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# An Assessment of Public Transportation Markets Using NHTS Data

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# Outline

- Source of information
- Motivation
- Objectives
- Data and methodology
- Results on market size
- Results on modal share
- Results on attitudes
- Results on socio-demographics of transit markets
- Results on trip characteristics of transit markets
- Conclusions
- Questions



## Source of Information

- Based on *An Assessment of Public Transportation Markets Using NHTS Data*
- A recent report of the National Center for Transit Research at CUTR
- Funded by the Florida Department of Transportation
- Diane Quigley was the project manager
- Xuehao Chu was the principal investigator
- The report is available at:

<http://www.nctr.usf.edu/wp-content/uploads/2012/03/77920.pdf>



# Motivation

APTA's 2007 Passenger Profile

- APTA's 2007 report – *A Profile of Public Transportation Passenger Demographics and Trip Characteristics Reported in On-board Surveys*
- Tabulated data from 150 on-board surveys
- Collected by transit agencies during 2000-2005
- Defined several transit markets for each of 15 demographic & trip characteristics (e.g., trip purpose)
- Weighted by system-wide annual ridership
- Determined market size (i.e., the distribution of transit riders across the markets for each characteristic)
  - E.g.: 59.2% of the riders were on their way to work



# Motivation

## Concerns

- Results from the 2007 profile report are part of APTA's annual *Public Transportation Fact Book*
- They are widely cited
  - Transit industry and government reports
  - Speeches of government officials
- They are used as important parameters in transportation studies, including *Moving Cooler*
- The data did not come from a uniform and statistically rigorous process
- The results are limited to information on the size of transit markets without their characteristics



# Objectives

Study

- To assess transit markets from several perspectives:
  - Market size
  - modal share
  - Attitudes
  - Socio-demographics
  - Trip characteristics
- To use data based on a uniform and statistically rigorous process
- To present descriptive information about these markets



# Objectives

Presentation

- To introduce basic information about the 2009 NHTS
- To show how the 2009 NHTS data were used in defining and assessing transit markets
- To highlight results from the assessment:
  - Market size
  - modal share
  - Attitudes
  - Socio-demographics
  - Trip characteristics



# Data and Methodology

## The 2009 NHTS Sample

- 2009 National Household Travel Survey (NHTS)
- 150,147 households, including 15,884 for Florida
- Each sample household given a travel day
- Telephone interviews based on pre-mailed diaries
- All persons 5 years of age or older
- All travel on the travel day:
  - All modes
  - All purposes
  - All trip lengths, and
  - All areas of the country, urban and rural
- Weights to expand the sample to national totals





# Data and Methodology

## Unit of Travel Data

- Travel data were collected for individual *person-trips* made by sample households on their travel day
- A person-trip is defined as any time a person went from one address to another for purposes other than changing the mode
- A person-trip is a one-way trip from its origin to its destination
- A person-trip is a linked trip for any mode, particularly for transit



# Data and Methodology

## Relevant Data Content

- Household and locational characteristics
  - Annual household income, vehicle availability, race and ethnicity, housing density, urbanized area
- Personal characteristics
  - Person age, driver status, immigration status, existence of medical conditions
- Personal habits and attitudes
  - Monthly frequency of transit use during the month immediately before the travel day
  - Attitudes toward transportation issues
- General trip characteristics
  - Day of week, start time, distance, duration, purpose, main mode (the one used for most of the distance)



# Data and Methodology

## Transit Trips and Characteristics

- Transit modes – local public bus, commuter bus, commuter train, subway or elevated train, and street car or trolley
- Transit trips – person-trips whose main mode is one of these transit modes
- Transit-specific trip characteristics:
  - Wait time
  - Up to 5 access modes
  - Up to 5 egress modes
  - Total access time
  - Total egress time



# Data and Methodology

## Data Quality

Population Segments	Sampled Transit Trips	Estimated Annual Transit Trips (millions)	95% Margin of Error (millions)	Standard Error (millions)	Coefficient of Variation (COV)
U.S. total	8,521	7,520	493.4	251.7	3.3%
U.S. zero-vehicle households	3,532	3,612	371.7	189.6	3.5%
U.S. non-drivers	910	922	200.7	102.4	11.1%
U.S. non-drivers in zero-vehicle households	520	541	174.6	89.1	16.5%
Florida total	513	228	55.5	28.3	12.4%



# Data and Methodology

## Characteristics for Defining Markets

	Characteristics	Description
Personal	Driver status	Whether one is at least 15 years old and, if so, whether one is a driver
	Immigration status	Whether one is an immigrant and, if so, year entered the U.S.
	Existence of medical conditions	Whether one has a condition that makes it difficult to travel outside of the home
Household	Household income	Ranges of annual household income
	Vehicle availability	Number of vehicles for household use relative to number of workers
	Race and ethnicity	Race and ethnicity of the householder
Travel	Frequency of transit use	Monthly number of times a person used transit
	Trip purpose	Purpose of individual person-trips on the travel day



# Data and Methodology

## Criteria for Defining Markets

Characteristics		Criteria			
		Segment 1	Segment 2	Segment 3	Segment 4
Personal	Driver status	Children (under 15 years of age)	Drivers	<b>Non-drivers</b>	
	Immigration status	<b>New immigrants</b> (2000-2009)	Older immigrants	Non-immigrants	
	Existence of medical conditions	<b>With conditions</b>	Without conditions		
Household	Household income	<b>Under \$15,000</b>	\$15,000-\$49,999	\$50,000-\$99,999	\$100,000+
	Vehicle availability	<b>Zero vehicles</b>	Vehicles < workers	Vehicles ≥ workers	
	Race and ethnicity	<b>Hispanics</b>	Non-Hispanic Whites	<b>Non-Hispanic Blacks</b>	Non-Hispanic Others
Travel	Frequency of usage	<b>30+ /month</b>	10-29/month	1-9/month	Non-users
	Trip purpose	<b>Work &amp; related</b>	School	Medical & dental	Others



# Data and Methodology

## Socio-Demographic Characteristics for Assessing Transit Markets

Category	Characteristics	Segments	Category	Characteristics	Segments
Personal	Person age	Under 18	Location	Housing density	0-999 units/square miles
		18 - 64			1,000-3,999 units/square mi.
		65+			4,000+ units/square miles
	Driver status	Under 15		Status and size of urbanized areas (UZA)	UZA 50,000-199,999
		Driver			UZA 200,000-999,999
		Non driver			UZA 1 million+
	Immigration status	New immigrant	Non UZA	Travel	Monthly frequency of transit use
Older immigrant		10 - 29 times a month			
medical conditions	Non immigrant	Having medical conditions	1 - 9 times a month		
	No medical conditions	No medical conditions	Non user		
Household	Household income	Under \$15,000	Transit not available		
		\$15,000 - \$49,999			
		\$50,000 - \$99,999			
		\$100,000+			
	Vehicles relative to workers	Zero vehicle			
		Vehicles < workers			
		Vehicles >= workers			
Race and ethnicity	Hispanic				
	Non-Hispanic White				
	Non-Hispanic Black				
		Non-Hispanic Other			



# Data and Methodology

## Trip Characteristics for Assessing Transit Markets

- Transit-Specific Characteristics
  - Wait time
  - Last access mode
  - First egress mode
  - Total access time
  - Total egress time
- General Characteristics
  - Day of week
  - Start time
  - Purpose
  - Distance
  - Duration
  - Speed





# Data and Methodology

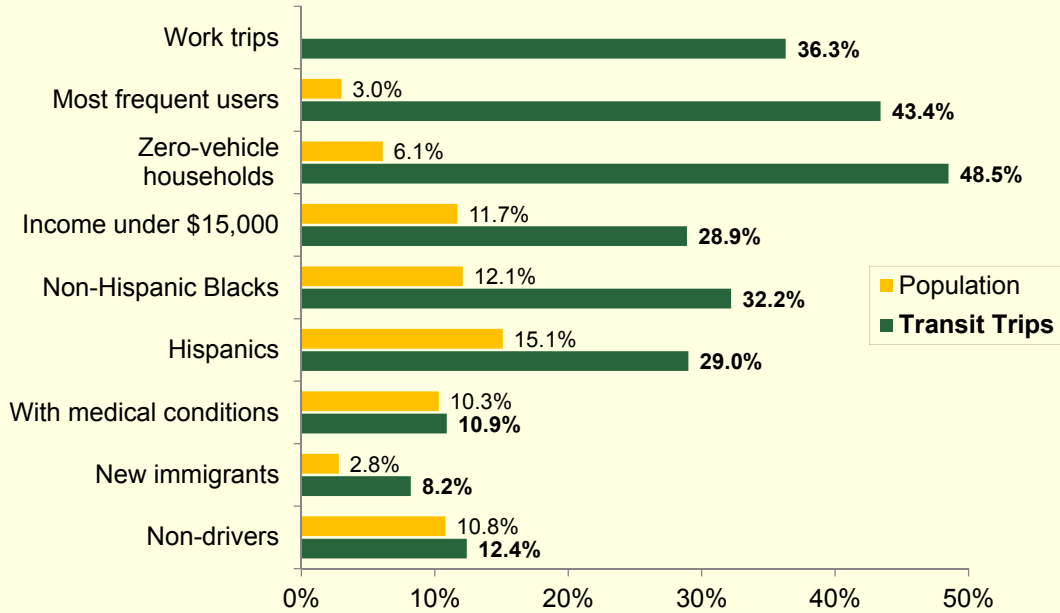
## Interpretation of Results

- Descriptive of the characteristics of transit markets, rather than presenting causal relationships
  - Transit modal share = 6.9% for persons under \$15,000
  - Transit modal share = 1.2% for persons \$100,000+
- Characteristics of trip markers, rather than persons
  - Similar to tabulated data from on-board surveys (riders not persons)
  - Persons making 4 times as many trips have 4 times as much influence on the results



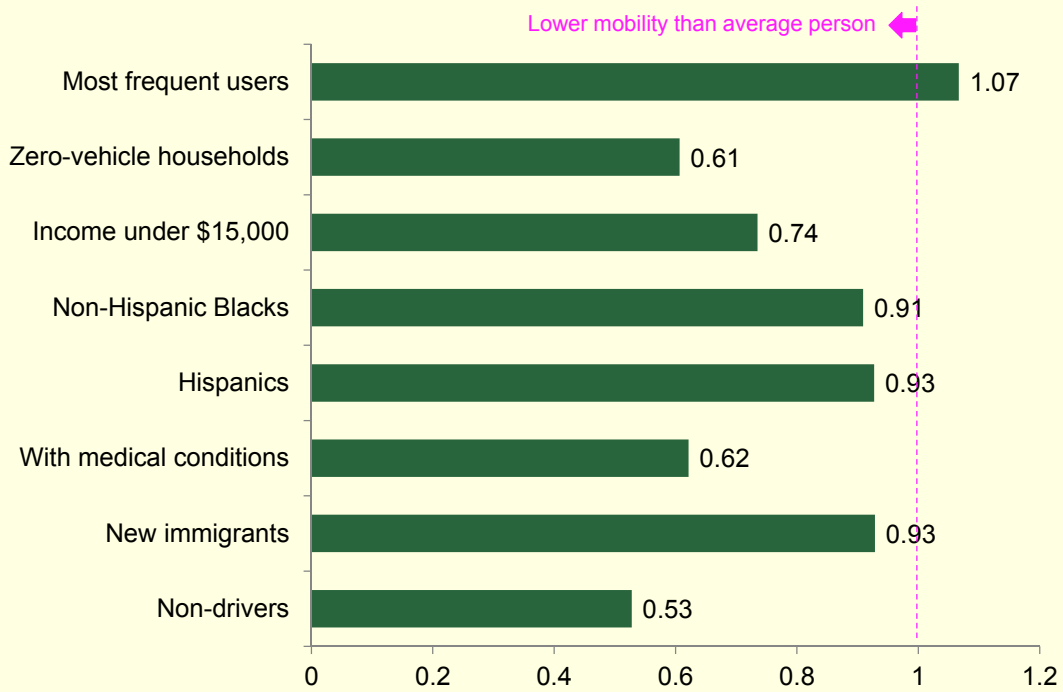
# Results on Market Size

Share of All Transit Trips vs. Share of Population for Selected Transit Markets



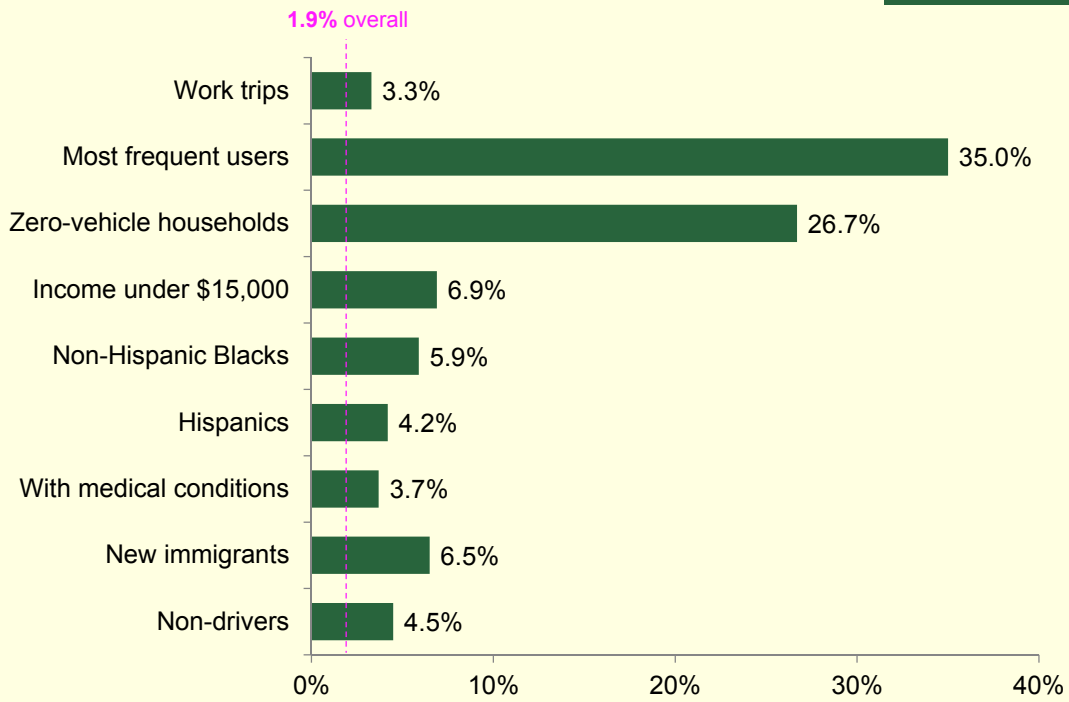
# Results on General Mobility

Ratio of Share of Travel by all Modes over Share of Population for Selected Markets



