Roadway Bicycle Compatibility, Livability, and Environmental Justice Performance Measures

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Overview

1. Introduction
2. Bicycle Compatibility
3. Environmental Justice
4. Future Work
U.S. Partnership for Sustainability Principals
Livability Principal # 1:

*Provide more transportation choices.*

Develop safe, reliable and economical transportation choices to decrease household transportation costs, reduce our nation’s dependence on foreign oil, improve air quality, reduce greenhouse gas emissions and promote public health.
Introduction - Bicycling & EJ, What’s the Problem?

- Regional Equity (Duthie, Cervenka and Waller 2007)
- Pollution (Deka 2004)
- Road user safety (Dumbaugh and Rae 2009)
- Access to jobs (Boschmann and Kwan 2010)
"Do we really want to restrict cycling to a tiny percentage of the population and exclude most women, children, and seniors? Or should we be truly inclusive and design our cycling policies for everyone?" (Pucher and Buehler 2009, 63)
Introduction – Housing + Transportation Costs

H+T Costs, % Income (median)

- Data not available
- Less than 45%
- 45% and Greater

Source: Center for Neighborhood Technology, htaindex.cnt.org.
For more, see Haas, et al (2009)
Introduction

Datasets:

• Regional roadways (bicycling subset) CAMPO, 2009

• Census Tracts, American Community Survey, 2009
Bicycle Compatibility Index

BCI = bike lane, width, volume, speed, parking, land use, adjustment factors
(Harkey, Reinfurt and Sorton 1998)
Bicycle Compatibility

Applying to a regional network:
1. Start with MPO’s modeling network
2. Add missing variables with Google Streetview, functional class estimations
3. Calculate BCI or BLOS in spreadsheet
4. Summarize in polygons
Average Bicycle Compatibility Index

Percentile (1st % = best bicycle compatibility)

Geography: Census Tracts (n=256)
Environmental Justice

Common variables are % minority and income

1. American Community Survey ‘% Other Race’ & ‘median income’ joined to Census Tracts

2. Roadway BCI joined to census tracts via 200’ buffer (Dumbaugh and Rae 2009, p. 317)
Percent Other Race
American Community Survey, 2009
Percentile (1st % = least diversity)

Legend:
- < 1% (0)
- 1% - 10% (25)
- 10% - 50% (103)
- 50% - 90% (102)
- 90% - 99% (23)
- >99% (3)

Moran's I = 0.6926
Median Family Income
American Community Survey, 2009
Percentile (99th% = highest income)
Median Income & Bicycle Compatibility (inv.)

OLS $R^2$: 0.003086
F-statistic: 0.786387
% Other Race & Bicycle Compatibility

OLS $R^2$: 0.008614
F-statistic: 2.20702
Bicycle Compatibility & Environmental Justice

Conclusion:

• In the Austin metro area, income or race are not significantly correlated with bicycle compatibility.
Future Work

• Improve data sources
  • Complete sidewalk network & add PLOS variables
  • 2010 Census data & new EJ definitions
  • Enhance bicycle network data with BCI or BLOS variables
Future Work

• Apply the method in other places
  • Are there locations that reveal clustering (Moran’s I) and BCI inequities to demographics ($R^2$)?
  • Texas, U.S., international?
Future Work

• Monitoring Results
  • Perform counts at different locations with similar urban form variables to isolate socio-demographic influences
Future Work

Consider demand, not just supply:

• Apply Iacono et al.’s (2010) non-motorized accessibility to an EJ framework.

• Is WalkScore more predictive of active transportation than infrastructure?
Questions?
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References:


