

Residential Land Use, Travel Characteristics, and Demography of Southern California

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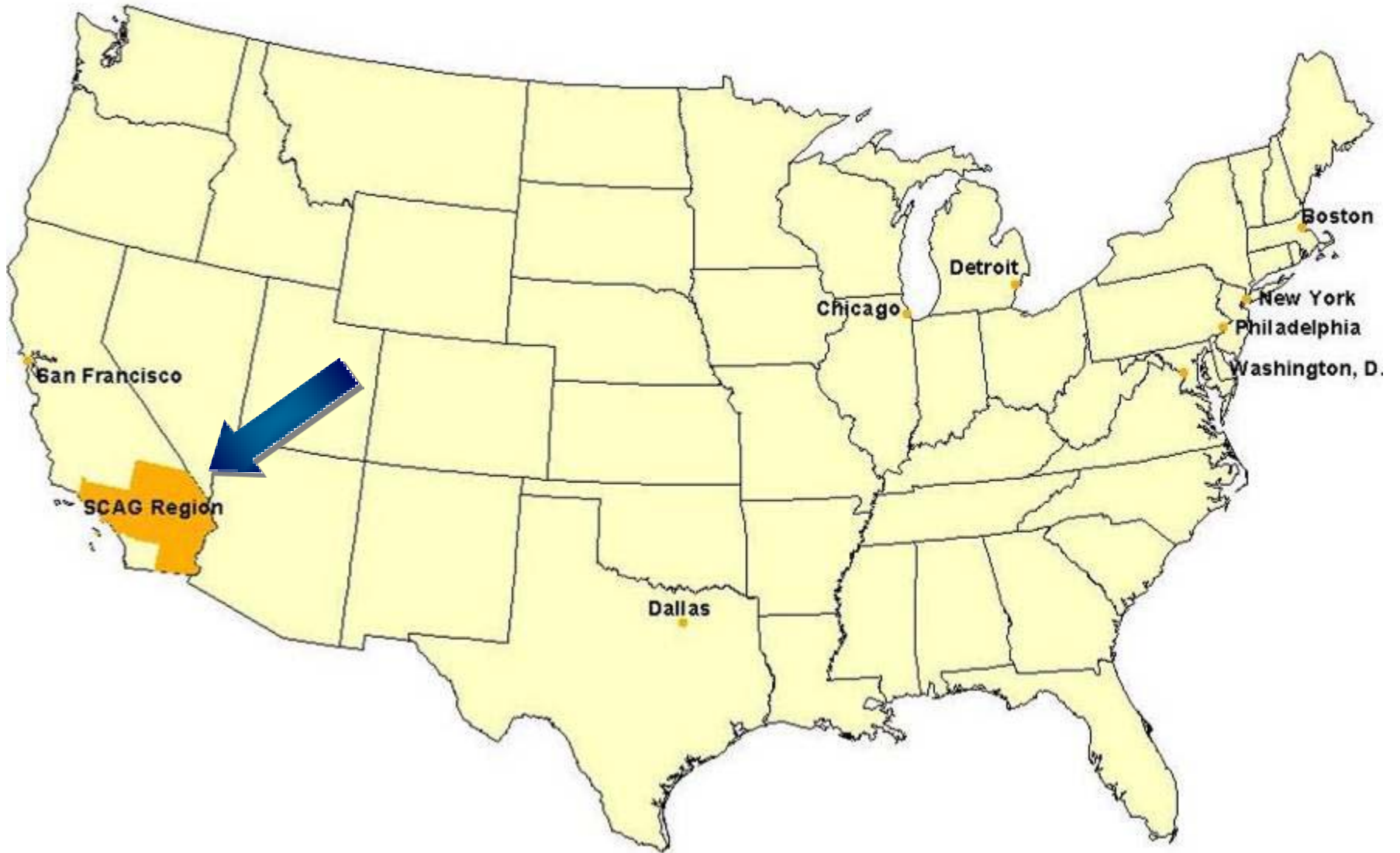
Objective of This Study

- Is to use NHTS data to provide updated travel characteristics for SCAG region.
- This presentation includes results of following analysis:
 1. Overall demographics and travel characteristics
 2. Relation between residential location and commuting
 3. Assimilation of Hispanic immigrants' travel behavior
 4. Income interaction with land use – transportation relation
- Results will be provided to SCAG modelers and planners for their analysis.

Study Area - SCAG Region

- SCAG
 - Southern California Association of Governments
 - A MPO in Southern California
- Six counties:
 - Los Angeles, Orange, Riverside, San Bernardino, Ventura, Imperial
- 18 million people, 6 million housing, and 8 million jobs
- About 6% of the US and half of California
- Los Angeles is the largest city

SCAG Region



SCAG Counties & Population Share

SOUTHERN CALIFORNIA

3 Inland counties:
San Bernardino, Riverside, Imperial
24 % of Total Population

Ventura
4%

Los Angeles
55%

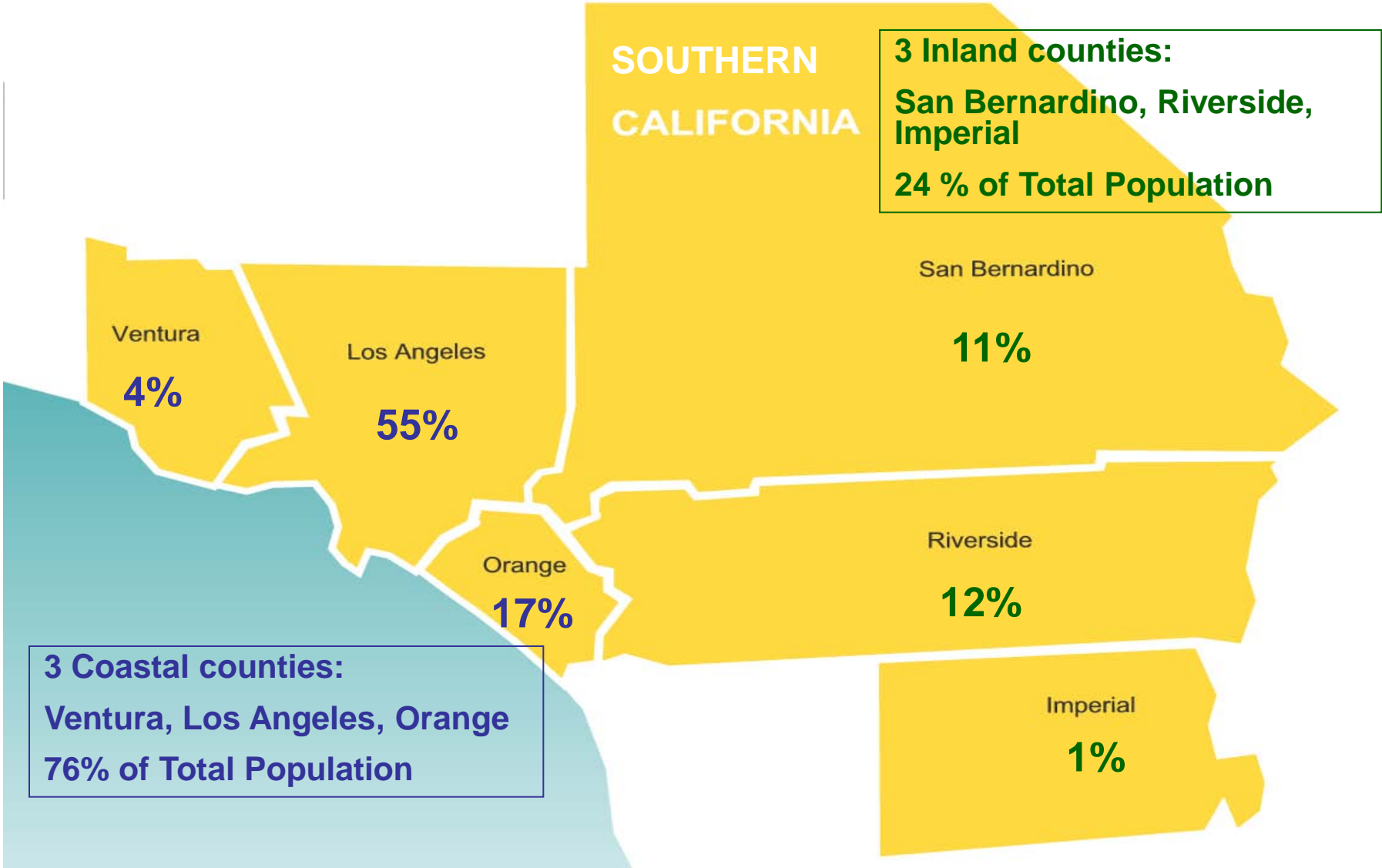
Orange
17%

San Bernardino
11%

Riverside
12%

Imperial
1%

3 Coastal counties:
Ventura, Los Angeles, Orange
76% of Total Population



Demographics Characteristics of SCAG Region

- Diversified demographics in Southern California include:
 - high share of Hispanic population (45%),
 - lot's of immigrants (30% are foreign born),
 - aging of baby boomer (16% in 2035)

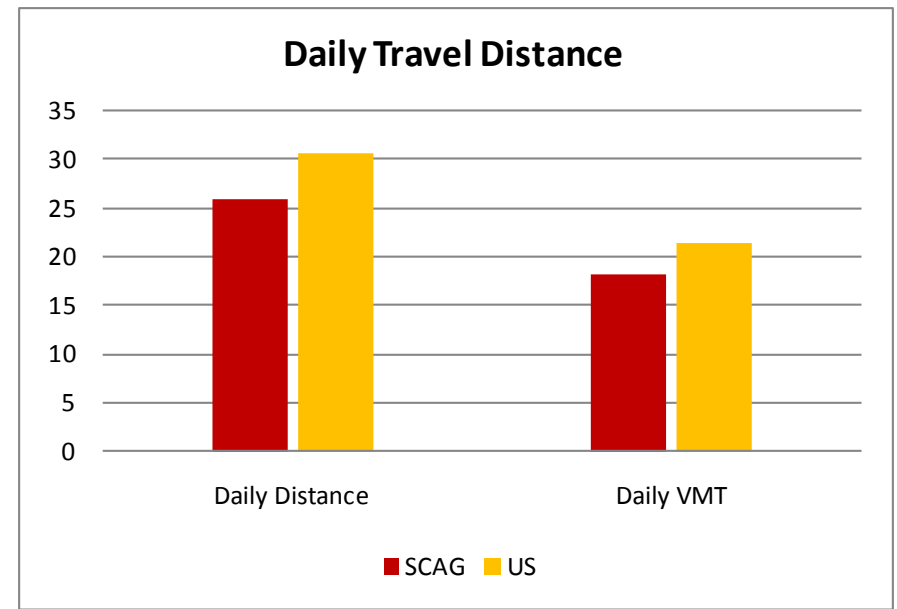
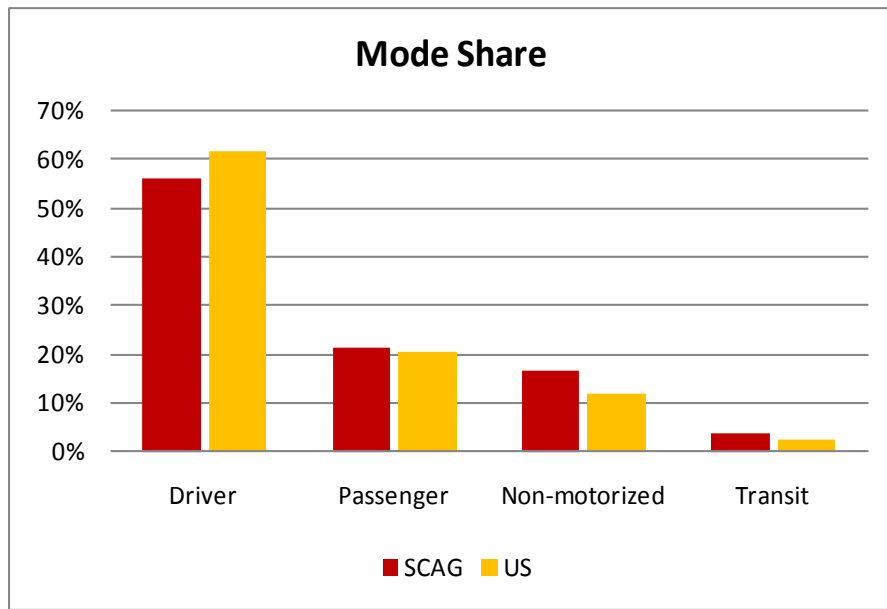
NHTS