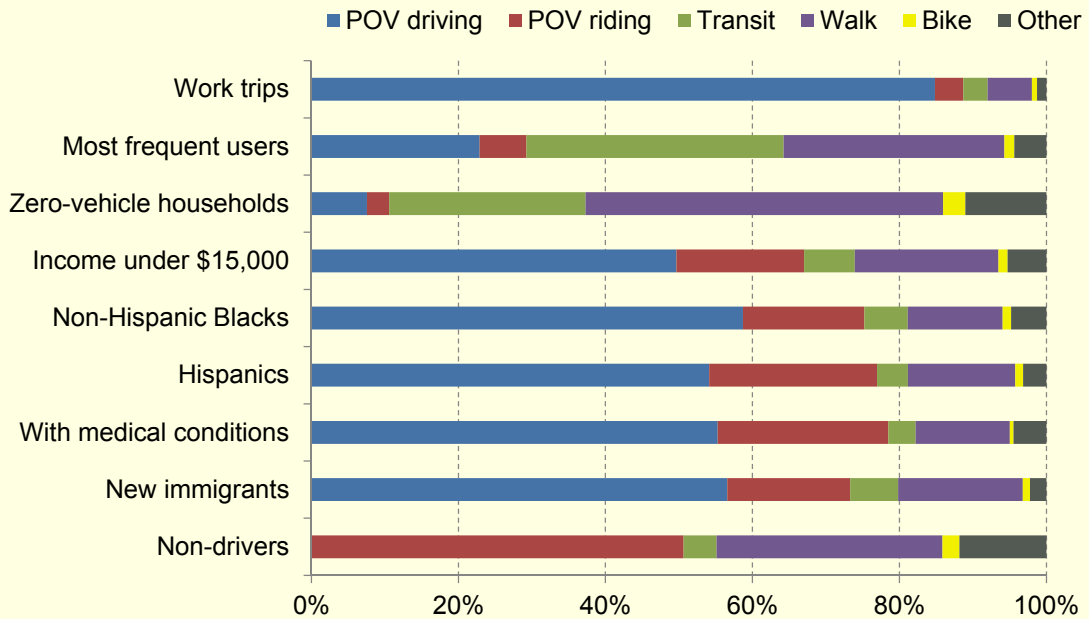
# Results on Modal Share

Transit's Share of Person Trips by All Modes for Selected Markets



# Results on Modal Share

Distribution of All Person Trips across Major Modes for Selected Markets

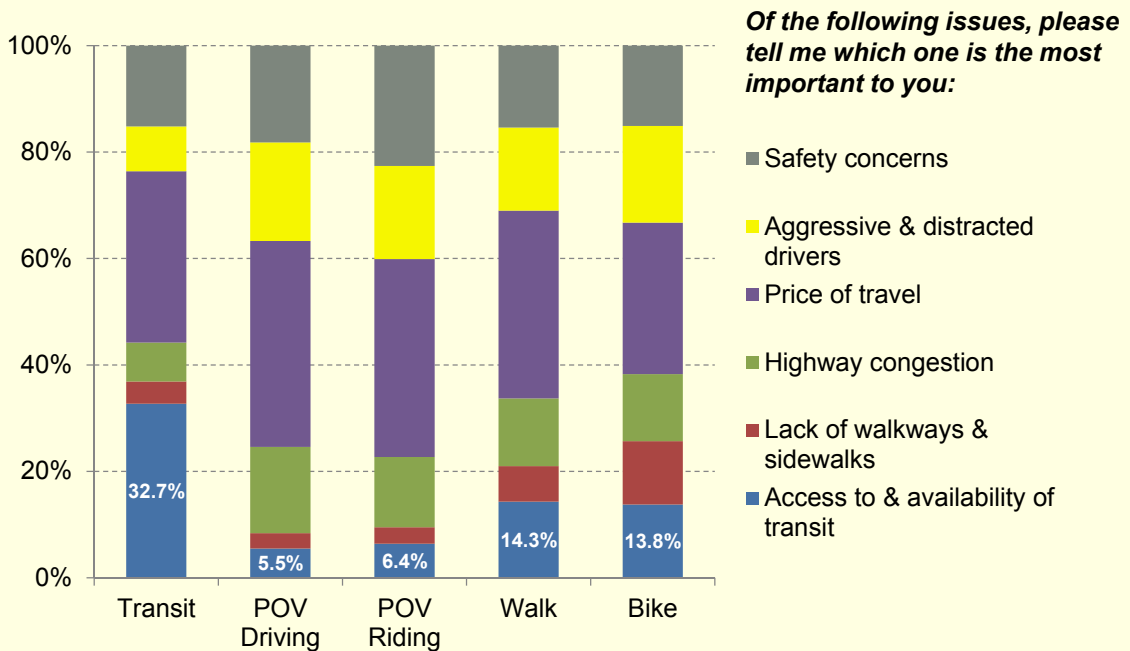


POV = privately operated vehicles



# Results on Attitudes

Distribution of Trip Makers by Their Most Important Issue for Each Major Mode

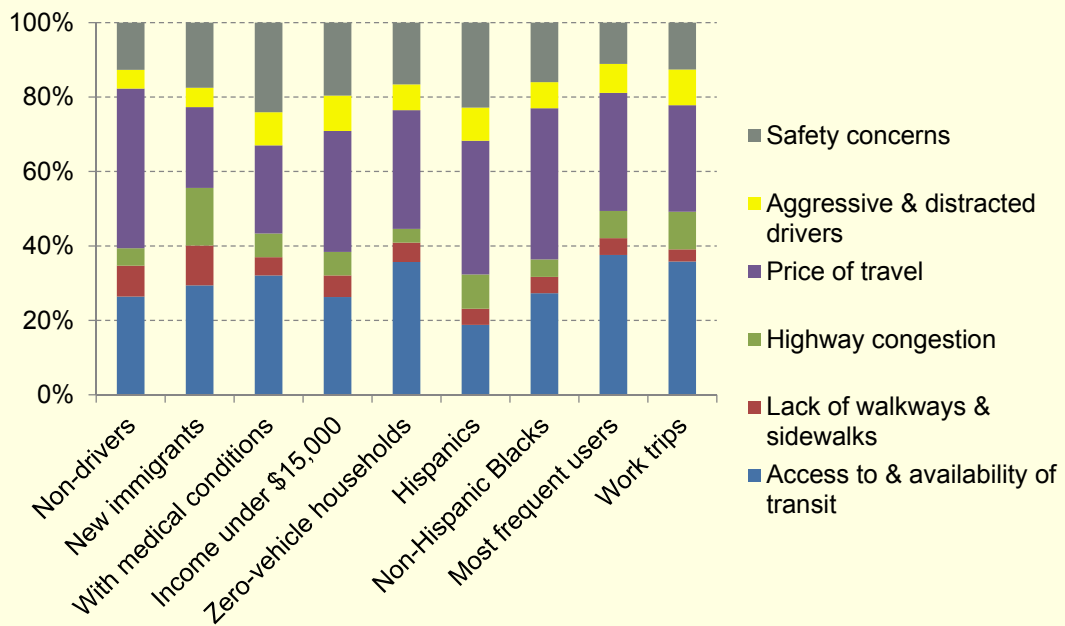


POV = privately operated vehicles



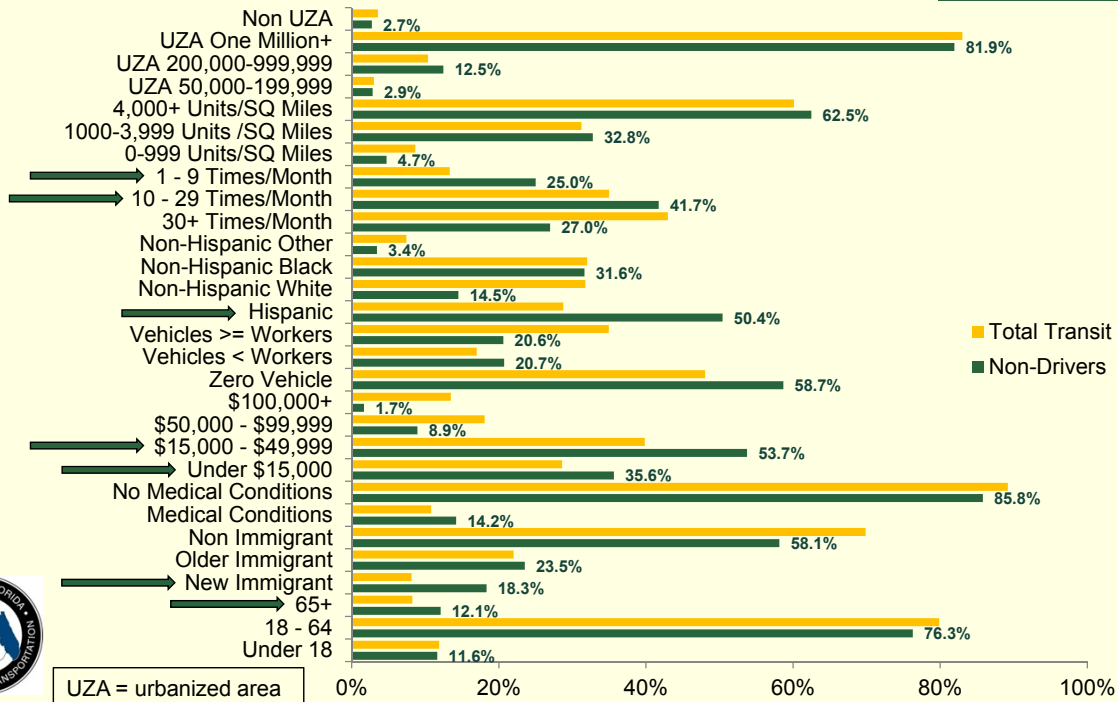
# Results on Attitudes

Distribution of Transit Trip Makers by Their Most Important Issue for Selected Markets



