

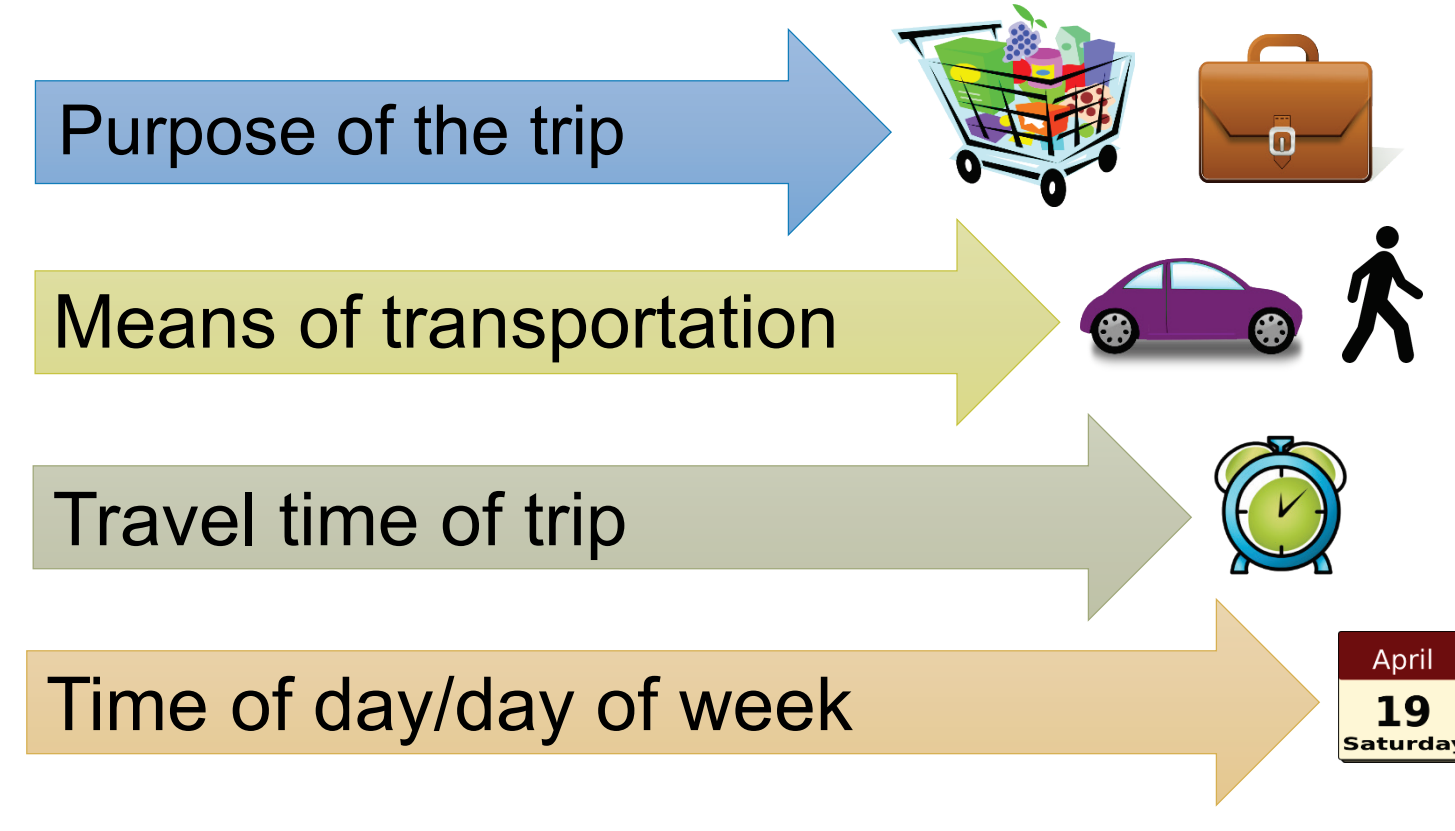
Improving Trip Reporting in the 2016 National Household Travel Survey

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 Disclaimer: Any views expressed are those of the authors and not necessarily those of the U.S. Department of Transportation.