- Thank FHWA and Transportation System Information (TSI) of California Department of Transportation (Caltrans) for supporting 2009 NHTS California add-on data.
- With about 6,700 household and 15,000 person samples, 2009 NHTS provides valuable data and sufficient observations to analyze travel characteristics of SCAG region.
- This study analyzes travel characteristics at person level

- Overall demographics and travel characteristics
- Relation between residential location and commuting
- Assimilation of Hispanic immigrants' travel behavior
- Income interaction with land use – transportation relation

Weekday Person Travel

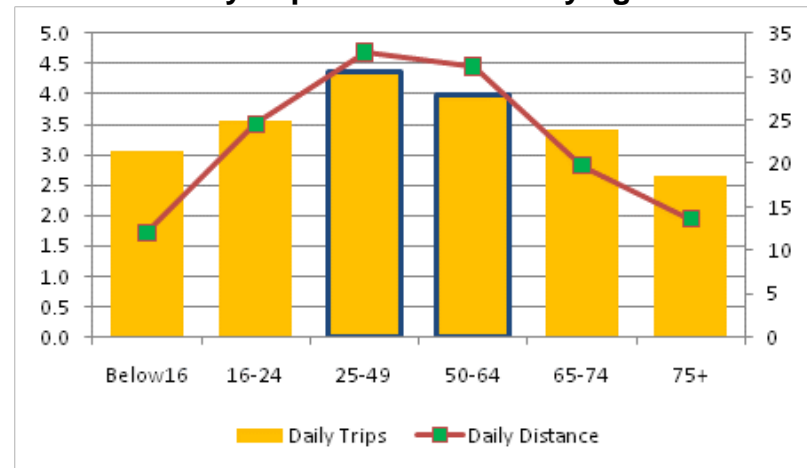
- Compared to the US, SCAG residents drive less and travel shorter distance, but use more non-motorized modes (walk, bicycle) and transit



Travel by Age

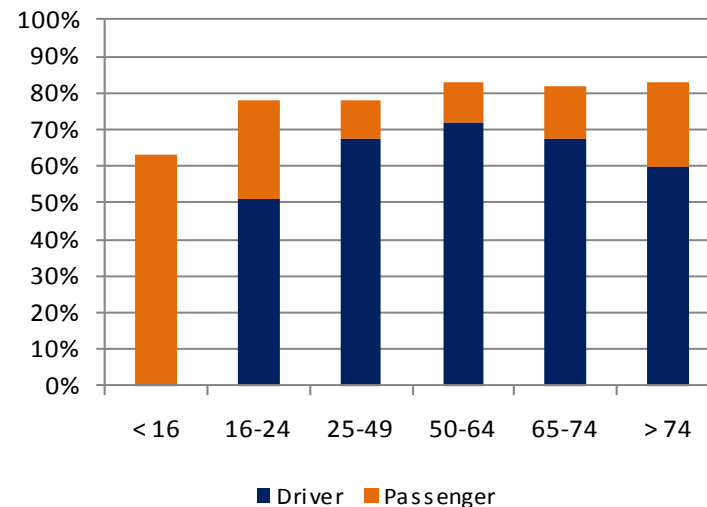
- Daily trips and travel distance are the highest for the working age population (25-64).

Daily Trips and Distance by Age



- The elderly still rely on a car, but drive less.

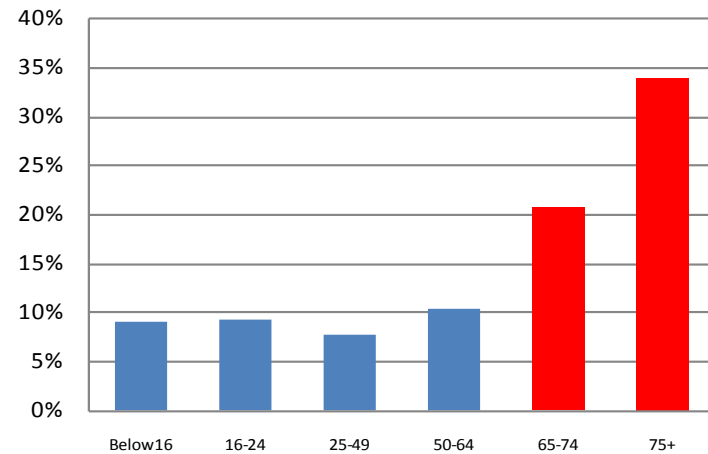
Auto Use by Age



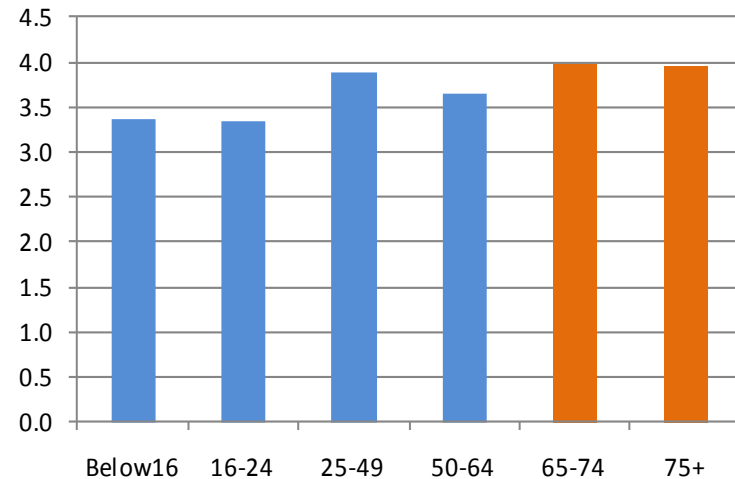
Travel by Age (Elderly)

- 20% - 33% of the elderly did not travel on the survey day.
- However, when they travel, their trips are no less than the younger.

% of Persons Did Not Travel



Non-work Trips by Age



Travel by Race/Ethnicity

- Compared to other groups, Hispanic population drive less; use more non-motorized and transit modes.

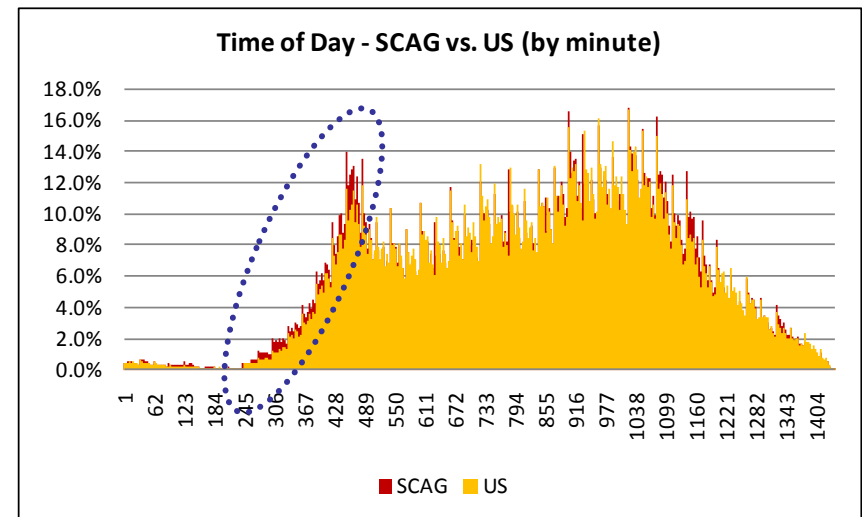
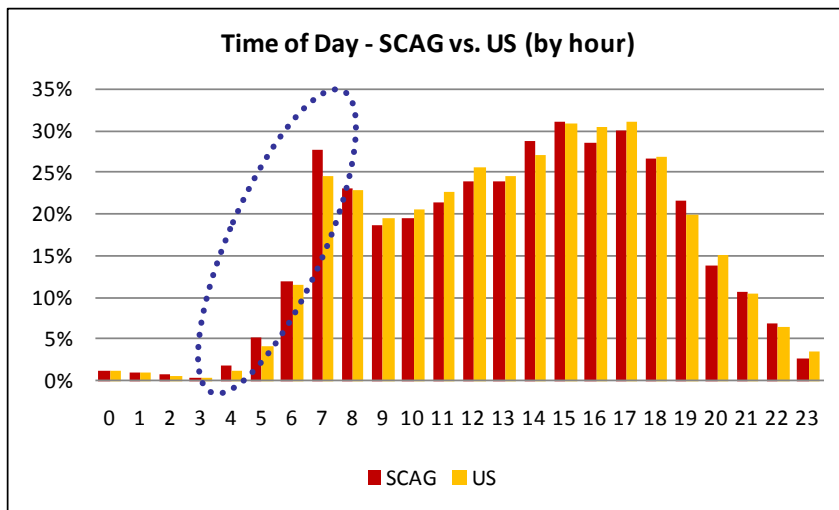
Daily Travel by Race/Ethnicity

Race	Trips	Distance	Driver_Auto	Passngr_Auto	NM	Transit
NH_WH	4.0	29	67%	18%	12%	1%
NH_BK	3.8	22	56%	20%	17%	5%
NH_AS	3.6	26	59%	23%	13%	2%
HISP	3.7	24	46%	24%	21%	6%