# Results on Socio-Demographics

Distribution of Transit Trips Made by *Non-Drivers*



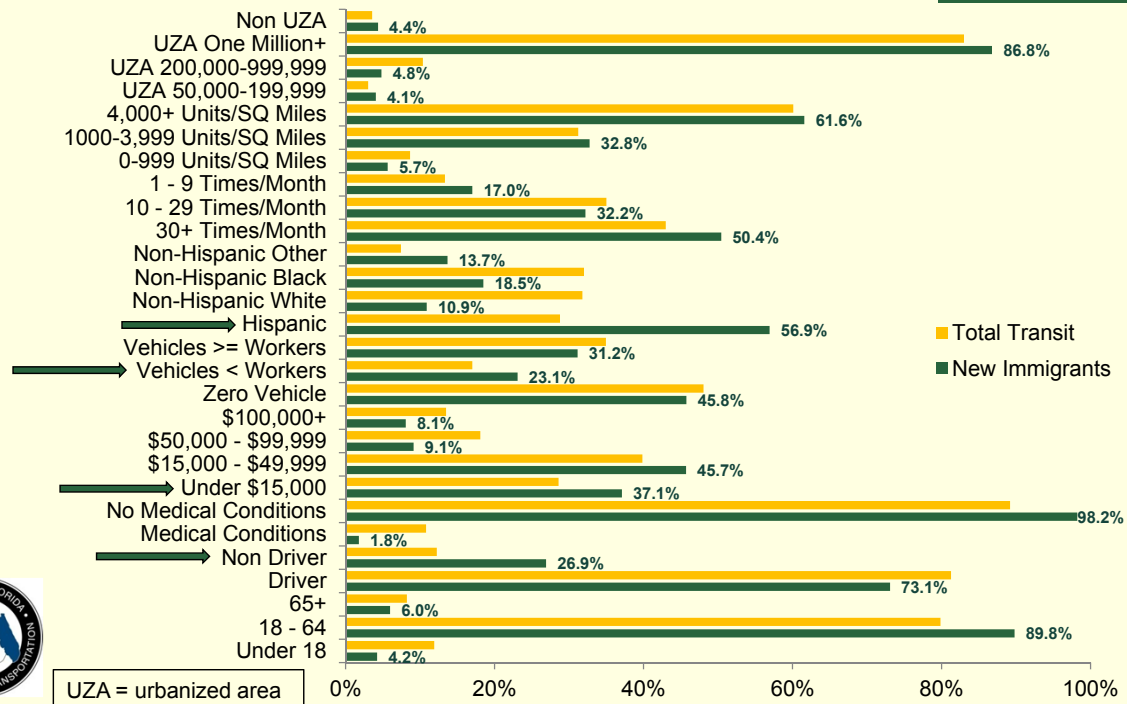
UZA = urbanized area





# Results on Socio-Demographics

Distribution of Transit Trips Made by *New Immigrants*

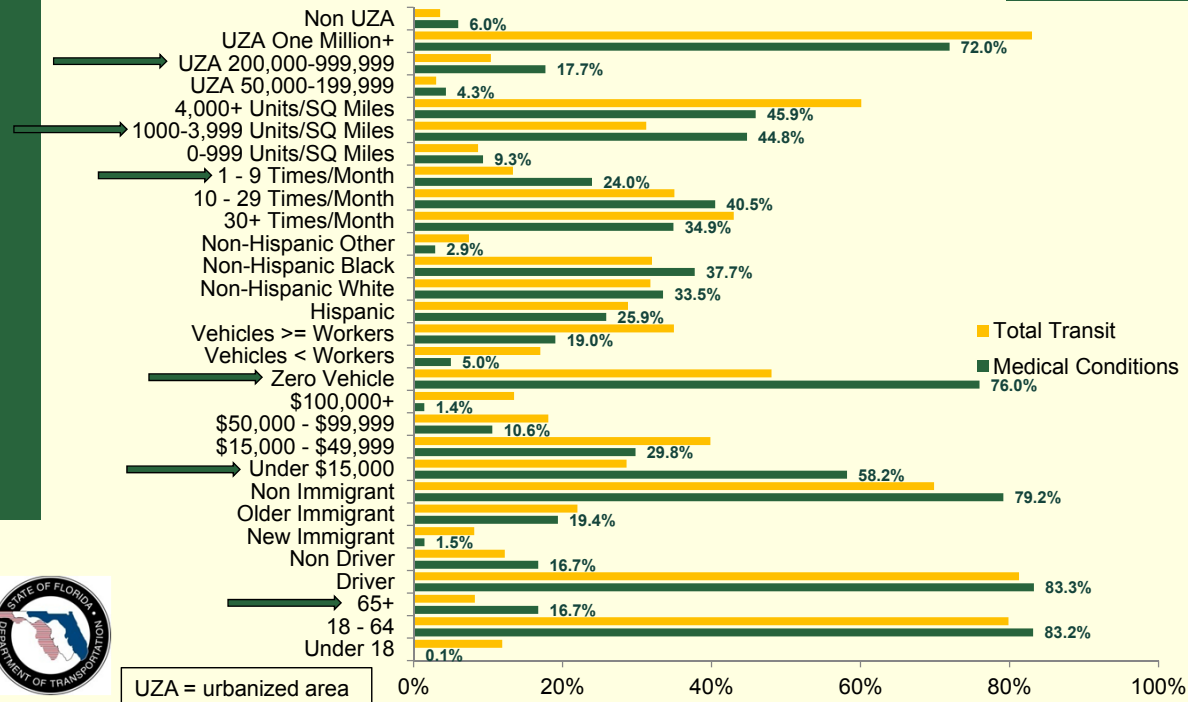


UZA = urbanized area



# Results on Socio-Demographics

Distribution of Transit Trips by Persons with *Medical Conditions*

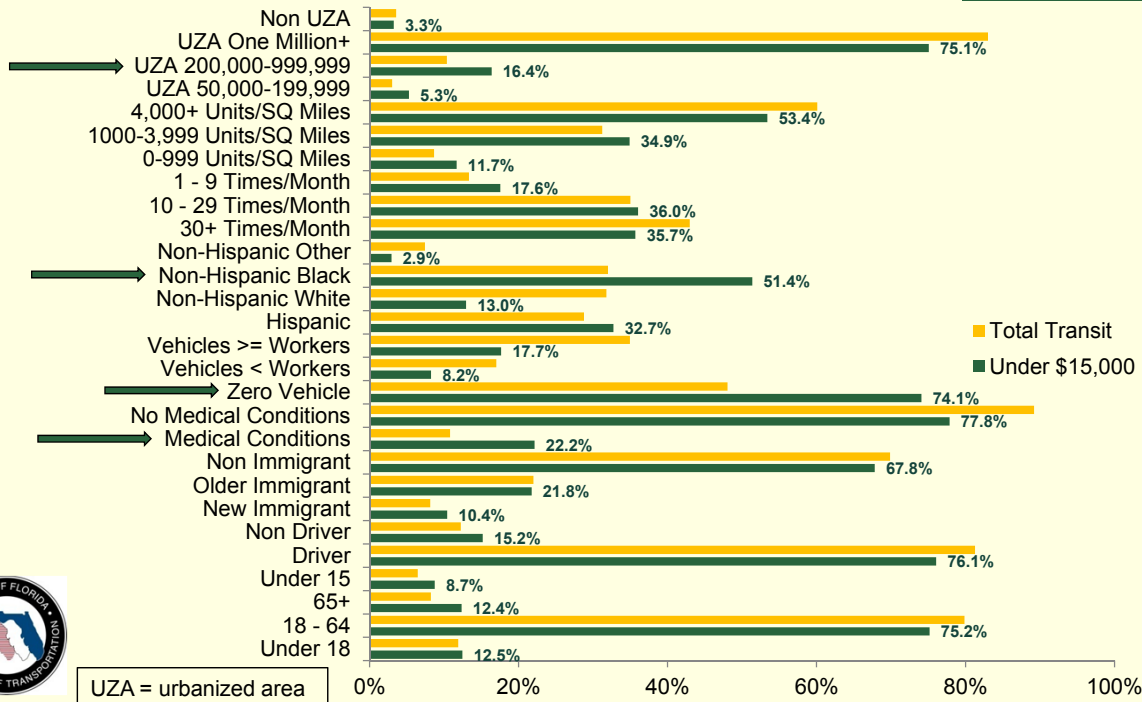


UZA = urbanized area



# Results on Socio-Demographics

Distribution of Transit Trips Made by Persons with *Income under \$15,000*

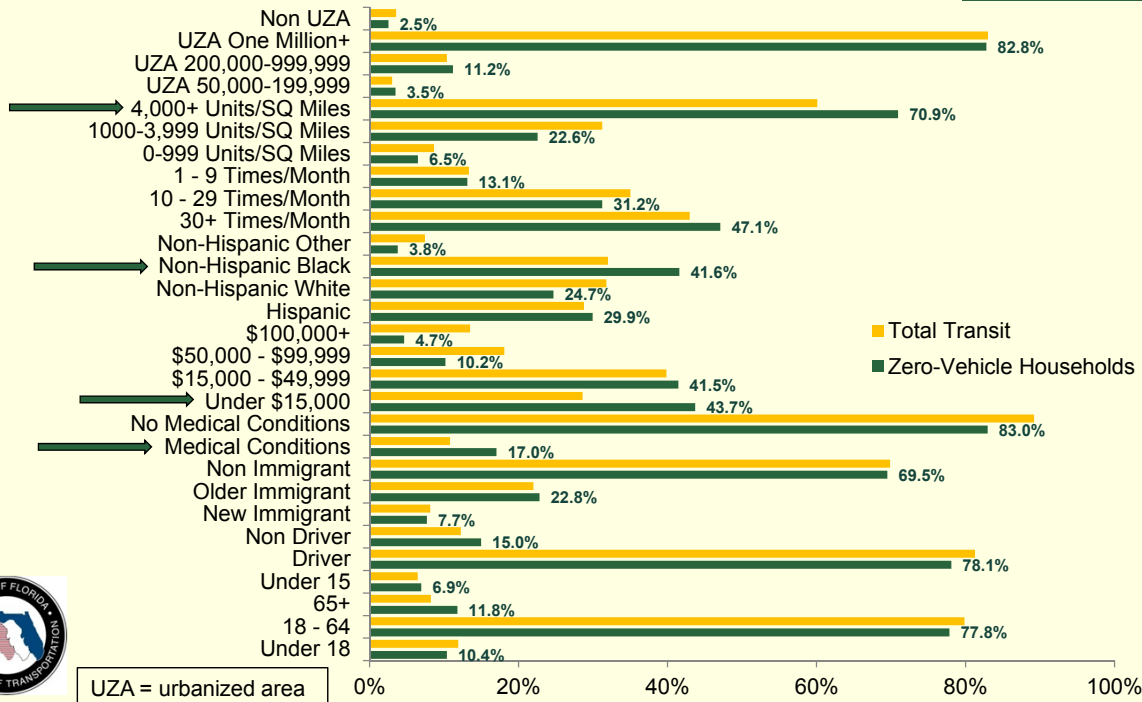


UZA = urbanized area