What is the NHTS?

The National Household Travel Survey (NHTS) is a periodic national survey providing travel and transportation pattern data to transport planners and policy makers in the United States.

- 2016 NHTS:**
- Nation's daily travel inventory.
 - Surveying 103,112 households.
 - Daily trips/household over 24-hour period.



Analyzed for trips, modes, purposes, trip lengths, and geographic areas including urban and rural areas.

Previous Surveys:
 1969, 1977, 1983, 1990, 1995, 2001, and 2009.

How are the data collected?

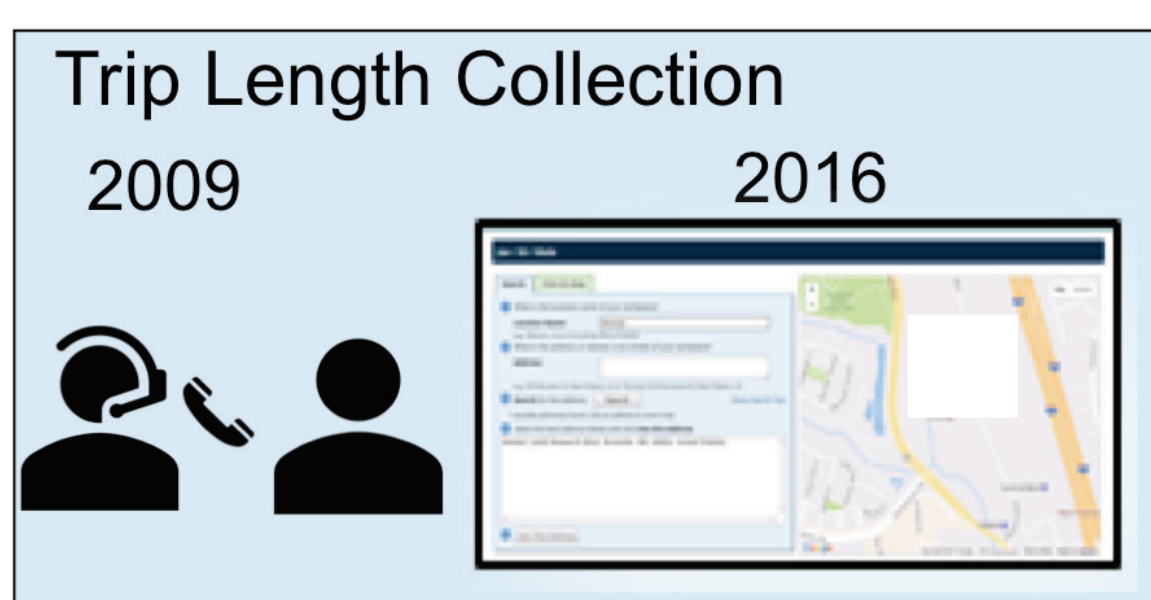
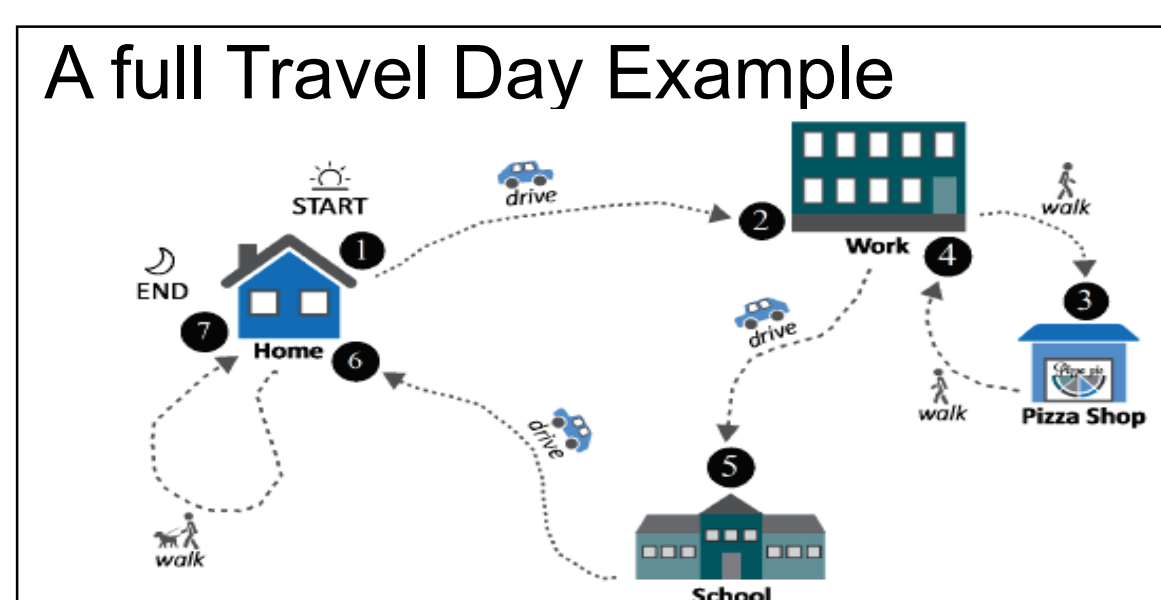
2016 NHTS DATA COLLECTION DESIGN