Time of Day

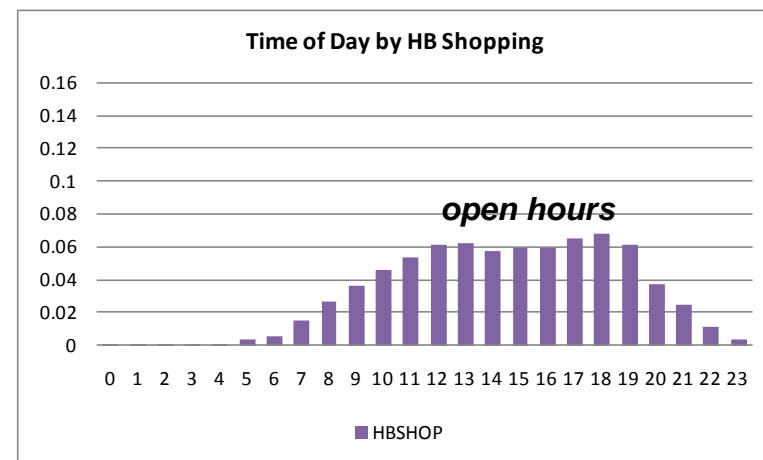
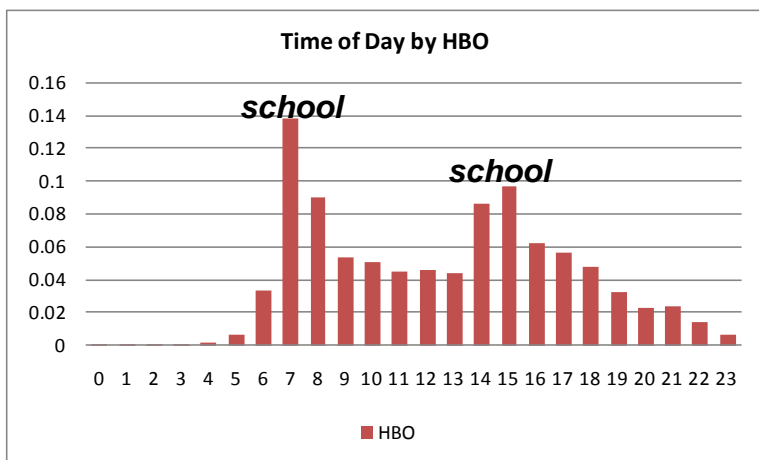
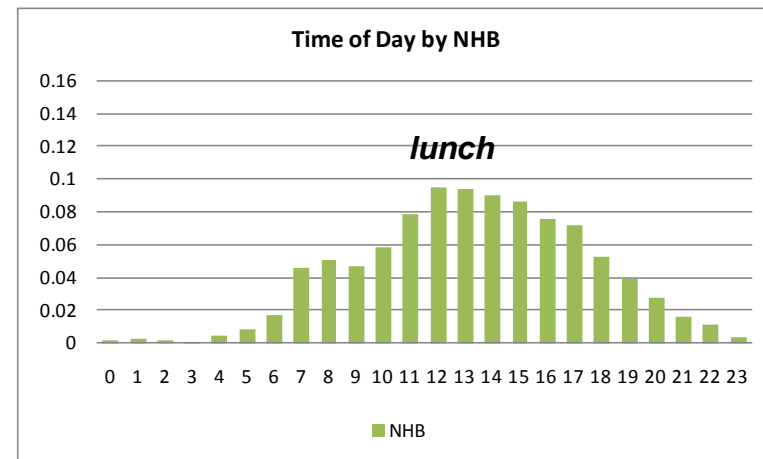
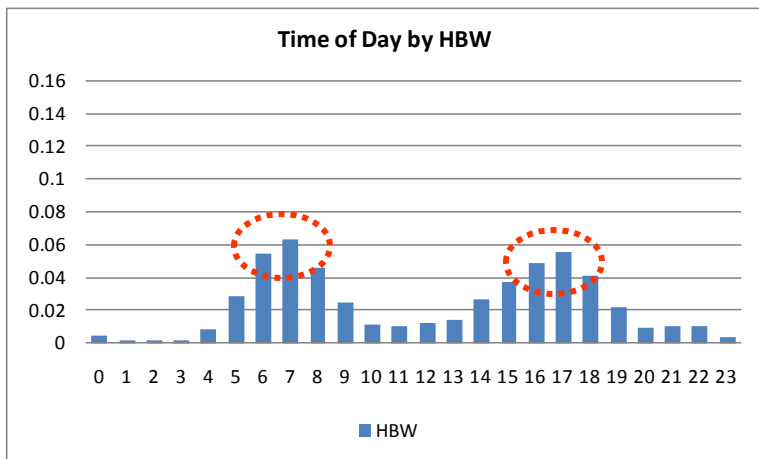
(% persons are traveling)

- Compared to the US, SCAG region shows higher % of people traveling in the morning (4:00-8:00).



Note: This chart shows % of persons who traveled within each hourly period. The purpose is to show the difference between US and SCAG, not for estimating travel length

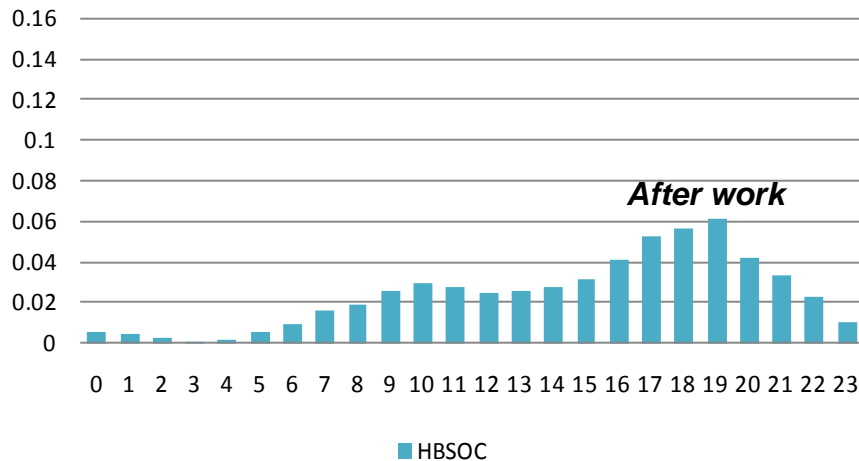
Time of Day by Purpose



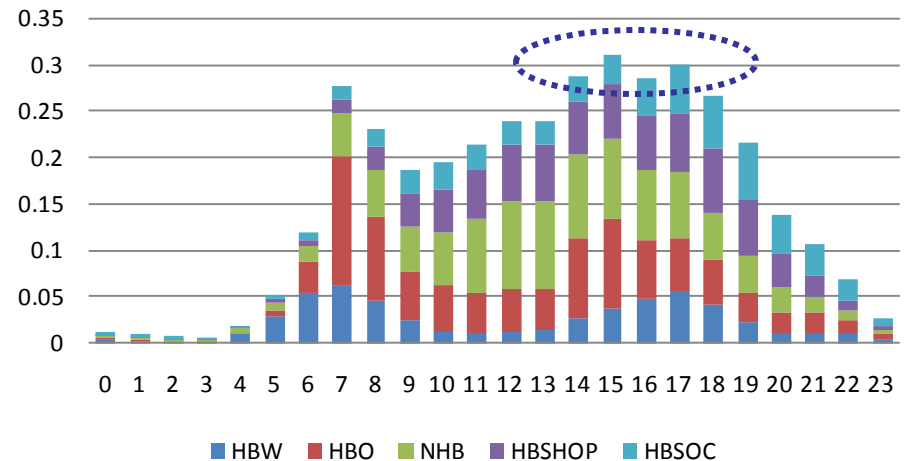
Time of Day by Purpose

- PM peak appears during 2 pm-6 pm due to travel demand for multiple activities
- PM peak lasts longer than AM peak.

Time of Day HB Social/Recreation

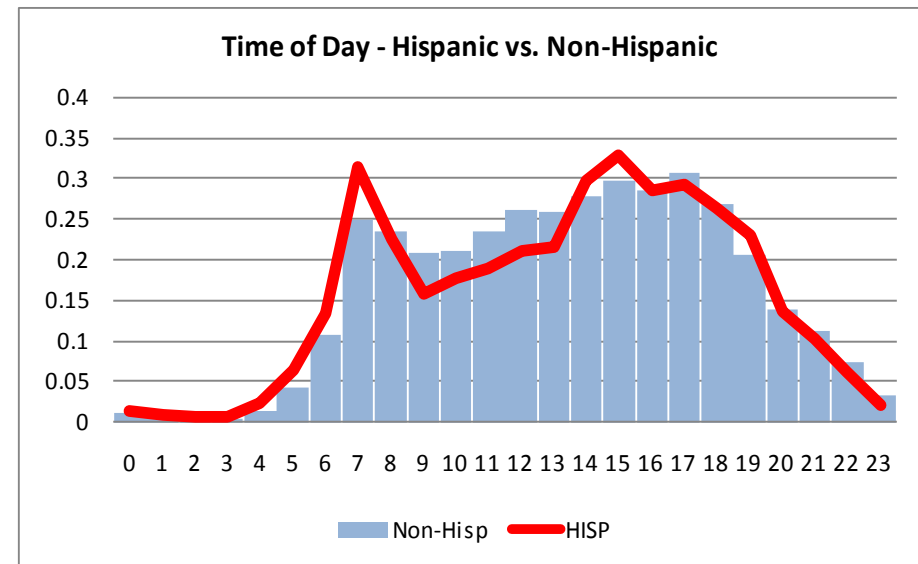
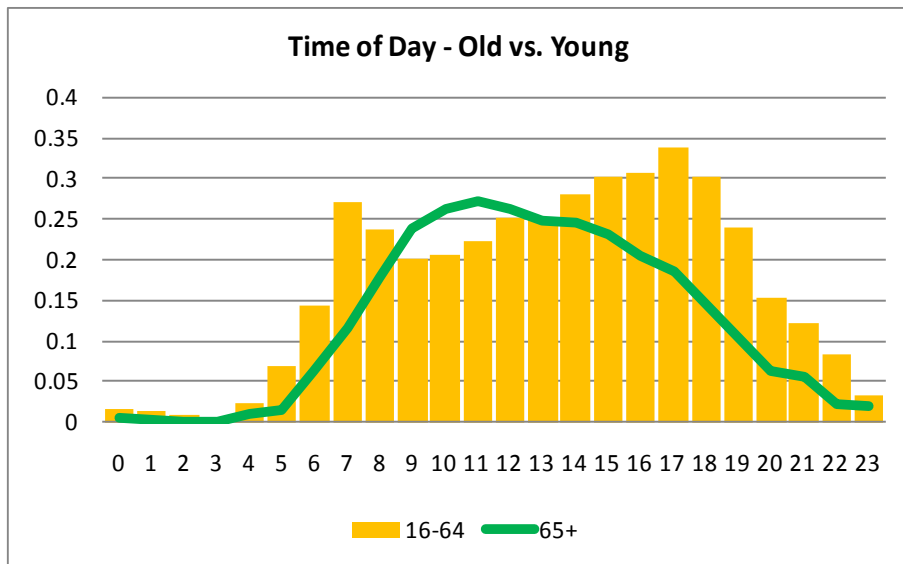


Time of Day by Purpose



Time of Day of Elderly & Hispanic

- Peak travel period for the elderly is around noon.
- More significant two peaks to Hispanic (7 am-8 am and 3 pm-4 pm) than non-Hispanic



- Overall demographics and travel characteristics
- **Relation between residential location and commuting**
- Assimilation of Hispanic immigrants' travel behavior
- Income interaction with land use – transportation relation