# Results on Socio-Demographics

Distribution of Transit Trips Made by *Zero-Vehicle Households*

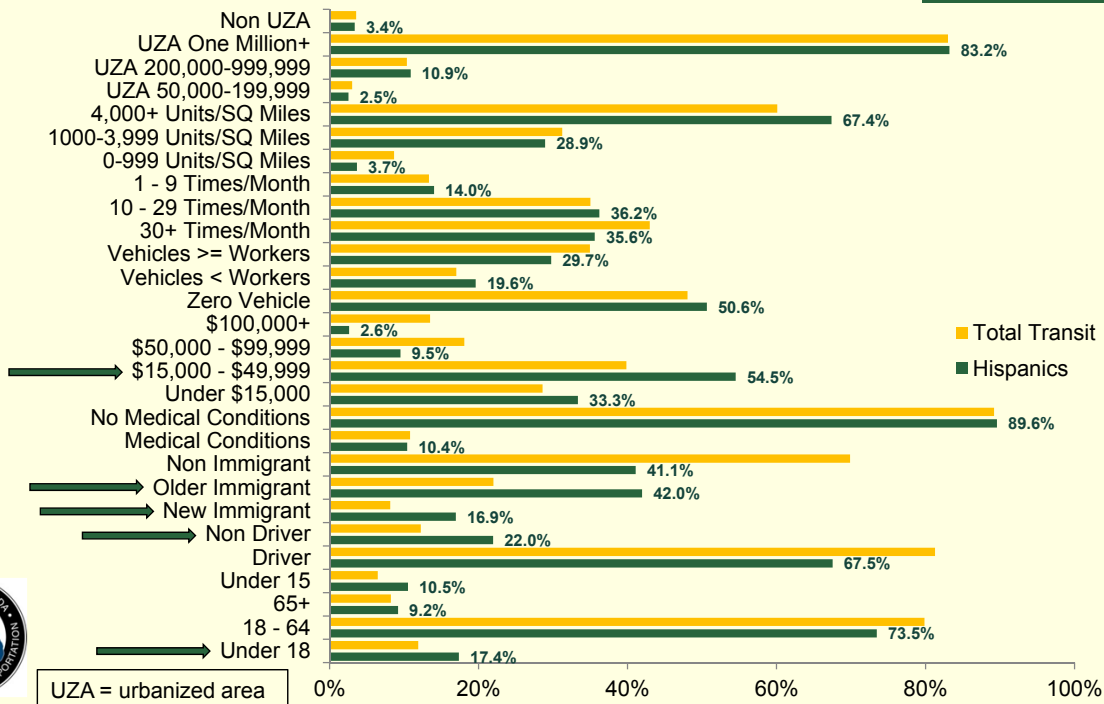


UZA = urbanized area



# Results on Socio-Demographics

Distribution of Transit Trips Made by *Hispanics*

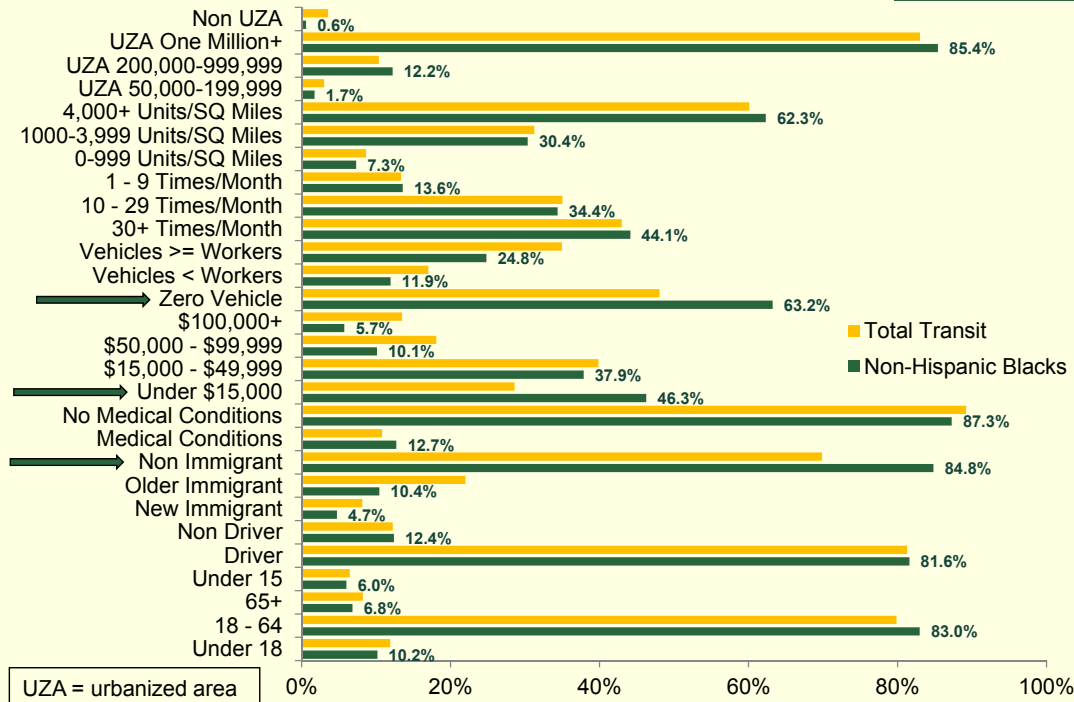


UZA = urbanized area



# Results on Socio-Demographics

Distribution of Transit Trips Made by *Non-Hispanic Blacks*

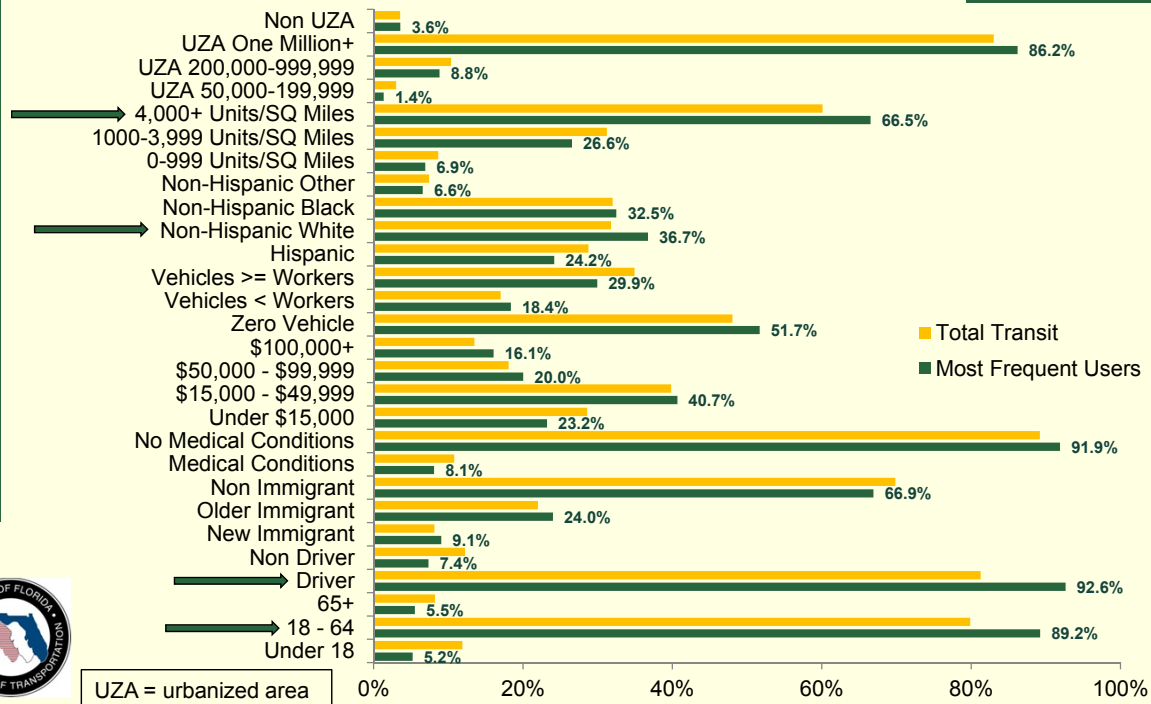


UZA = urbanized area



# Results on Socio-Demographics

Distribution of Transit Trips Made by the *Most Frequent Users*

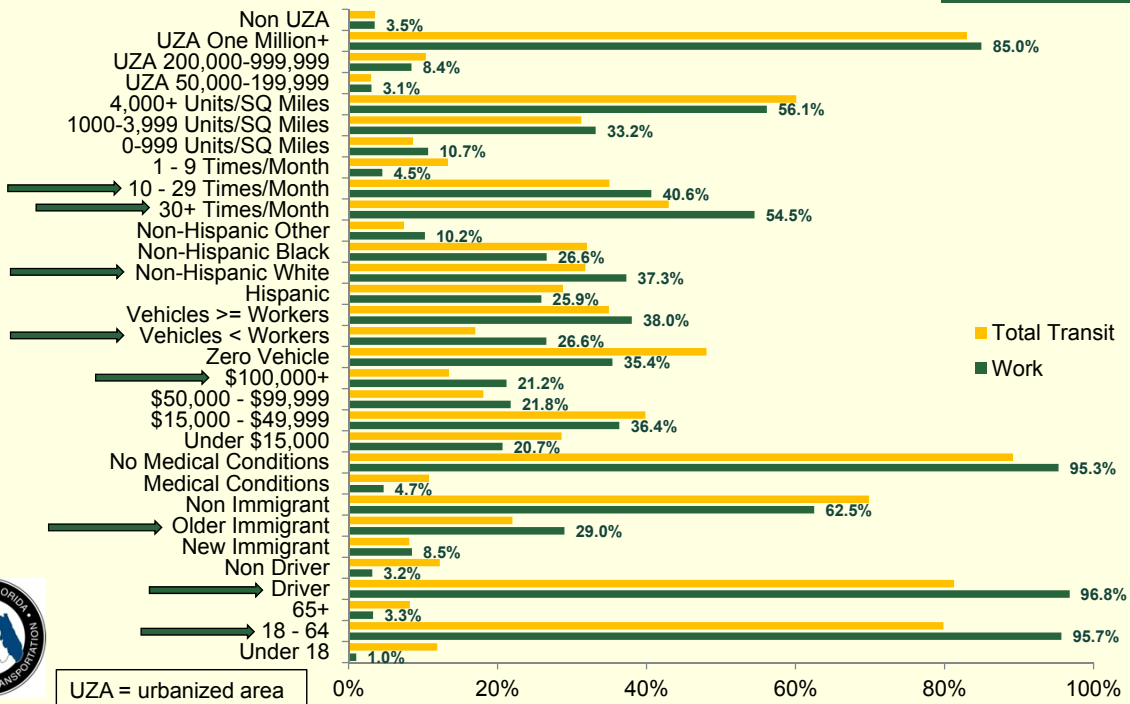


UZA = urbanized area



# Results on Socio-Demographics

Distribution of Transit Trips Made for *Work Purposes*



