Sketch Planning Tool for Non-motorized Travel

Using Census Data in Identifying Discriminating Factors of Walk/Bike Friendly Communities

Presented by
Ho-Ling Hwang, Ph.D.
Center for Transportation Analysis
Oak Ridge National Laboratory
Acknowledgment

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- NHTS Add-on areas provided access for data

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ORNL Team
- Rick Schmoyer, Ph.D.
- Tim Reuscher
- Daniel Wilson
- Ryan Parten
- Ho-Ling Hwang, Ph.D.
Study Objectives

Current Scope: Utilizes 2009 National Household Travel Survey (NHTS) data and integrates with other data sources, including American Community Survey (ACS) data to

– identify factors that make communities walk/bike
– understand why/why-not travelers walk/bike in their communities

Follow-up (optional): Develops a GIS-based visualization planning tool

– using factors identified above
– with a selected neighborhood for the prototype case study
Data Sources:
Use Census data directly and indirectly

- National House Travel Survey (NHTS) data
  - NHTS 2009 national dataset with Nelsen Claritas variables
  - NHTS add-on data

- American Community Survey (ACS) data
  - Demographic data
  - Commuting to work data (i.e., journey to work)

- Census Master Address File (MAF) and Topologically Integrated Geographic Encoding and Referencing System (TIGER)
  - Line Shapefiles for geographic information system (GIS) (e.g., roads, rivers)
  - Cartographic boundary files for legal entities and statistical geographic areas (e.g., county, tract, block group)

- Others
  - Walk scores and transit scores
  - Centers for Disease Control (CDC) Obesity data
NHTS Characteristics on Walk/Bike Trips:

All HHs

Non-Biking HHs

Biking HHs

Non-Walking HHs

Walking HHs

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

With kids Ages 0-15

With kids Ages 0-15

Lower income

Higher income

Lower income

Higher income

Lower income

Higher income

Lower income

Higher income

< $20,000

$20,000 - $39,999

$40,000 - $59,999

$60,000 - $79,999

$80,000 - $99,999

$100,000+
NHTS Characteristics on Walk/Bike Trips:

- **All HHs**
- **Non-Biking HHs**
- **Biking HHs**
- **Non-Walking HHs**
- **Walking HHs**

- **All Persons**
- **Non-Bikers**
- **Bikers**
- **Non-Walkers**
- **Walkers**

Legend:
- no workers in HH
- 1 worker in HH
- 2 workers in HH
- 3 workers in HH
- 4 workers in HH
- 5 or more workers in HH
- Less than high school graduate
- High school graduate, include GED
- Some college or Associate's degree (Vocational)
- Bachelor's degree (BA, AB, BS)
- Graduate or Professional Degree (MA, MS, MBA, MD, PHD, EdD, JD)
NHTS Trip Distribution by Age Group

Percent of trips in group (%)
Purpose of visit to destination (trip end) - NHTS Add-on area, Why-To variable
ACS Walk/Bike Commuting Trips:

Nationally, walking accounted for over 20% of “non-POV mode share in commute trips, while biking is only about 4%.
ACS: walked to work
block group trip counts

Miami, FL

Milwaukee, WI
ACS: walked to work (block group mode share, %)
Use of Census demographic data & TIGER boundary files

Maps showing population density for all persons (left) and persons ages 5-17 (right) by block group in a downtown neighborhood in Dallas, TX.
Data derived using Census TIGER shapefiles

Roadway density and intersection density within a given geographic boundary can be calculated.

Roadway density (miles or roadway per square mile of the block group) in the downtown Dallas, TX neighborhood.

Intersection density (number of intersections per square mile of the block group) in the same neighborhood.
Measuring walkability at block group

Mode share of walking to work (percent of commute trips made by walking), based on ACS 2005-2009 5-year data on workers 16 & older.

Walk Score measures provided by WalkScore.com, based on distance to amenities, e.g., grocery, restaurants, shopping, coffee, banks, parks, schools, book stores, & entertainment.
Data Analysis Methodology

• Data screening at national and NHTS Add-on areas
  • Established the basis for the final choice of factors
  • Choices of potential predictors
  • Stepwise procedure considered
• Discriminant Analysis vs. Logistic Regression
  • Classification modeling methods
  • Concern of multivariate normality assumption
Dependent variables being considered in the modeling efforts

**Trip rate**
- Number of walk trips per capita in block group
- Number of walk trips (including egress/access to transit) per capita in block group
- Number of bike trips per capita in Census tract

**Trip length**
- Bike miles per capita in Census tract
- Walk miles per capita in block group

**Mode share**
- Non-home based walk trips
Summary

- Census data plays a major role in this research
- Modeling effort continuing
- Currently acquiring work place employment data for the study areas
- Continue to explore/investigate potential entropy variables to measure land-use mix
- Final report for this Phase I study will be completed by the end of January 2012