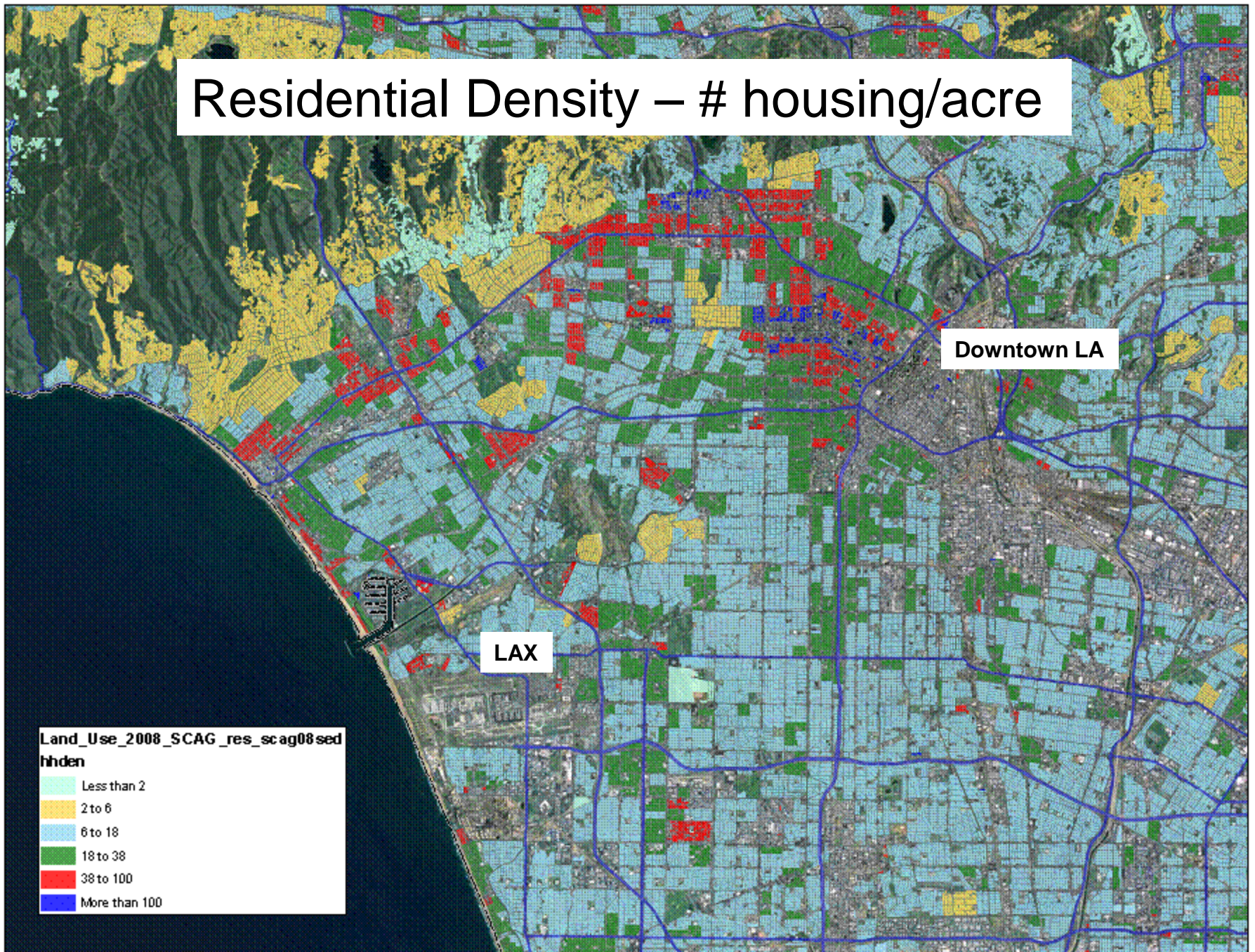
Introduction

- Travel behavior theory recognized that daily travel choices are related to choices about residential location, school location, job location, and auto ownership.
- Is this relation described above the same for people with different demographic background?
- We use NHTS to examine the relation between residential density of neighborhoods, distance to work, and mode for commute
 - *Neighborhoods: Using 11K SCAG TAZs (Census block group)*

Findings

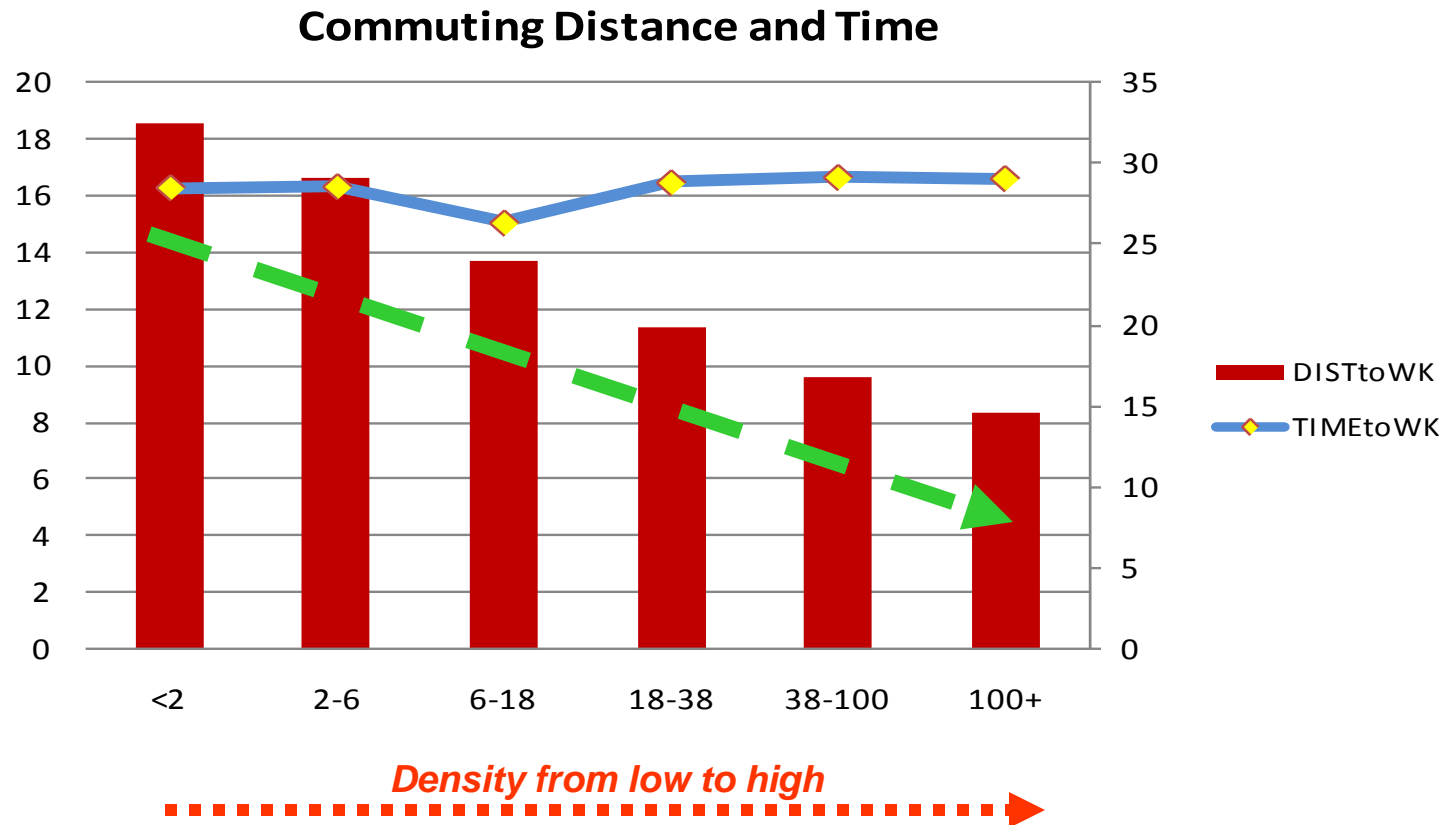
- Results are as expected.
- Residents living in higher density neighborhoods:
 - Cars are less available to household members.
 - Transit services are more available.
 - Shorter distance to work (work location closer to home)
 - Workers are less likely to commute by a car; more likely by transit and non-motorized modes.
- Commuting time is about the same for workers living in neighborhoods with different density.

Residential Density – # housing/acre



Residential Density & Commuting Distance

- Living in higher density neighborhoods:
 - Shorter commuting distance.
- Commuting time is about the same for all density.



Residential Density & Commuting Mode

- Living in higher density neighborhoods:
 - Cars are less available.
 - Transit services are more available.
 - Workers are less likely to commute by a car; more likely by transit and non-motorized modes.







Commuting Mode by Density

Residential Density	Car/Hhsize	Transit Density	% Commuting Mode		
			Auto	Transit	NM
<2	0.9	0.0	93	2	1
2-6	0.8	0.0	91	2	2
6-18	0.6	0.1	88	4	3
18-38	0.5	0.3	82	10	5
38-100	0.5	0.5	78	12	6
100+	0.3	1.2	63	19	14

How about the Hispanic Population?

- Similar to total population, the Hispanic living in higher density neighborhoods are:
 - less likely to live in a single-family house,
 - lower car ownership, and
 - shorter commuting distance

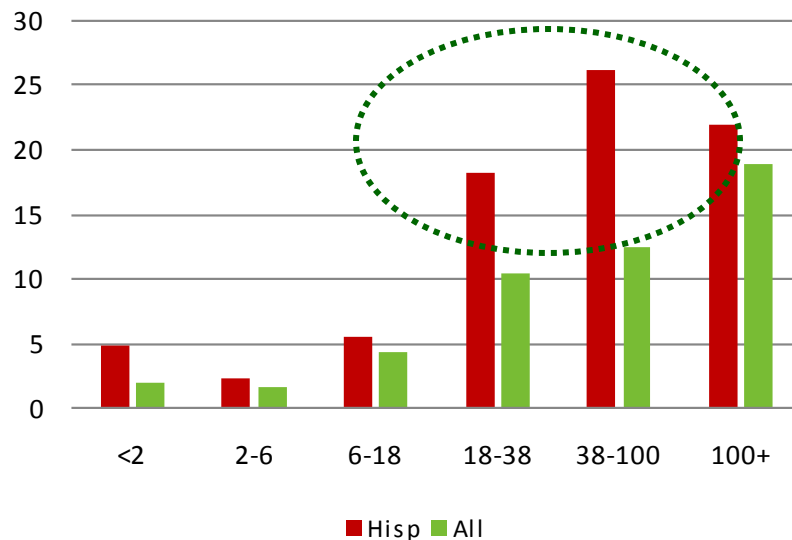
Household Characteristics and Commuting

Res Density	Households	Car/Hhsize	% No car	DISTtoWK	TIMEtoWK
	% SDO				
<2	75	0.7	5	12 	22
2-6	79	0.6	2	19 	31
6-18	57	0.5	13	13 	27
18-38	23	0.4	18	12 	31
38-100	11	0.3	29	10 	33
100+	0	0.2	49	7 	27

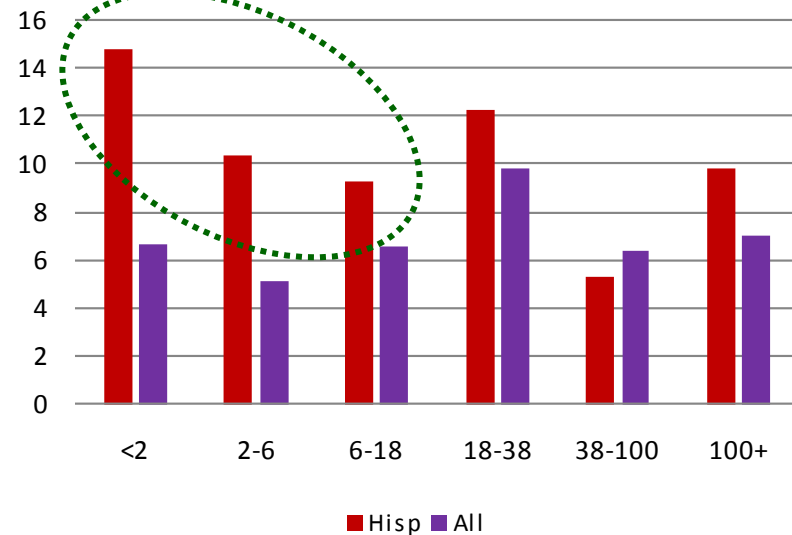
Hispanic - Commuting Mode

- Compared to total population,
 - Hispanic commuters have higher % of transit use, especially in higher density areas.
 - They also have higher % of carpool, especially in lower density areas.

