Exploring Spatial Patterns of Pedestrian Injury in Toronto, Canada

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Study Area

- Toronto has the largest population in Canada (approximately 2.6 million in 2011)
- Pedestrian’s account for 52% of all fatalities and 11% of all injuries from motor vehicle collisions\(^1\)

Figure source: Toronto Public Health, 2012
Study Area

Census Tract Boundaries 2006

Classification
- Downtown
- Inner Suburbs

Pre Amalgamation Toronto
- Toronto
- East York
- Etobicoke
- North York
- Scarborough
- York
Study Area
Research Objectives

i. Exploration of pedestrian motor-vehicle collisions (PMVCs) and injury by age and severity

ii. Detection of spatial clusters to identify areas with higher rates of PMVCs and injury events
Vulnerable Pedestrians

Children (0 – 14 years)
- Road traffic injury is the single largest cause of YLL (17%) in children and youth in Canada, specifically pedestrian injury accounts for 25% of total injuries²

Seniors (65 years and older)
- In Ontario in 2010, seniors accounted for a remarkably large share of pedestrian fatalities despite their representation in the population³
Data

- Weekday PMVCs occurring between January 1, 2000 to December 31, 2011
- Motor Vehicle Collision Reports filed by Toronto Police Services
- Injury Severity:
  - i. All PMVCs
  - ii. ‘Severe’ injury: major and fatal injury

Figure Source: City of Toronto, Transportation Services
Indirect Standardized Rates

- Why census tracts?
  1. Generally homogenous environment and urban design features
  2. Weekday collisions are likely to occur close to home in the CT in which a child lives, while for seniors PMVCs tend to occur on regular trips, generally occurring close to home

- Calculated standardized (i) collision and (ii) morbidity ratios
Cluster Analysis

- Standardized collision/morbidity ratios
- Spatial Empirical Bayes Rate Smoothing
- Local Moran’s I Significance and Cluster Maps
- Outlier Analysis
RESULTS
Children

Local Moran’s I results for children’s standardized collision ratios
Local Moran’s I results for children’s standardized morbidity ratios
Seniors

Local Moran’s I results of senior’s standardized collision ratios
Seniors

Local Moran’s I results of senior’s standardized morbidity ratios
DISCUSSION
Policy Implications

- Intervention planning and implementation must acknowledge spatial differences in PMVCs and injury for children and seniors
- Age-based guidance of interventions for the built environment
Conclusions

- Examining injury events by level of severity reveals a shift in the intensity away from the downtown core towards the inner suburbs of Toronto
- Additional attention, on the policy and planning front, is needed for pedestrian safety in the inner suburbs
Thank You

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References


