehicle Occupancies - NHTS

[Graph showing vehicle occupancies from 1969 to 2009 for work trips and all trips, with occupancies ranging from 1.13 to 1.90 over the years.]
Transit Mode Share Trends

- Census/ACS Journey to Work, Usual Mode
- NPTS/NHTS Work Trips, Survey Day
- NPTS/NHTS All Trips
- NHTS 2001 Adjusted
- NHTS Work Trip, Work Trip Usual Mode

Percent on Transit:
- 8.90%
- 6.40%
- 5.30%
- 4.70%
- 4.99%
- 4.60%
- 3.56%
- 3.67%
- 3.68%
- 3.40%
- 2.70%
- 2.70%
- 2.20%
- 1.81%
- 1.76%
- 1.56%
- 1.92%

Years:
- 1968
- 1970
- 1972
- 1974
- 1976
- 1980
- 1984
- 1988
- 1990
- 1992
- 1994
- 1996
- 1998
- 2000
- 2002
- 2004
- 2006
- 2008
- 2010
- 2012
Time Spent in Travel per Day

Minutes

49.2 62.8 71.2 84.5 76.4
Person Miles of Travel per Hour (speed, all trips)

- 1977: 28.9
- 1983: 28.3
- 1990 adj.: 30.9
- 1995: 31.0
- 2001: 30.3
- 2008: 28.3

MPH
Mean Household Income Received by Each Quintile
1967 to 2008

Census, 2008 dollars
Driving Population by Age and Gender

![Graph showing the percentage of population by age and gender for 2001 and 2008, comparing males and females.]
PMT and VMT per Capita by Age
Vehicle Availability

Vehicles per worker

Vehicles per person 16 and older

Vehicles per person

Vehicles per driver
Declining Zero-Vehicle Households?

Source: CUTR analysis of NHTS, NPTS, U.S. Census Bureau and 2002-09 ACS
# Household Vehicle Ownership Distribution

## Household Percents

### National Household Vehicle Ownership Distribution, 2009

<table>
<thead>
<tr>
<th>HH Vehicles</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5+</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5.79%</td>
<td>2.28%</td>
<td>0.38%</td>
<td>0.19%</td>
<td>0.05%</td>
<td>8.69%</td>
</tr>
<tr>
<td>1</td>
<td>20.40%</td>
<td>10.18%</td>
<td>1.31%</td>
<td>0.33%</td>
<td>0.06%</td>
<td>32.28%</td>
</tr>
<tr>
<td>2</td>
<td>3.66%</td>
<td>29.04%</td>
<td>2.92%</td>
<td>0.62%</td>
<td>0.08%</td>
<td>36.32%</td>
</tr>
<tr>
<td>3</td>
<td>0.74%</td>
<td>9.06%</td>
<td>3.72%</td>
<td>0.78%</td>
<td>0.09%</td>
<td>14.39%</td>
</tr>
<tr>
<td>4</td>
<td>0.21%</td>
<td>2.58%</td>
<td>1.54%</td>
<td>0.82%</td>
<td>0.13%</td>
<td>5.30%</td>
</tr>
<tr>
<td>5+</td>
<td>0.14%</td>
<td>1.40%</td>
<td>0.82%</td>
<td>0.49%</td>
<td>0.17%</td>
<td>3.02%</td>
</tr>
<tr>
<td>All</td>
<td>30.96%</td>
<td>54.54%</td>
<td>10.69%</td>
<td>3.23%</td>
<td>0.58%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

### Percentage Breakdown

- 20.66% More cars than adults
- 54.16% Cars equals adults
- 16.50% Fewer cars than adults
- 8.69% Zero cars
Transit Mode Share by Vehicle Availability

Mode Share Percent

0 Cars, 1 or More Workers
0 cars, 0 Workers
2+ More Workers than Autos
1 More Worker than Autos
Cars is Greater Than Workers
Cars = Workers
1 Car, 1 Worker

Shortage of Vehicles

2001
2008
Transit Market Share by Car Availability

**2001**
- 1 Car, 1 Worker: 11.2%
- Cars = Workers: 15.4%
- Cars is Greater than Workers: 9.7%
- 0 Cars, 1 or More Workers: 34.9%
- 0 Cars, 0 Workers: 8.2%
- 2+ More Workers than Autos: 9.4%

**2008**
- 1 Car, 1 Worker: 13.4%
- Cars = Workers: 15.6%
- Cars is Greater than Workers: 32.5%
- 0 Cars, 1 or More Workers: 13.7%
- 0 Cars, 0 Workers: 3.3%
- 2+ More Workers than Autos: 14.4%
- 1 More Worker than Autos: 7.2%
Transit Mode Share by Income

Mode Share

- Under $15,000
- $15,000-$50,000
- $50,000+

- 2008
- 2001
- 1995
Transit and Elderly

Person Trips per Day by Age

Transit Mode Share by Age

Share of Transit Trips by Age Groups
Where Have We Been

Changes 2001-2009

Population……………………,+8.7%
Person VMT……………………,-1.6%
VMT/Population………………,-10.4%
Trip Rate………………………,-4.4%
Trip Length…………………,-6.2%
SOV Share…………………,+6.4%
Travel Speed…………………,-6.7%

Where are we Going?

- Demographics
  - Population Diversity
  - Activity Patterns
  - Land Use

- Economics & Technology
  - Income & Wealth
  - Technology
  - Mode Availability & Performance

Where are we Going?
Fundamental Economic and Demographic Changes Continue

- Traditional Households Waning...
  Atlantic Journal-Constitution, May 2011

- Home Ownership Levels at New Lows...

- .... the average graduate finishes school with $24,000 of debt...
  Institute for College Access and Success, May 2011

- ... 85 percent of this year’s college graduating class will be forced to move back home.
  Twentysomething Inc., May 2011

- Hispanics account for half of US population growth.
  Census, May 2011

- Could Housing Market Stay Down For 14 More Years?
  The Consumerist, June 2011
Fundamental Economic and Demographic Changes Continue

As the economy tightens, younger car buyers are staying out of the new car market.
   The Consumerist, May 2011

Americans got used to staycations during the recession, but as the economy begins to recover many are now ready to graduate to the short-stay getaway...
   AP, May 2011

Women now hold nearly half of all paid U.S. jobs (49.8 percent)...narrowing the male-female wage gap to its lowest point in history.
   -UNC News, Jan 2011

U.S. Reports Continuing Drop in Birth Rate—
   Data show broad-based decline among all races, nearly all ages, and in all states.
   Healthday, March 2011

UPDATE: Gas Prices, Economy Leave Retailers With Mixed May Sales
   WSJ, 2011
Role of Communications Technology

• 30% of couples meet online, eHarmony is responsible for 5% of all marriages
• Holiday shoppers spent 12% more on line in 2010 than 2009
• 85% of Americans own cell phones, 25% of households have gone cell phone only
• 51% of Americans 12 years of age or older have a Facebook account
• There was a 21% increase in online course enrollment in colleges across the country in 2010.
• Households with teenage children had 5.2 online purchases and 4.2 home deliveries per month according to NHTS.
**Socio-Demographic Issues**
- Aging population
- Saturation of female labor force participation
- Different young adult behaviors
- Slowing migration - locked in homes/less mobile
- Reduced immigration
- Income/wealth impact
- Changing household composition
- Slowing of suburbanization?

**System Supply Issues**
- Future system supply and speed
- Energy and other costs
- Environment/climate concerns
- Evolving technology impacting travel
- Etc.
How can the current and future NHTS help us address transportation planning and policy issues going forward?
NHTS - A Fix for Data Addicts and Inoculation Against Uninformed Decisions