% Transit Commuting

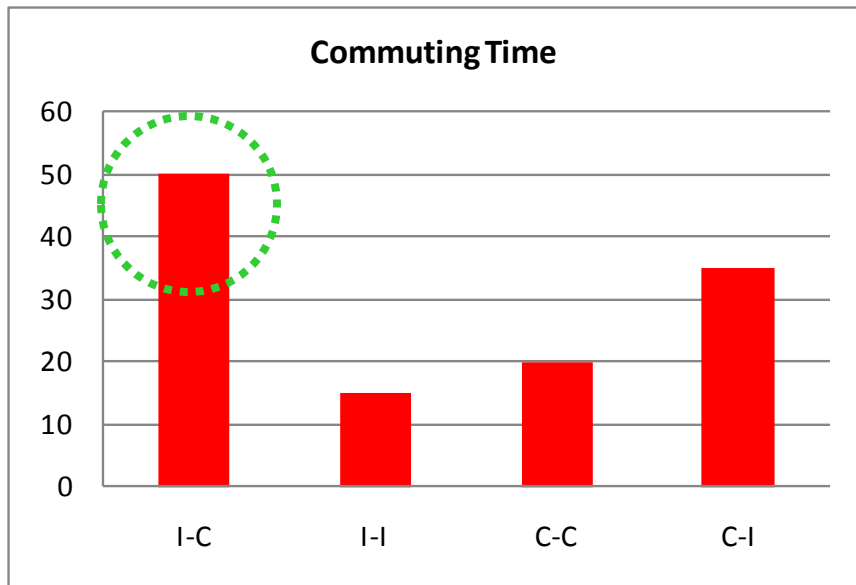


% Carpool/passenger Commuting

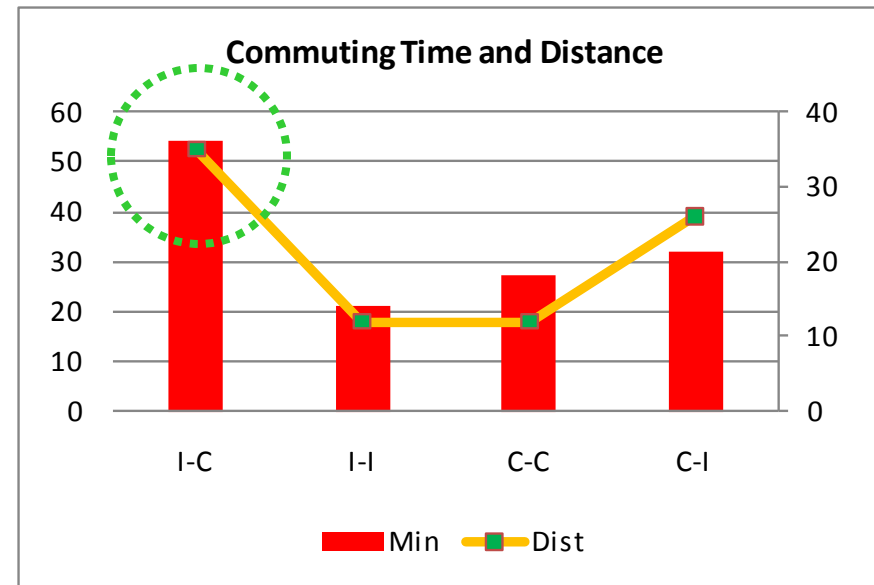


Long Distance Commute

- According to 2009 ACS, about 300,000 workers living in inland counties commute long time to coastal counties.
- Their median commuting time is 50 minutes. 97% by cars.
- 2009 NHTS shows consistent pattern as ACS.
- Why do they want to commute for long time/distance?



2009 ACS

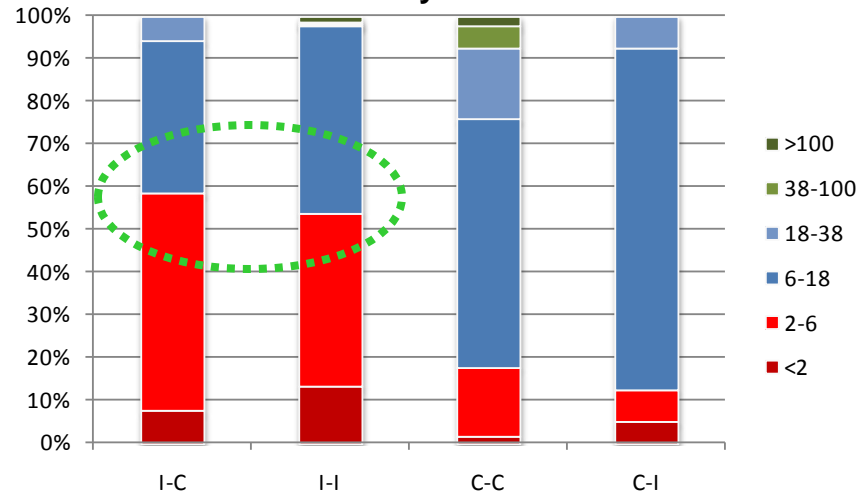


2009 NHTS

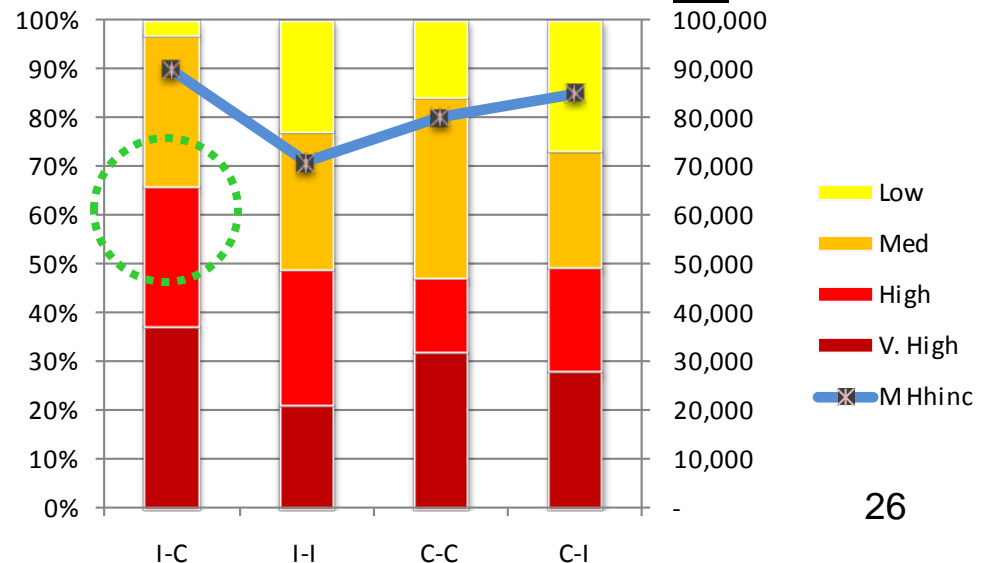
Long Distance Commute (2)

- Inland neighborhoods are characterized as lower-density, with more affordable single-family housings than coastal counterparts.
- Median household income of inter-county commuters are higher than other commuters
- Some people who prefer to live in low-density living environment would like to trade off commuting time.
- Their income can support their choice on long-distance driving.

Residential Density Distribution



Income Distribution of Commuters



- Overall demographics and travel characteristics
- Relation between residential location and commuting
- Assimilation of Hispanic immigrants' travel behavior
- Income interaction with land use – transportation relation

Introduction

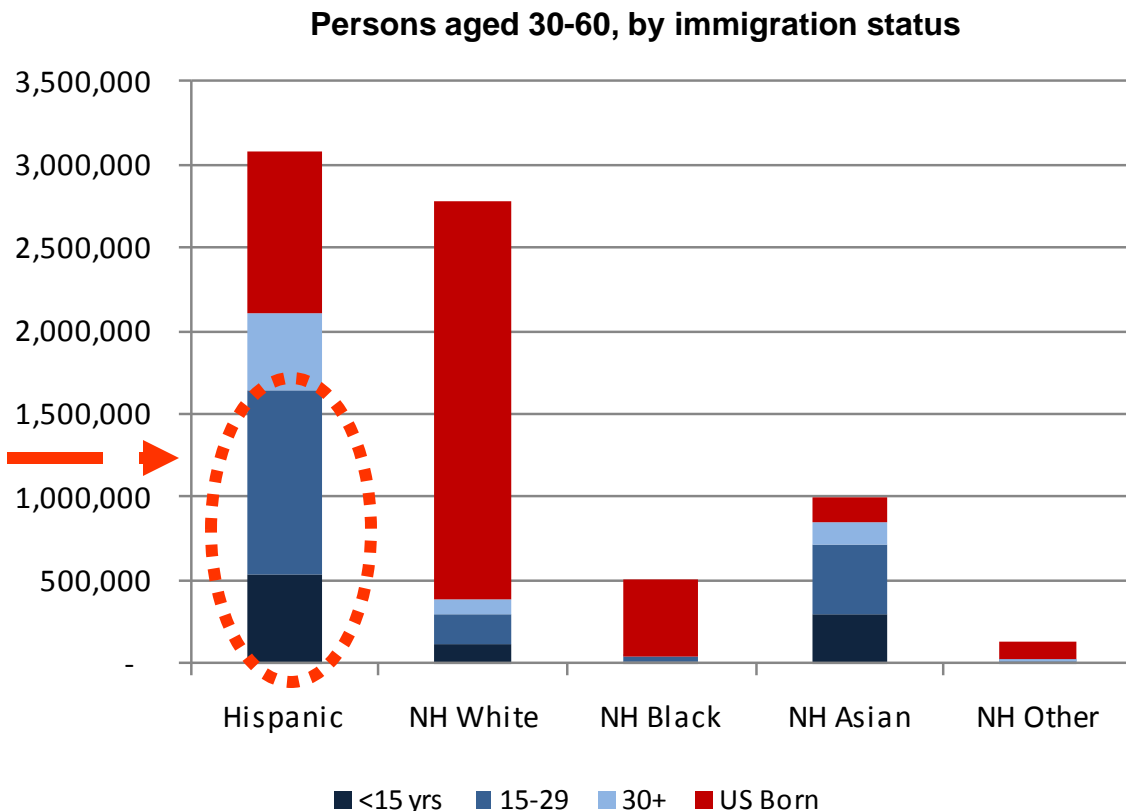
- Each year, many immigrants move to Southern California.
- Will immigrants change their behavior after years living in this region? How about their residential location-housing-travel relation.
- The objective is to analyze the difference between newer immigrants, long-term immigrants, and the US born.
- Focus on adults between 30-60 years old – they are primary decision makers of their family.
- By three race/ethnicity groups: Hispanic, Non-Hispanic White, and others. This study focuses on Hispanic population, due to larger share to total population.