Recruitment

Randomly selected households receive introductory package. Voluntary participants mail back the completed recruitment survey.

Retrieval

Travel logs mailed to recruited households. Members (ages 5+) complete logs for assigned travel day (24-hour) via web or phone.

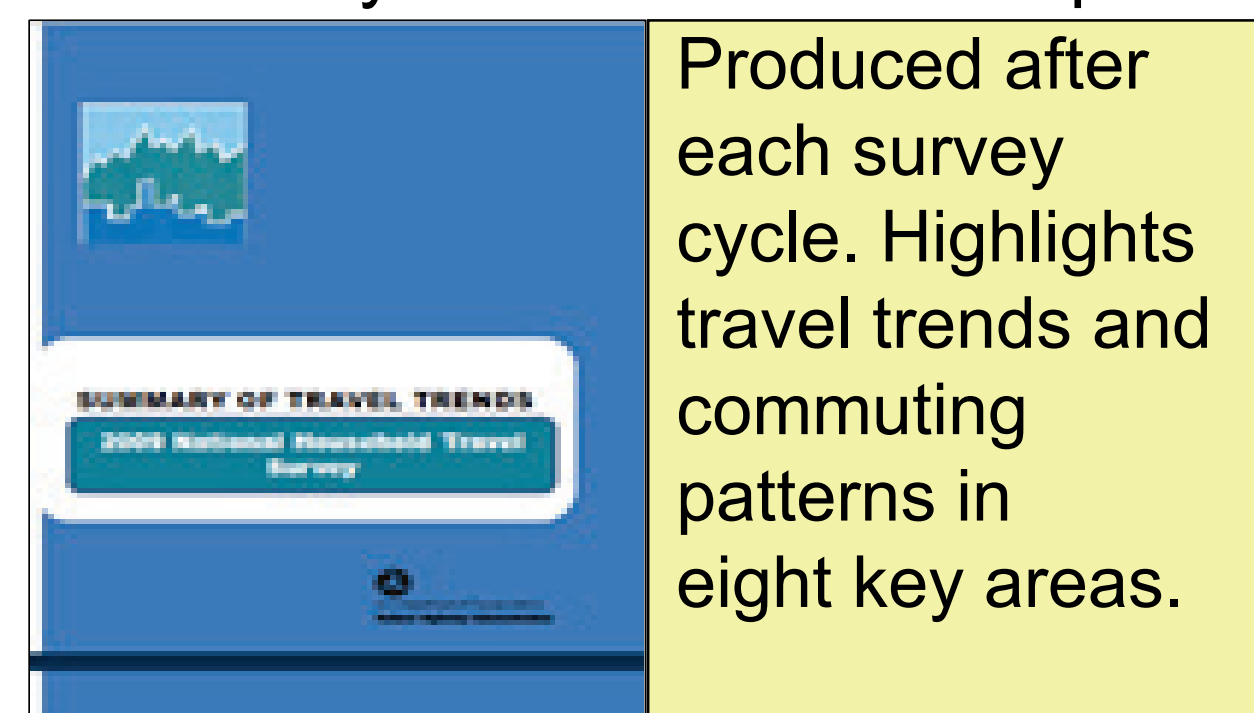


How are the data used?

TOPICS:



Summary of Travel Trends Report



Produced after each survey cycle. Highlights travel trends and commuting patterns in eight key areas.

Table 3: Summary of Travel Statistics 1969, 1977, 1983, 1990 and 1995 NPTS and 2001 and 2009 NHTS

	1969	1977	1983	1990	1995	2001	2009	95% CI
Per Person								
Daily Person Trips	2.02	2.32	2.89	3.76	4.35	3.74	3.75	0.03
Daily PMT	19.51	25.95	25.05	34.91	38.67	36.89	36.13	1.35
Per Driver								
Daily Vehicle Trips	2.32	2.34	2.36	3.26	3.57	3.35	3.02	0.03
Daily VMT	20.64	19.49	16.68	28.49	32.14	32.73	28.97	0.71
Per Household								
Daily Person Trips	6.36	7.58	7.20	8.34	10.49	9.66	8.50	0.59
Daily PMT	61.55	68.27	62.47	83.06	94.41	95.24	90.42	3.38
Daily Vehicle Trips	3.83	3.95	4.07	5.69	6.36	5.95	5.66	0.06
Daily VMT	34.01	32.97	32.16	49.76	57.25	58.05	54.38	1.34
Per Trip								
Average person trip length (miles)	9.67	8.87	8.68	9.47	9.13	10.04	9.75	0.36
Average vehicle trip length (miles)	8.89	8.34	7.90	8.85	9.06	9.87	9.72	0.22

Trends have been adjusted as needed due to changes in methods over time.

What are the objectives?

- To understand implications of change in methods to document trip length.
- To evaluate the differences in trip distances (in miles) between the 2009 self-reported distances and the 2016 real-time computer-aided trip distance calculations.

All graphs below contain four measures of trip length:

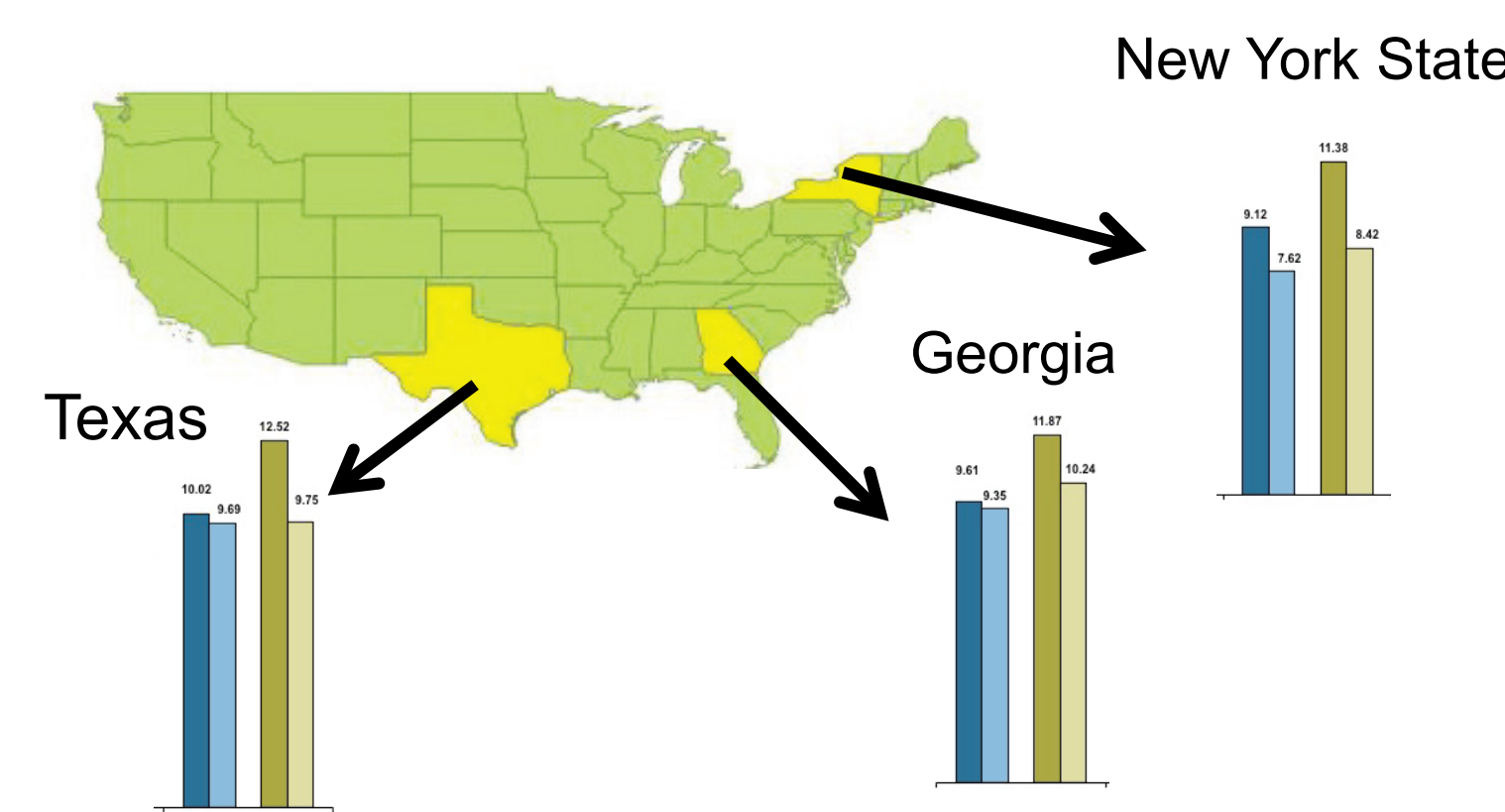
- For the 2009 NHTS, self-reported mileage (TRPMILES) and calculated Great Circle Distance (GCD) numbers are shown.
- For 2016 interim NHTS data, calculated GCD and route distances are presented.

GCD is defined as "the shortest distance between two points on the surface of a sphere, measured along the surface of the sphere (as opposed to a straight line through the sphere's interior)." Here we calculate GCD using Vincenty's Formulae via the GEODIST function in SAS.

[See https://en.wikipedia.org/wiki/Great-circle_distance and https://en.wikipedia.org/wiki/Vincenty's_formulae.]

What are the results?

Differences in Trip Length by Geography



2016 average trip miles were significantly higher than 2009 average self-reported trip miles, implying 2016 NHTS using real-time geocoding along routes captured longer trip miles (as expected).

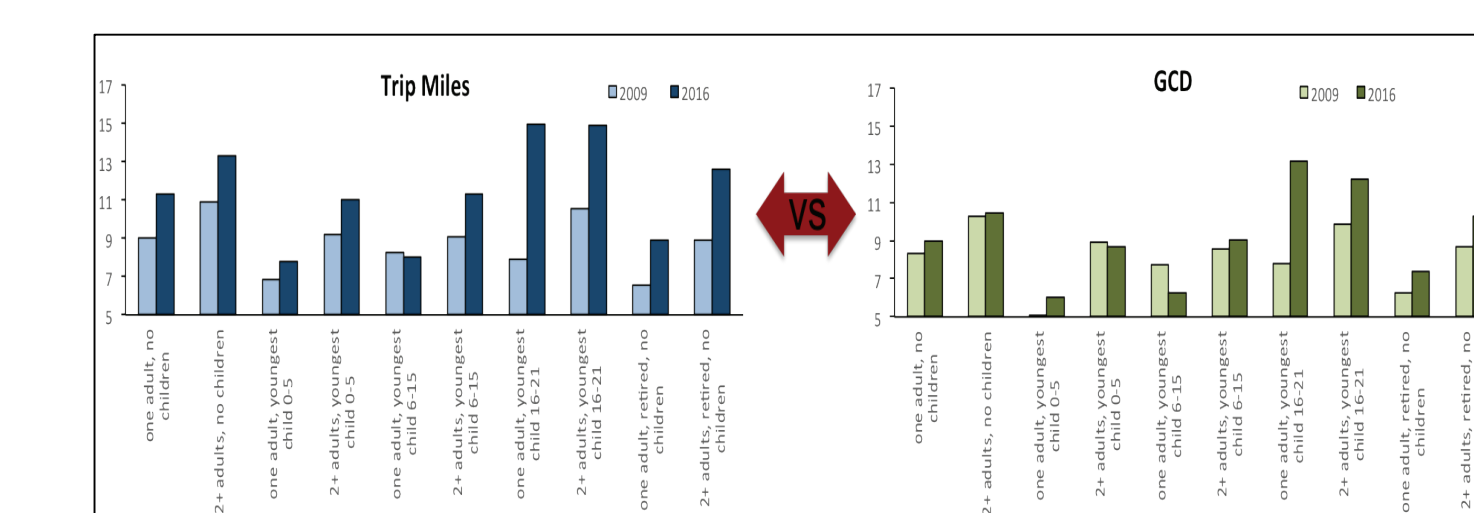
Differences in Trip Length by Trip Purpose

Trip Purpose	2009 Trip Miles	2016 Trip Miles	2009 GCD	2016 GCD
Work	13.38	15.70*	12.15	12.40
Shopping	11.59*	10.80	9.90*	8.39
Other	6.06	7.16*	5.89*	5.51
Commuting	9.61	12.72*	9.24	10.32*

2016 average trip miles for work trips, shopping trips, and other-purposed trips was also significantly greater than 2009 average self-reported trip miles.

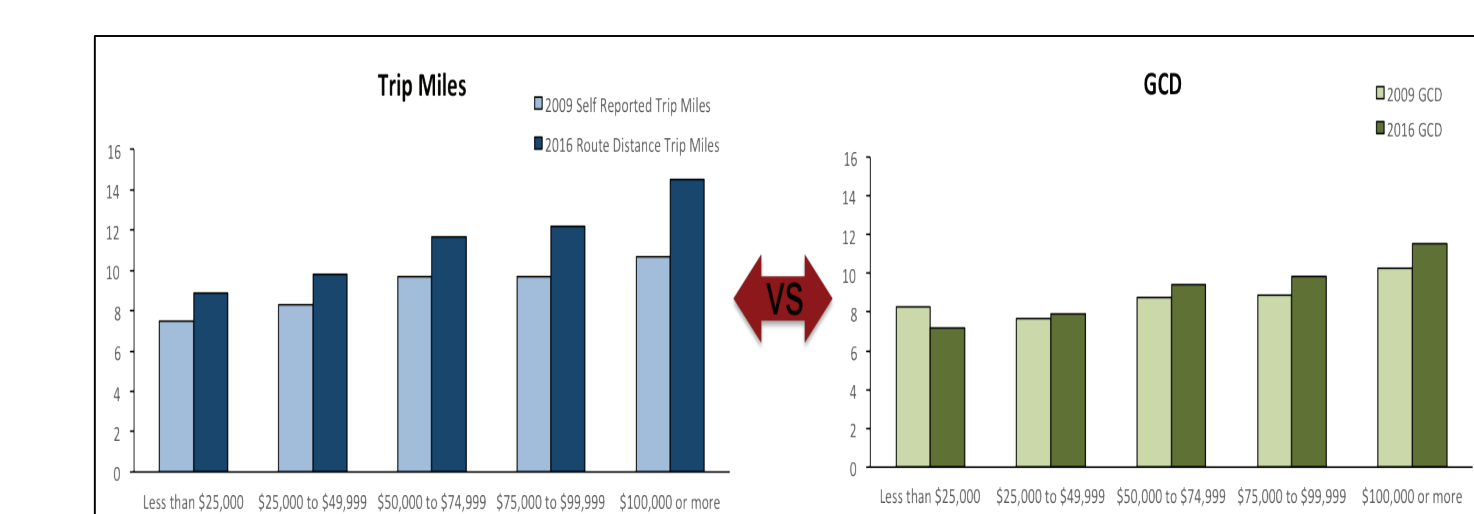
*Significantly higher than the other group in comparison, based on two-sided tests assuming equal variances and significant level of 0.05.

