



CUTR

CENTER for URBAN
TRANSPORTATION
RESEARCH

A Decomposition Approach to Comparing Pedestrian Fatality Risks across Geographies

Steve Polzin, **Xuehao Chu**, Jodi Godfrey

10th UTC Spotlight Conference on Pedestrian and Bicycle Safety

December 1-2, 2016 • Keck Center, Washington, D.C.



Research Questions

- Many geographies ranked most dangerous to pedestrians are in the Southeastern region (Federal Region 4).
- Can we gain better understanding of geographical differences in pedestrian safety through decomposing pedestrian mortality rates (\equiv fatalities per capita) into components?
- How does the decomposition outcome depend on the exposure measure used?



Alabama
Florida
Georgia
Kentucky
Mississippi
North Carolina
South Carolina
Tennessee

Methods

- Multiplicative components of mortality rates
 - **Exposure Per capita**
 - **Risk of Involvement** (\equiv pedestrians involved per unit of exposure)
 - **Risk of Death** (\equiv pedestrian deaths per involvement)
- Alternative measures of exposure
 - Basic Measure: Person hours walked (PHW)
 - Square root of [PHW*vehicle hours traveled (VHT)]
 - Square root of (PHW*non-freeway VMT)
- % difference between Southeastern and other regions in mortality rate and each component

Data

- Exposure
 - 2009 National Household Travel Survey (NHTS)
 - PHW, including walking for transit access & egress
 - VHT by household vehicles only
 - 2009 *Highway Statistics*: non-freeway VMT
- Non-fatal crashes (2009)
 - *State Data System Crash Data Report: 2000-2009*
 - Published summary data by states
 - Tabulated data from state crash databases
 - No data for Massachusetts, New Hampshire, Rhode Island on non-fatal crashes and injuries
 - Pedestrian crashes with all vehicle types

Key Findings

Pedestrian Mortality Rate: +44% higher in Southeastern than in other regions during 2009

Components	PHW	Square Root of (PHW * VHT)	Square Root of (PHW * VMT)
Exposure Per Capita	-47%	-25%	-16%
Risk of Involvement (pedestrians involved per unit of exposure)	+49%	+4%	-7%
Risk of Death (pedestrian deaths per involvement)	+85%	+85%	+85%

Future Research Needs

- Use different exposure measures for different crash types. Examples:
 - Number of person crossings for crossing crashes
 - Roadside walking for roadside crashes
- Consider better ways to account vehicle activities in measuring pedestrian risks
 - **Micro-level:** product of pedestrian and vehicle activities (literature)
 - **Macro:** square root of product of pedestrian and vehicle activities (this research)
 - **New Macro:** Theoretically sound and practically feasible

Implications for Practice