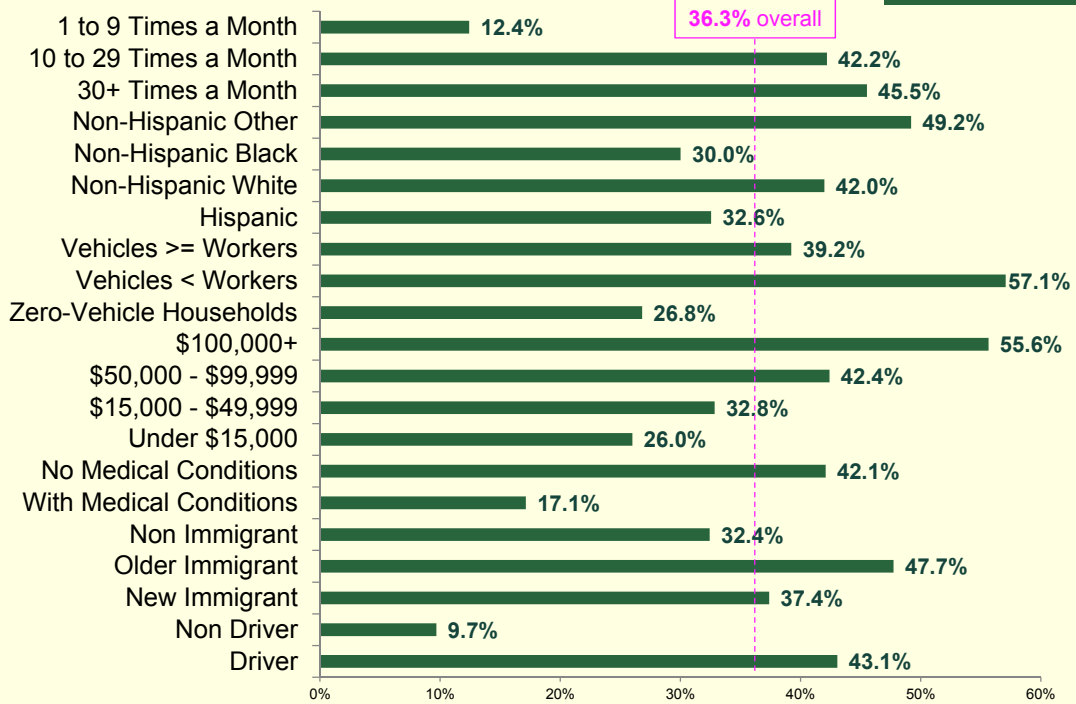
UZA = urbanized area





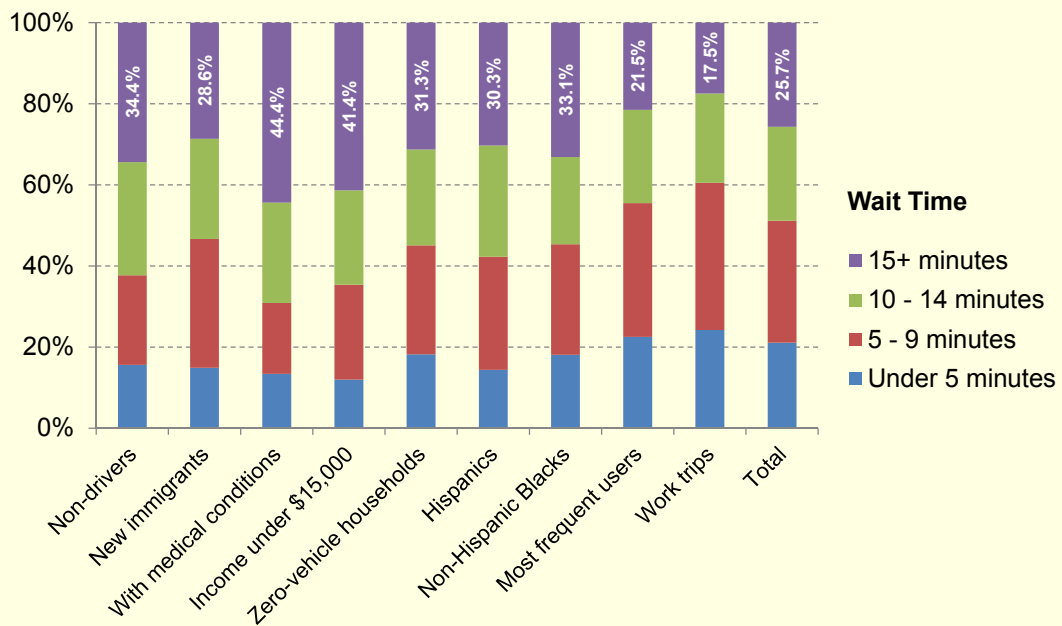
# Results on Trip Characteristics

Percent of Transit Trips for Work Purposes



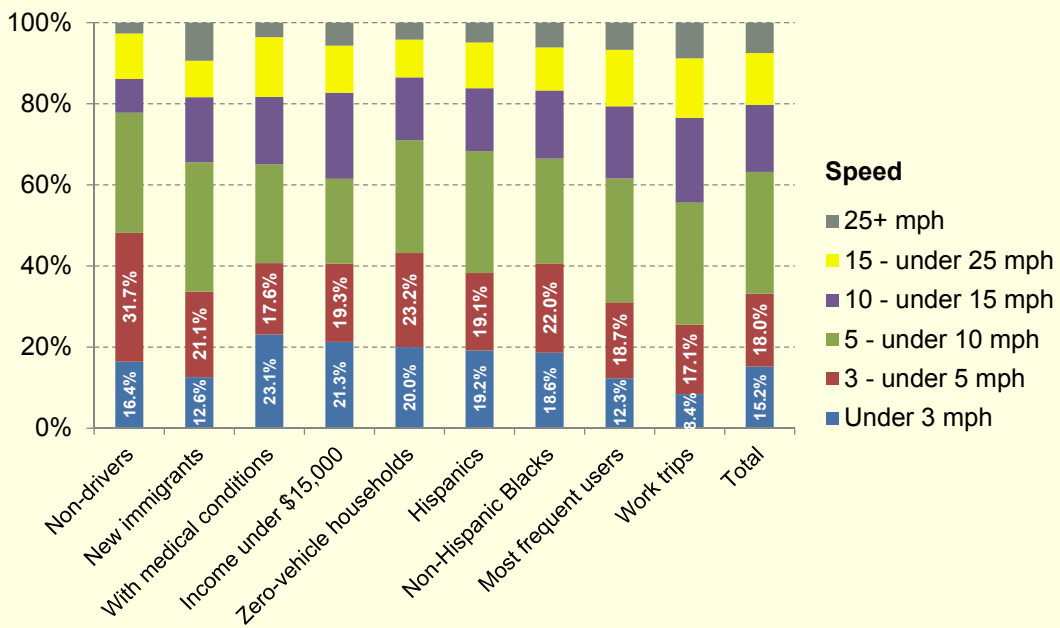
# Results on Trip Characteristics

Distribution of Transit Trips by Wait Time for Selected Transit Markets



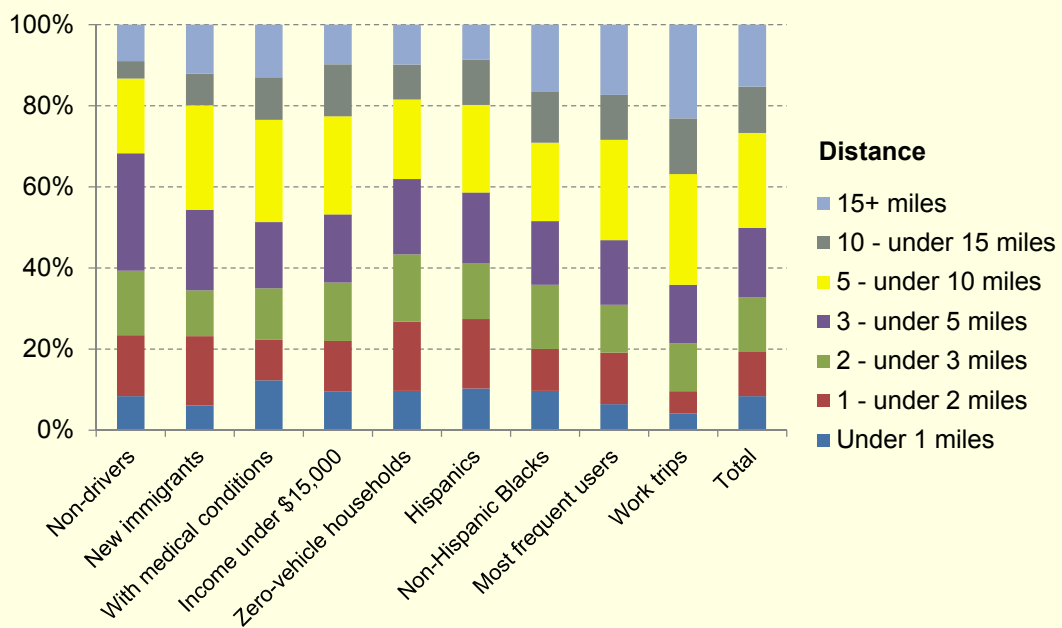
# Results on Trip Characteristics

Distribution of Transit Trips by Door-to-Door Speed for Selected Transit Markets



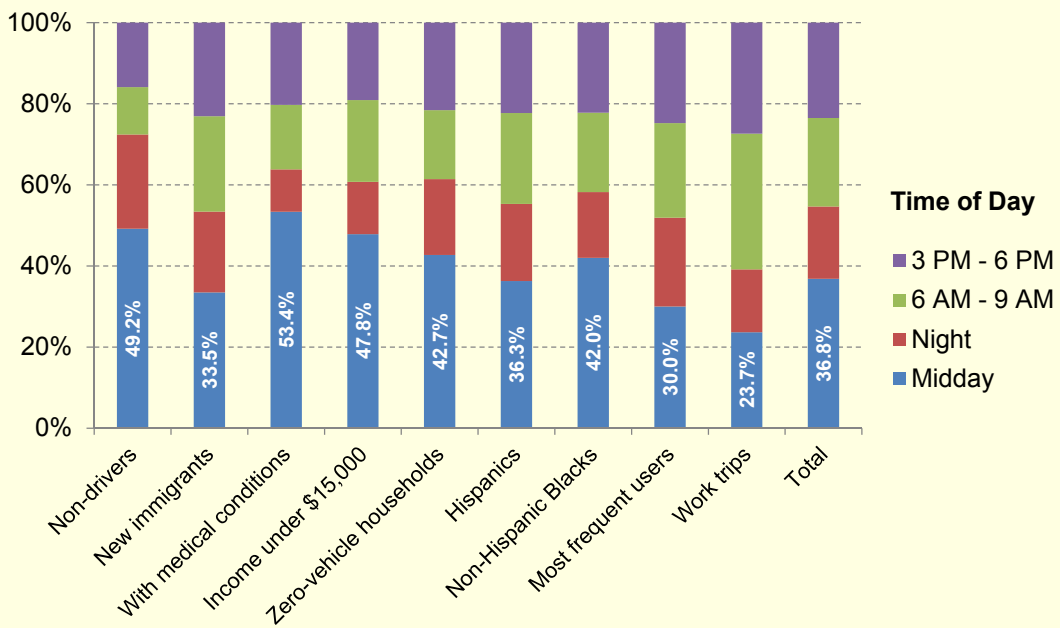
# Results on Trip Characteristics

Distribution of Transit Trips by Door-to-Door Distance for Selected Transit Markets



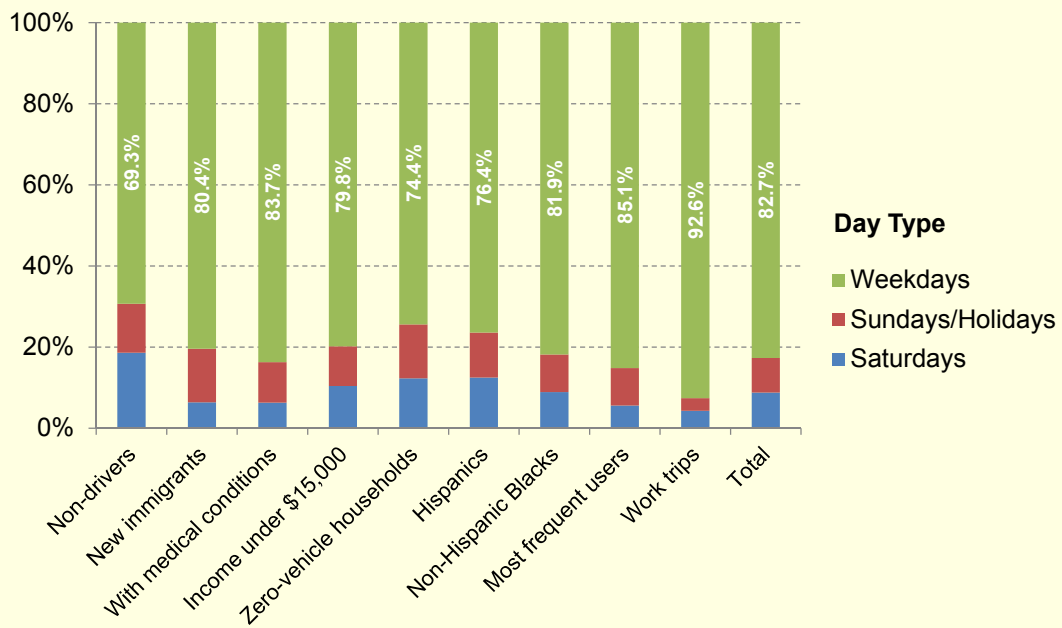
# Results on Trip Characteristics

Distribution of Transit Trips by Time of Day for Selected Transit Markets



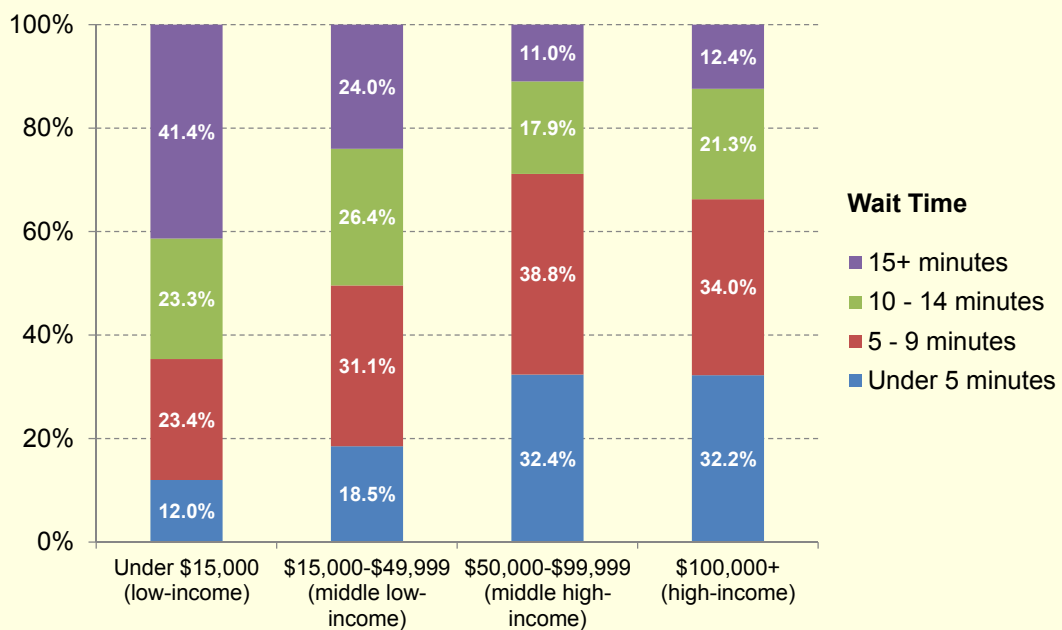
# Results on Trip Characteristics

Distribution of Transit trips by Day Type for Selected Transit Markets



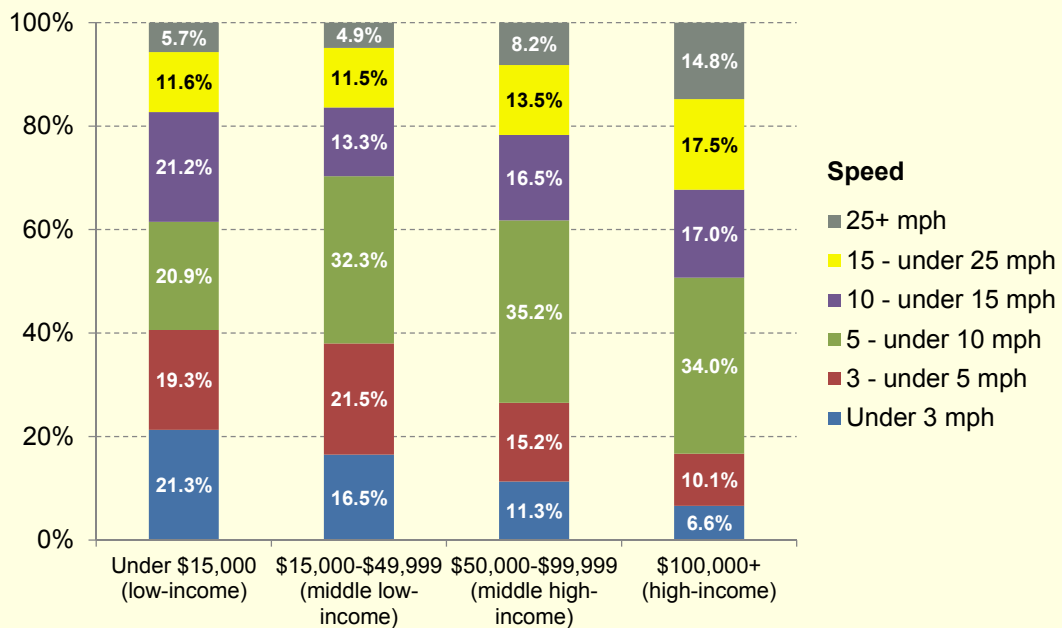
# Results on Trip Characteristics

Distribution of Transit Trips by Wait Time for Income-Based Markets



# Results on Trip Characteristics

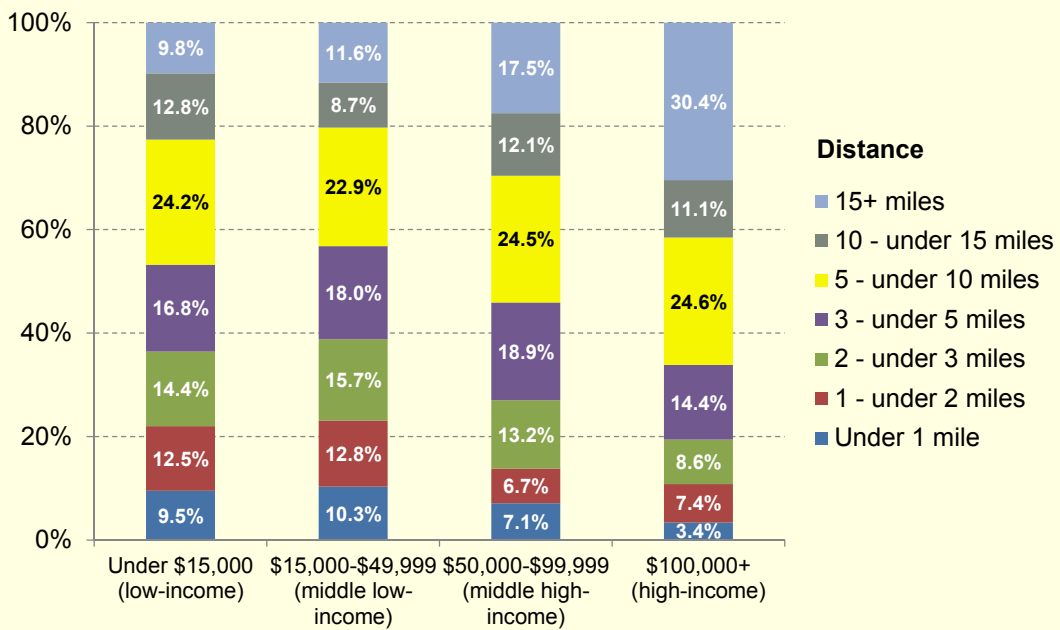
Distribution of Transit Trips by Door-to-Door Speed for Income-Based Markets





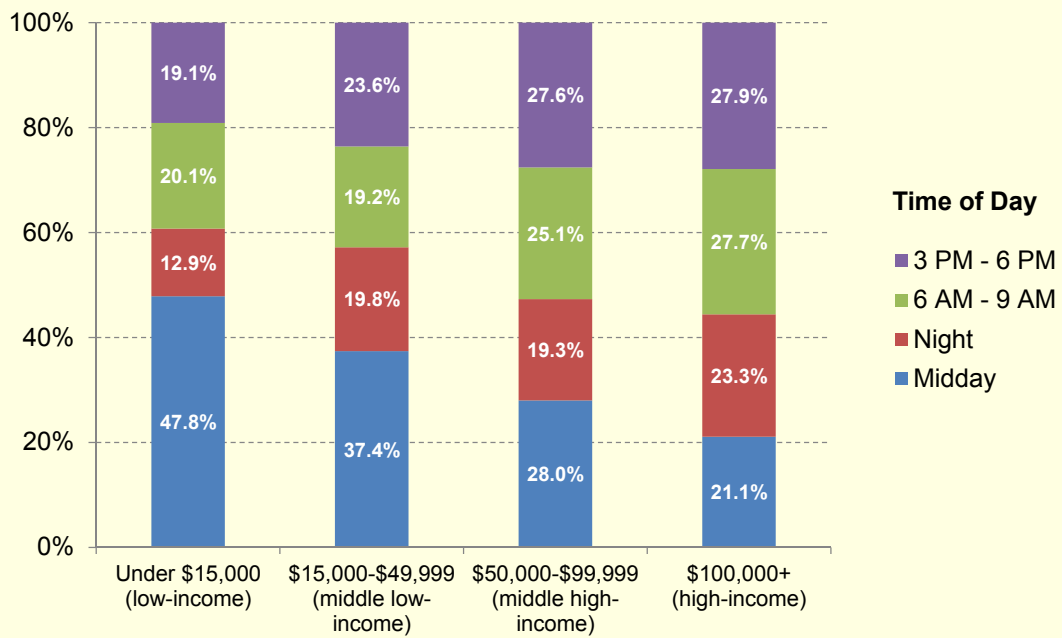
# Results on Trip Characteristics

Distribution of Transit Trips by Door-to-Door Distance for Income-Based Markets



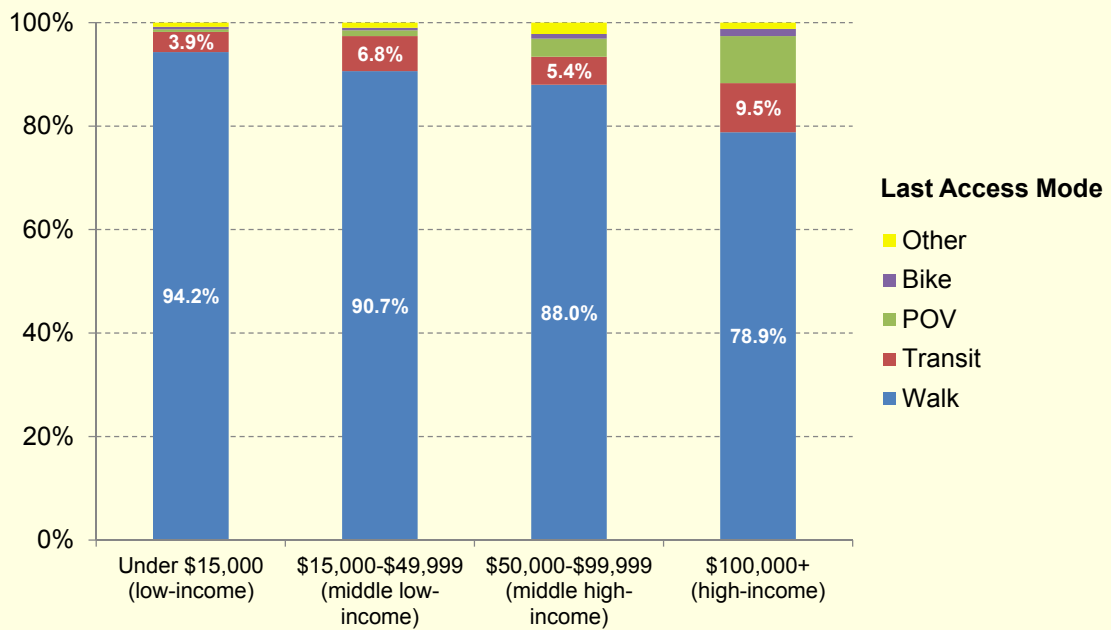
# Results on Trip Characteristics

Distribution of Transit Trips by Time of Day for Income-Based Markets



# Results on Trip Characteristics

Distribution of Transit Trips by Last Access Mode for Income-Based Markets

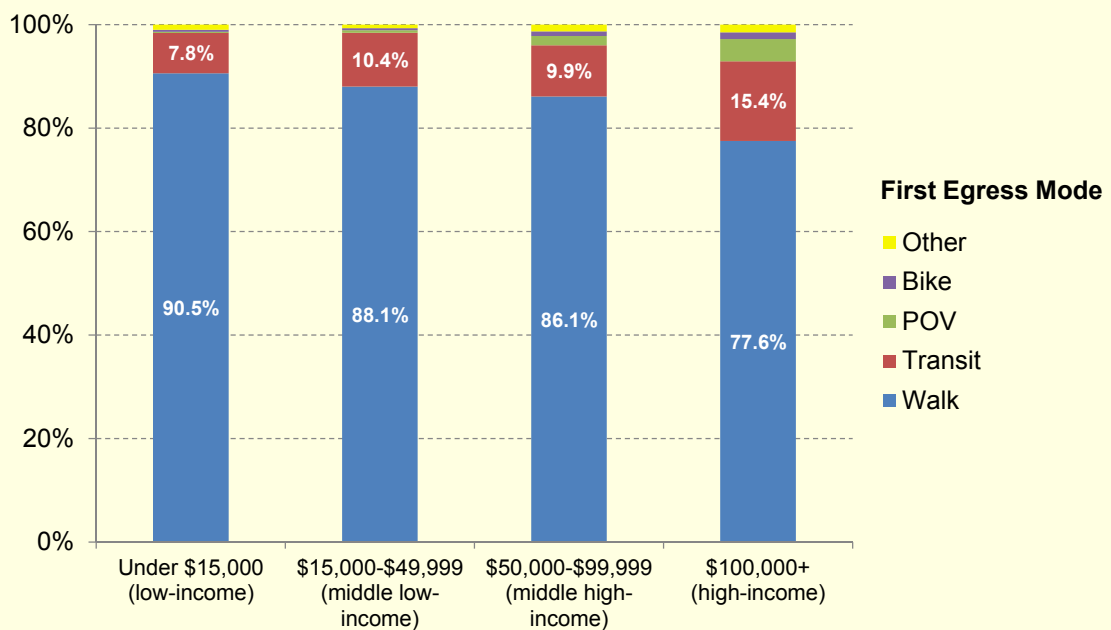


POV = privately operated vehicles



# Results on Trip Characteristics

Distribution of Transit Trips by First Egress Mode for Income-Based Markets



POV = privately operated vehicles



## Conclusions

- The 2009 NHTS provides rich and statistically more reliable data for assessing transit markets
- The results help us understand not only the significance of each transit market (its market size), but also its many characteristics, including general mobility, reliance on transit and each other major mode, attitudes toward transportation issues, socio-demographic characteristics, and trip characteristics
- The presentation highlighted some of the results. For more information, please refer to the report at:

<http://www.nctr.usf.edu/wp-content/uploads/2012/03/77920.pdf>



## Questions

# THANK YOU!

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