Findings

- As Hispanic immigrants stay longer in the US, their income status is improved, and they tend to live in a single-family house in a lower-density neighborhood, just similar to the US born.
- They also commute longer distance, drive more and use less transit than new Hispanic immigrants.
- Our earlier finding regarding Hispanic's driving less and using more transit is probably due to large proportion of newer immigrants.
- This travel behavior assimilation of Hispanic immigrants and the second generation challenges transportation modeling that use race/ethnicity.

Immigrants Aged 30-60 Years Old (2009 ACS)

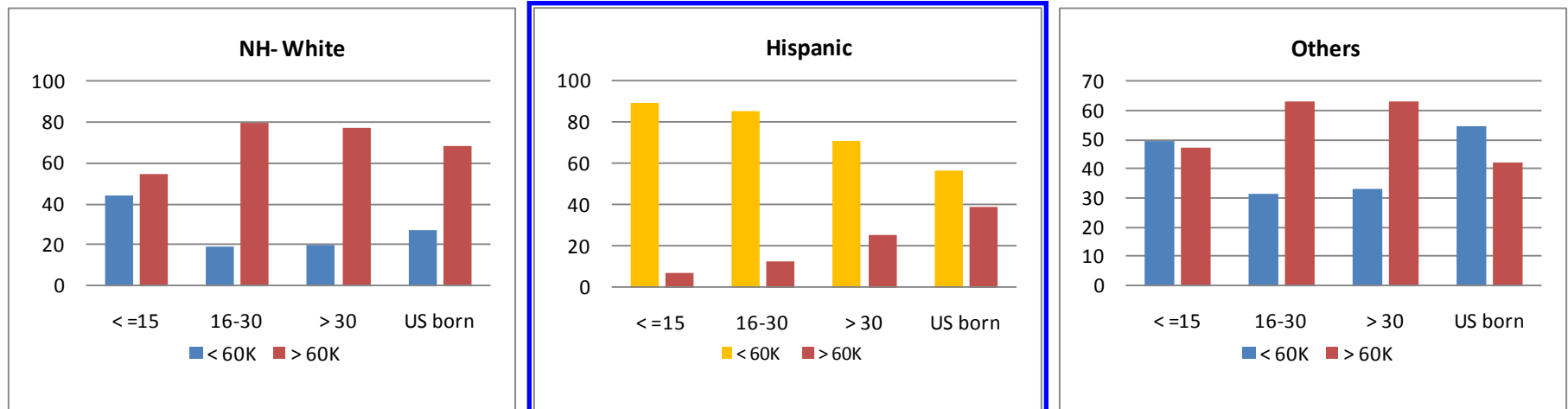
- 45% of total population and 2/3 of Hispanic, are immigrants.
- Half of Hispanic are immigrants who entered US < 30 years



Household Income

- Income status is improved to Hispanic immigrants as they stay longer in the US.

Household Income by Immigration Status



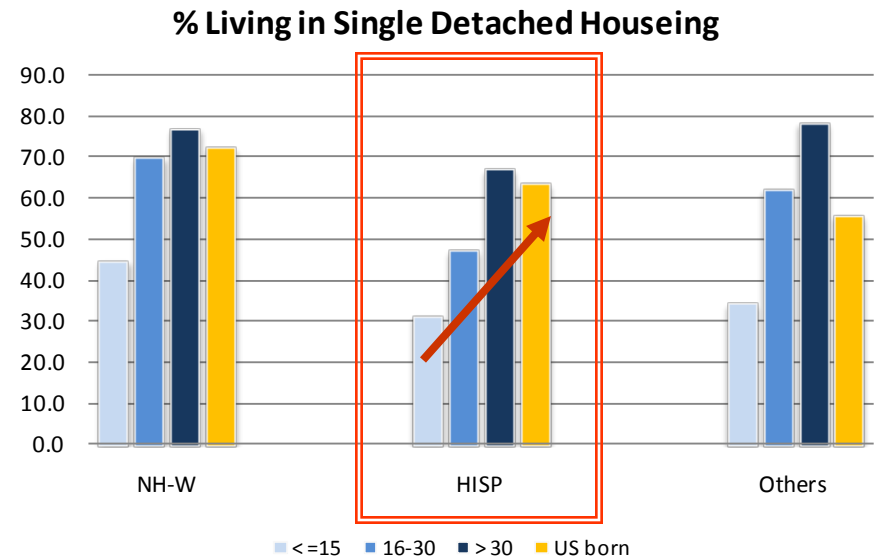
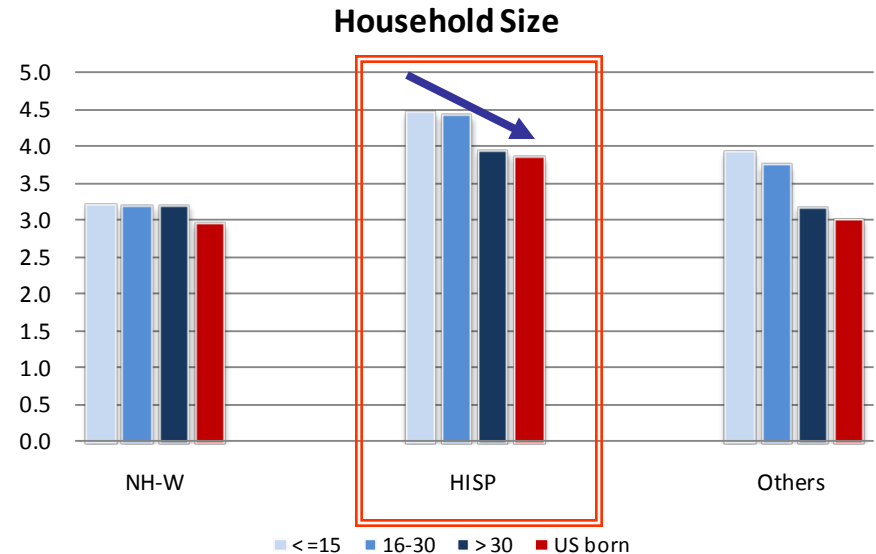
Household Size & Housing Type

- As Hispanic immigrants staying longer in the US:

1. smaller household size.

2. more likely to live in a single-family house

- Similar to the US born.



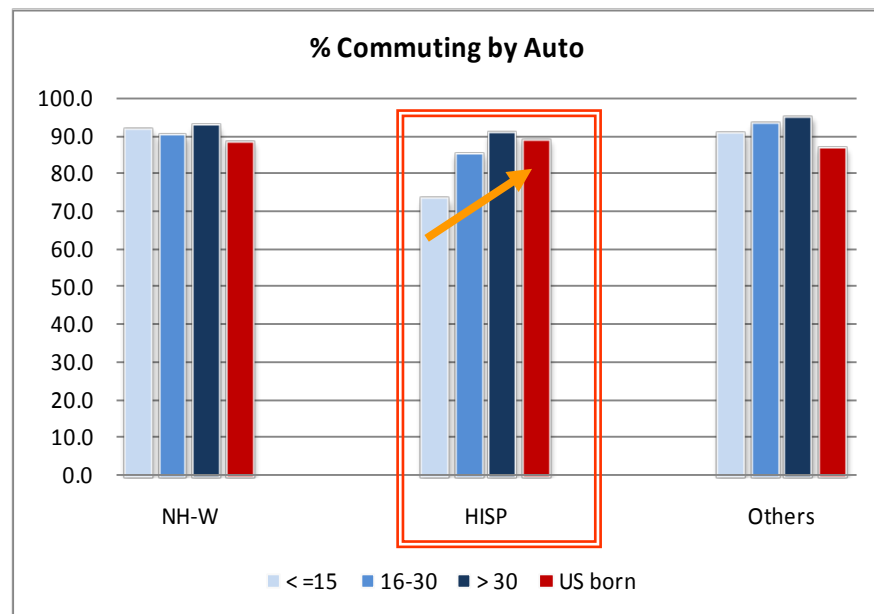
Commuting Distance and Mode

- As Hispanic immigrants staying longer in the US:

1. longer commuting distance.

2. more likely to use a car as commuting mode.

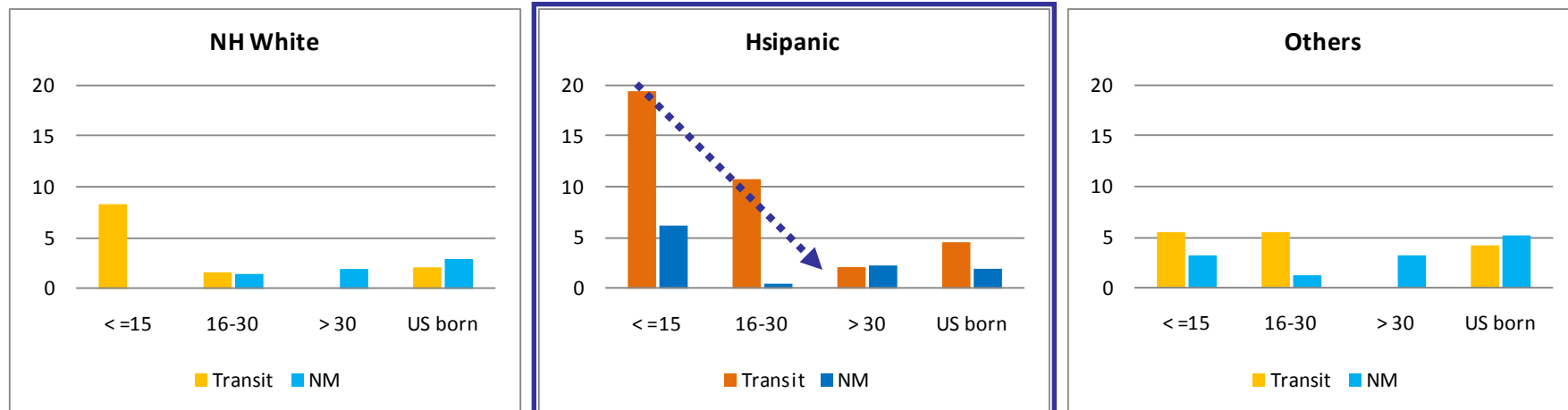
Distance to Work			
Years in US	NH-W	HISP	Others
< =15	14	12	13
16-30	16	14	13
> 30	18	16	15
US born	17	16	14



Other Commuting Modes

- As Hispanic immigrants staying longer in the US:
 - The use of transit and NM modes significantly drop
- The impression of high transit use of Hispanic population may be attributed to large proportion of newer immigrants.