Differences in Trip Length by Life Cycle



In all groups except the "one adult with youngest child 6-15" category, the 2016 average trip miles was significantly greater than the 2009 average trip miles.

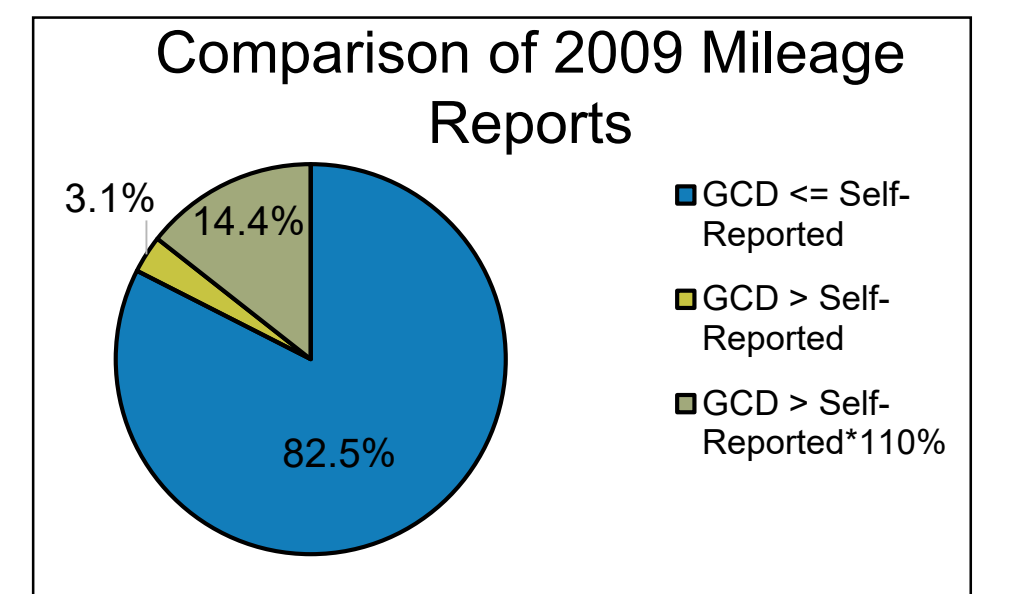
Differences in Trip Length by Income



Regardless of income level, the 2016 average trip miles was significantly greater than the 2009 average.

What are the findings?

- GCD values show a slight increase between 2009 and 2016.
- Difference between self-reported miles in 2009 and route miles in 2016 is more pronounced, indicating self-reported trip mileage can be inaccurately estimated.
- Out of the 350,000+ trips from 2009, 17.5% had self-reported values under the GCD number, with 14.4% having at least 10% fewer miles than the GCD value. A large number of trips that are impossibly low has the potential to bias mileage numbers downward.
- The 2016 NHTS design eliminates respondent bias by allowing them to choose origins and destinations on a map. 2016 data are anticipated to provide more accurate trip mileage data by using efficient mapping tools and increased quality control.



What's next?

FUTURE RESEARCH

- All measures of mileage are valid. User documentation needs to be enhanced to provide insights as to when it is appropriate to use each measure.
- The team plans to run the 2009 origin-destination address details through a Google mapping tool to estimate route miles. This will provide the final piece of the puzzle in comparing the mileage obtained in both surveys.
- The reported mileage will be analyzed by travel mode to identify whether the differences in mileage estimates vary by travel mode. Walk trips in particular will be investigated.
- A mileage adjustment factor will be developed to allow for a better comparison between 2009 and 2016 results. It will also be applied to prior data sets (all containing self-reported mileage).

Acknowledgements

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- Special thanks to the Georgia DOT, New York State DOT, and Texas DOT for permission to analyze the detailed origin-destination data in this research.
- For more details about the NHTS, visit <http://nhts.ornl.gov>.
- For more information about the 2016 NHTS, visit www.nationalhouseholdtravelsurvey.com.