Share of Transit and Non-motorized



- Overall demographics and travel characteristics
- Relation between residential location and commuting
- Assimilation of immigrants' travel behavior
- Income interaction with land use – transportation relation

Introduction

- It is known that people with higher income generally drive more. What will happen if higher income people living in high density neighborhoods?
- Does influence of land use density outweigh income on vehicle use?
- This study is to analyze travel behavior of by two neighborhood characteristics: density and median household income.
 - 5 land use density categories: <6, 6-10, 10-18, 18-38, 38+
 - 2 levels of median household income: \leq \$40K (low income), $>$ \$40K (medium to high income)

Findings

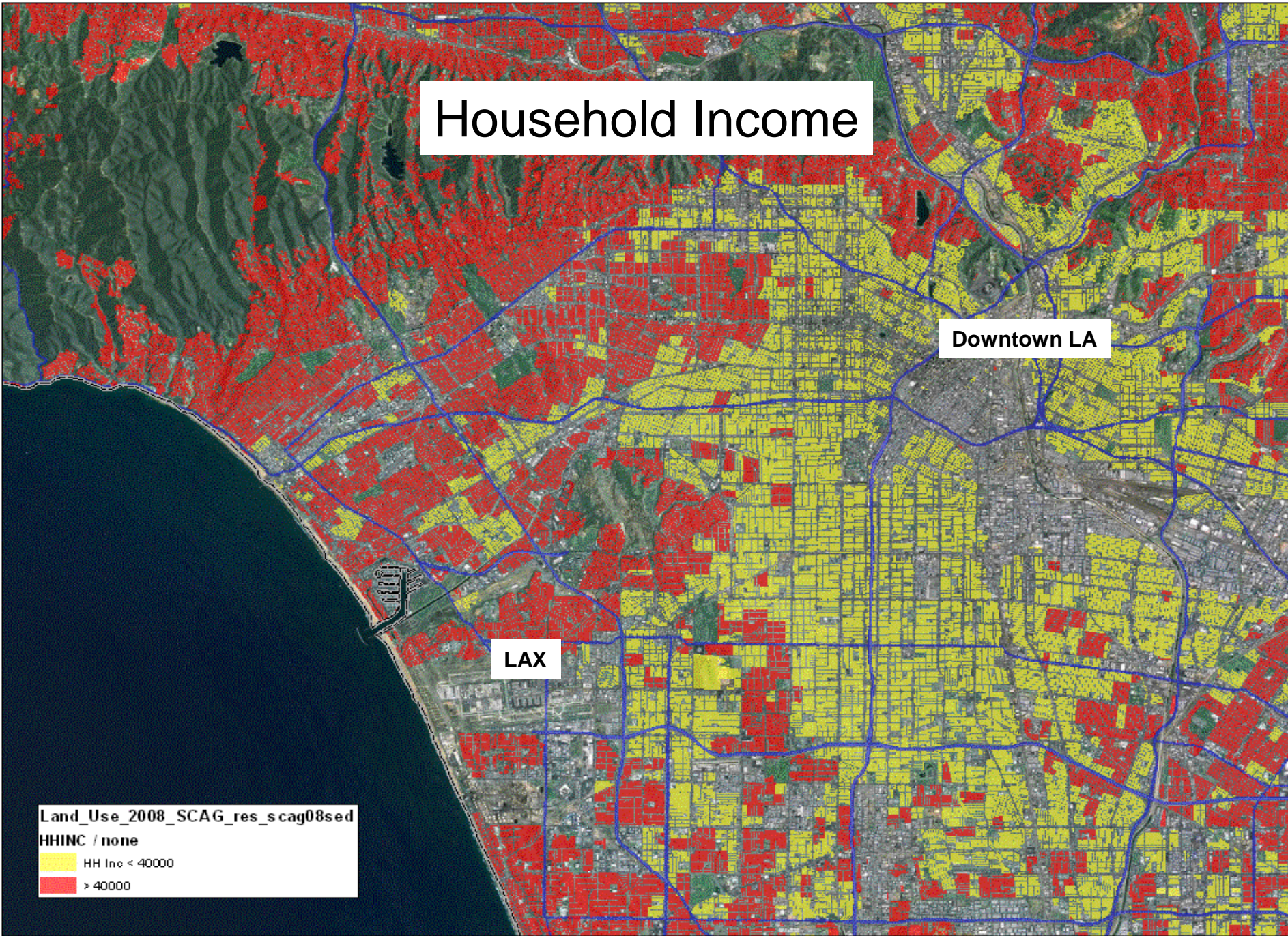
- For lower income residents, as their neighborhood density increases, their work location is closer to home. They tend to drive less, walk more, and use more transit.
- Higher income (or non low income) residents show different pattern. Generally speaking, residential density has less significant association with their travel behavior. They do not drive less or use more transit as they live in higher density neighborhoods.
- This study does not analyze residential self selection.
- Land use policies that promote higher density development to reduce car use as well as greenhouse emission should be further reviewed by different demographic characteristics.

Household Income

Downtown LA

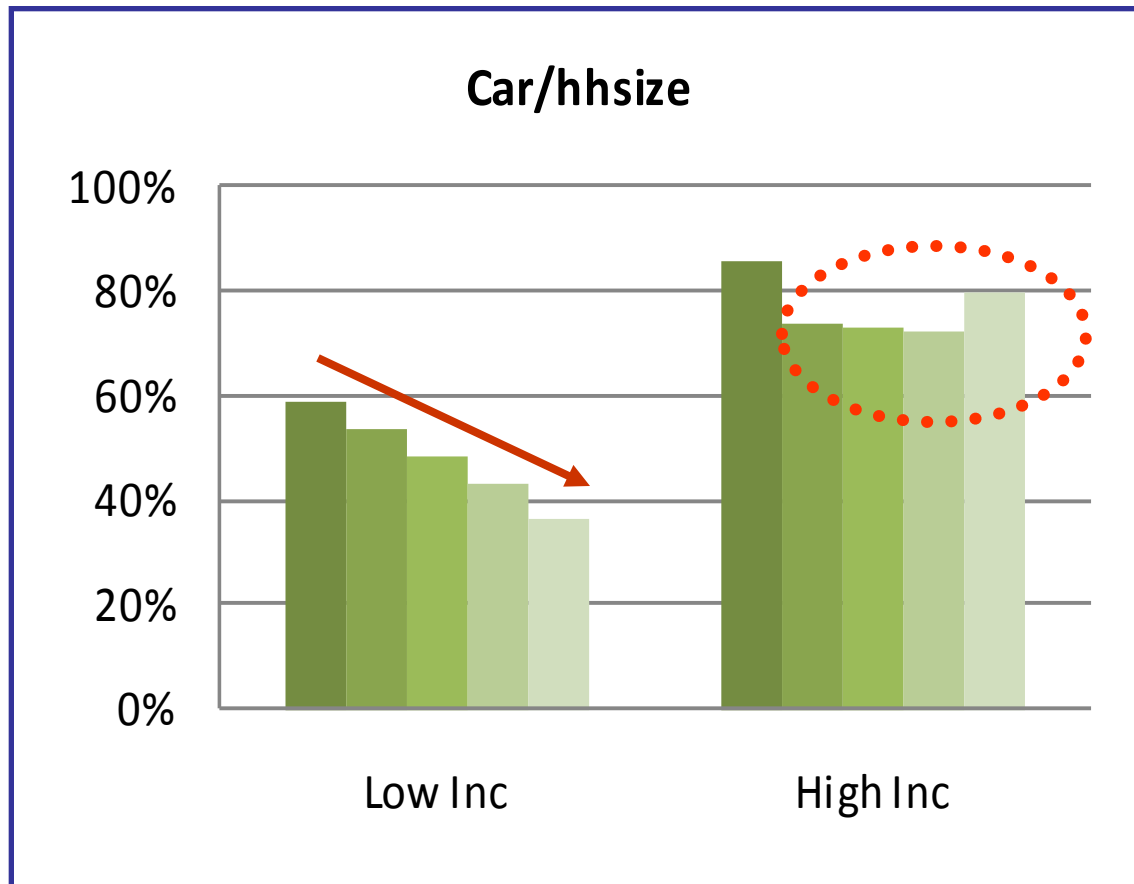
LAX

Land_Use_2008_SCAG_res_scag08sed
HHINC / none
HH Inc < 40000
> 40000



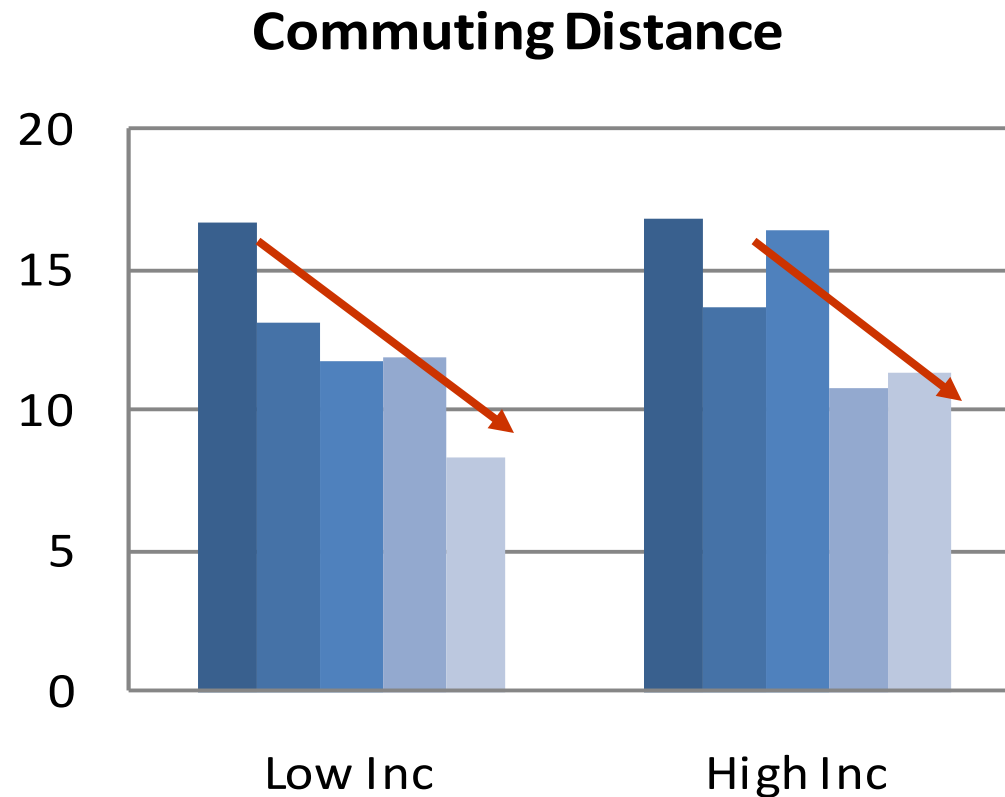
Car Availability

- Density has no significant association with car availability for high income neighborhoods.



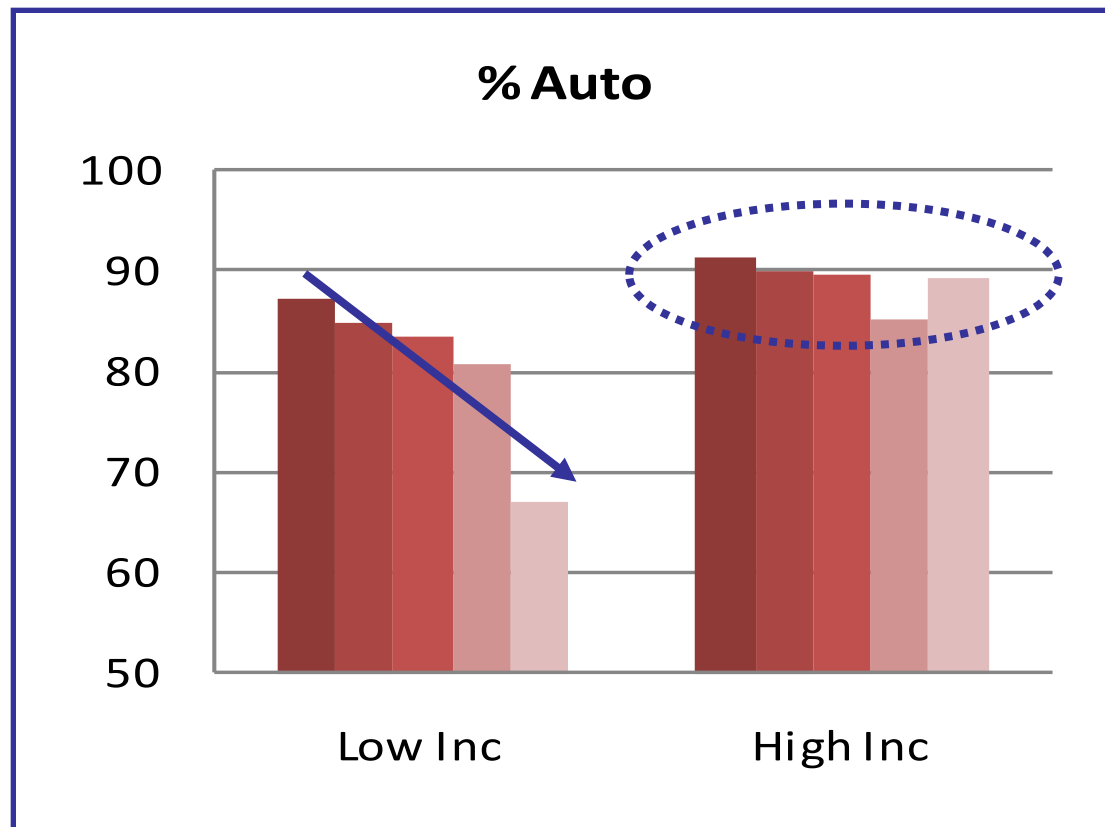
Commuting Distance

- Overall, commuting distance decreases with density. People live closer to work location while living in high density areas.



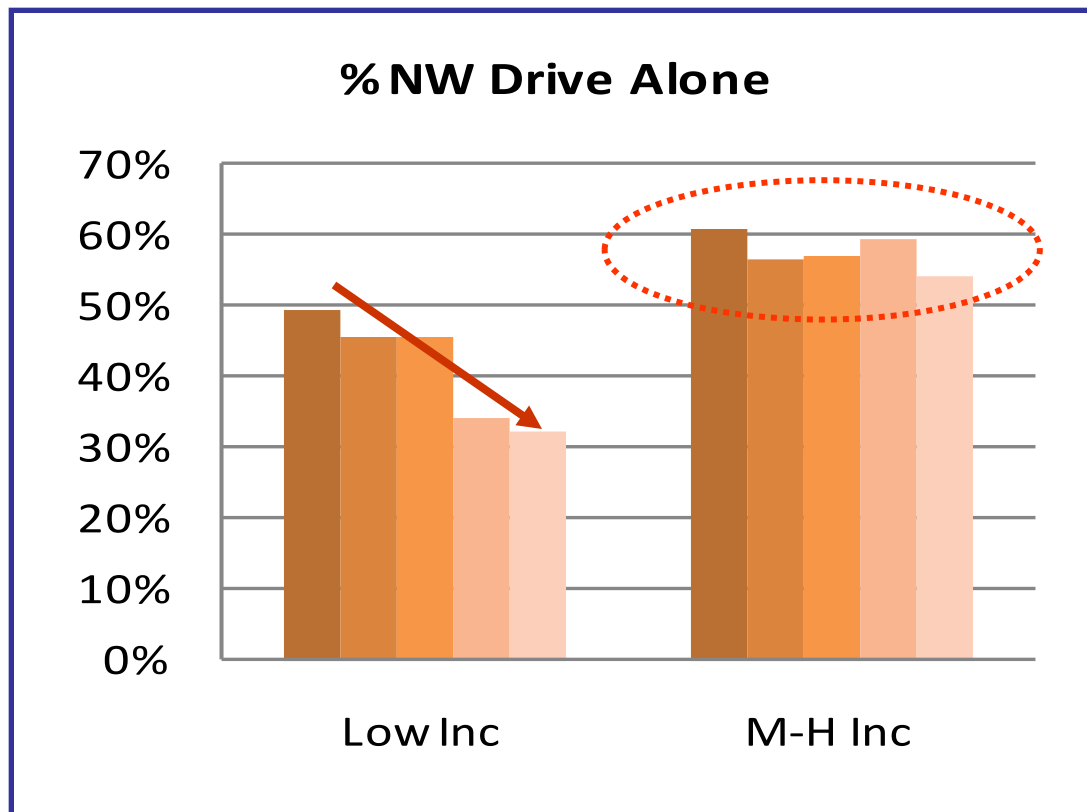
Commuting Mode

- For residents living in low income neighborhoods, % of auto use for commute decreases.
- For residents living in high income neighborhoods, residential density has no significant association with auto use.



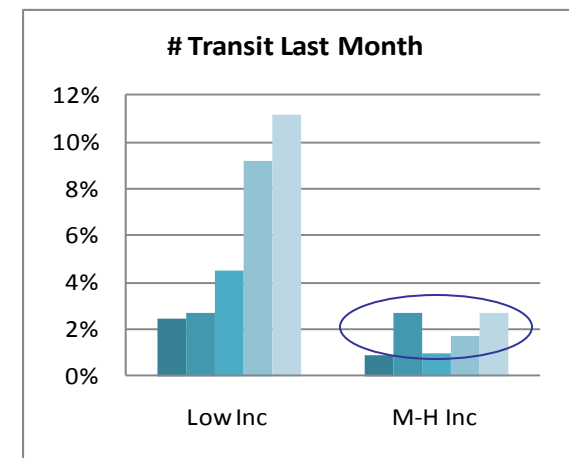
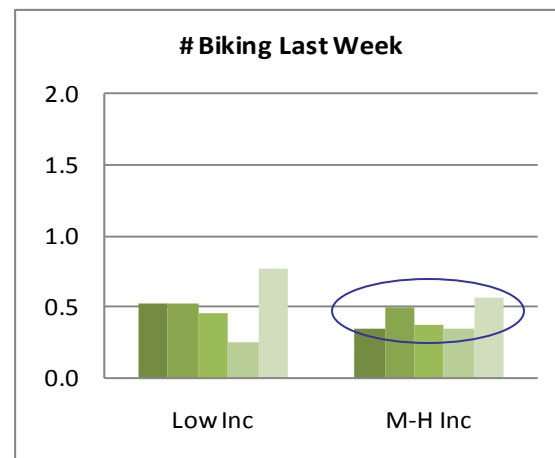
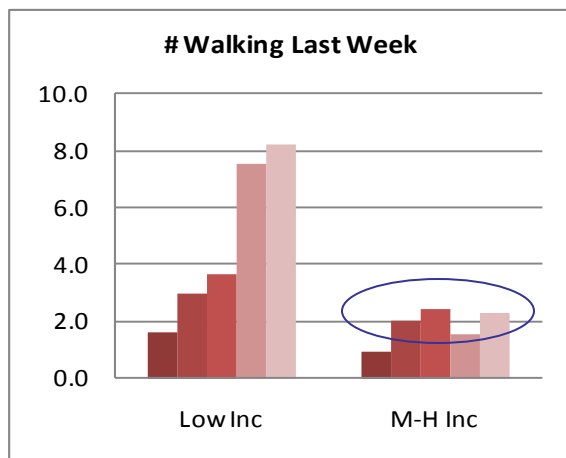
Non-Work Travel

- Residential density has no significant association with car use for non-work purpose for residents of high income neighborhoods.



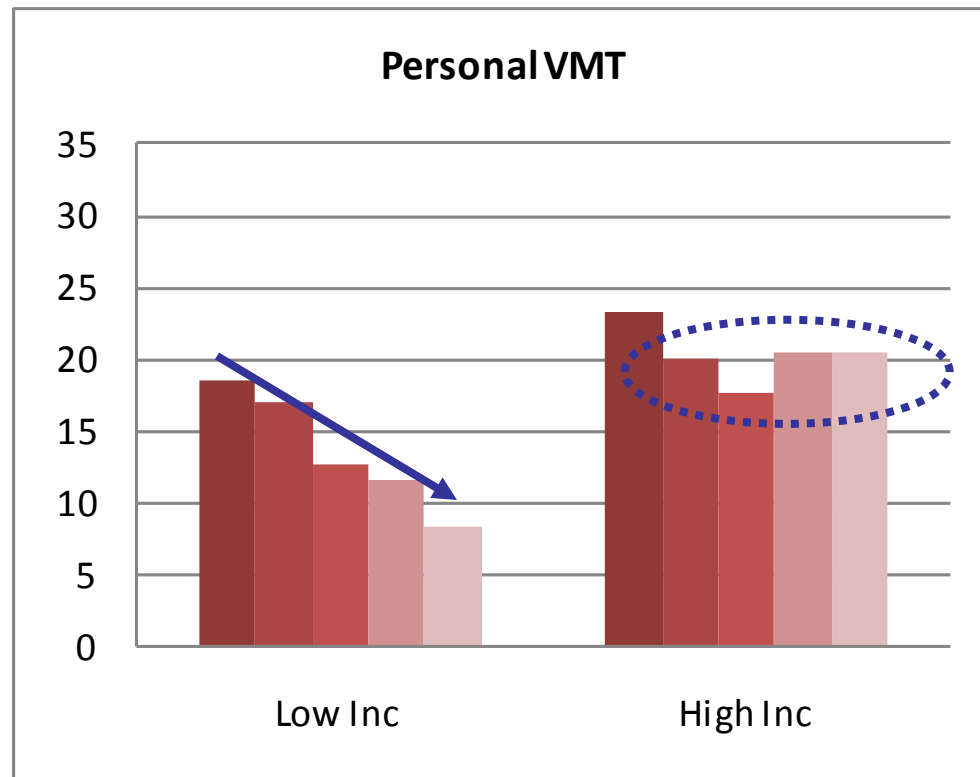
Non-Motorized & Transit

- Are people living in higher density neighborhoods more likely to travel more by non-motorized modes or transit? NHTS provides data regarding the number of walk/bike trips last week, and transit trips last month.
- Density has no clear effect on walking/biking/transit use for people living in high income neighborhoods.



Personal Vehicle Miles of Travel

- For low income neighborhoods, personal VMT decreases with higher density.
- For high income neighborhoods, personal VMT is about the same for residential density > 6 units/acre.



Test Mean Difference

- The table shows that the auto use for commute, daily drive alone trips, and person VMT are about the same with residential density > 2 units/acre among medium or high income people.

Test of Mean Difference by Residential Density > 2 units/acre			(Pr>F)
	Low (< 30K)	Medium (30-80K)	High (80K+)
<u>Commuting</u>			
Distance to Work	0.11	0.000	0.34
Time to Work	0.20	0.05	0.74
Commute by Auto	0.000	0.000	0.25
<u>Daily Travel</u>			
Daily Trips	0.14	0.36	0.20
Daily Distance	0.004	0.17	0.003
Daily Drive Alone Trips	0.000	0.95	0.21
VMT	0.000	0.49	0.03
<i>red font: means are significantly different</i>			<i>(persons . 16 yr. old)</i>

Conclusion

- NHTS provides valuable information for us to understand regional travel pattern and its relation with land use and demographics characteristics.
- Future studies:
 - Analyze travel-land use-demographics with household data
 - Understand future pattern of immigration status
 - More test on income interaction with land use on vehicle use

Thank you