

Pedestrian Collisions on City Streets, King County, 1999-2004

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Research Background

- In 2004, 68,000 pedestrians were injured in traffic collisions in US, 4641 of them were died. In 2005, this number raised to 4881, which was accounting for more than 10 percent of total traffic-related fatalities (NHTSA, 2006).
- In Washington State, 1,769 pedestrians were involved in collisions in 2004 (WSDOT, 2005). And 60 died within three weeks of the collisions, representing 10.6% of total traffic-related fatalities in WA State (NHTSA, 2006).
- King County only has slight more than 28% of state population but has 44% of all statewide pedestrian collisions, 34.4% pedestrian fatalities and 41.7 percent of disabling injuries in the state, 1999--2004 (Moudon, Lin, et al. 2007).

Research Background

- From 1999-2004, 3464 pedestrian collisions happened in King County, WA. 72.1% of them were on City Streets. 22.7% of them were on State Routes.
- A follow up research for Moudon, Lin et al. (2007) work on State Routes.

Research Objectives

- Injury severity research.
- Investigate multiple factors that might affect pedestrian injury severity levels on city streets, King County, 1999-2004.

Research Questions

- What are the factors that contribute to high/low pedestrian injury severity?
- What are the factors that affect 5-scale (KABCO) pedestrian injury severity?
- What are the difference between these significant factors and those on State Routes?

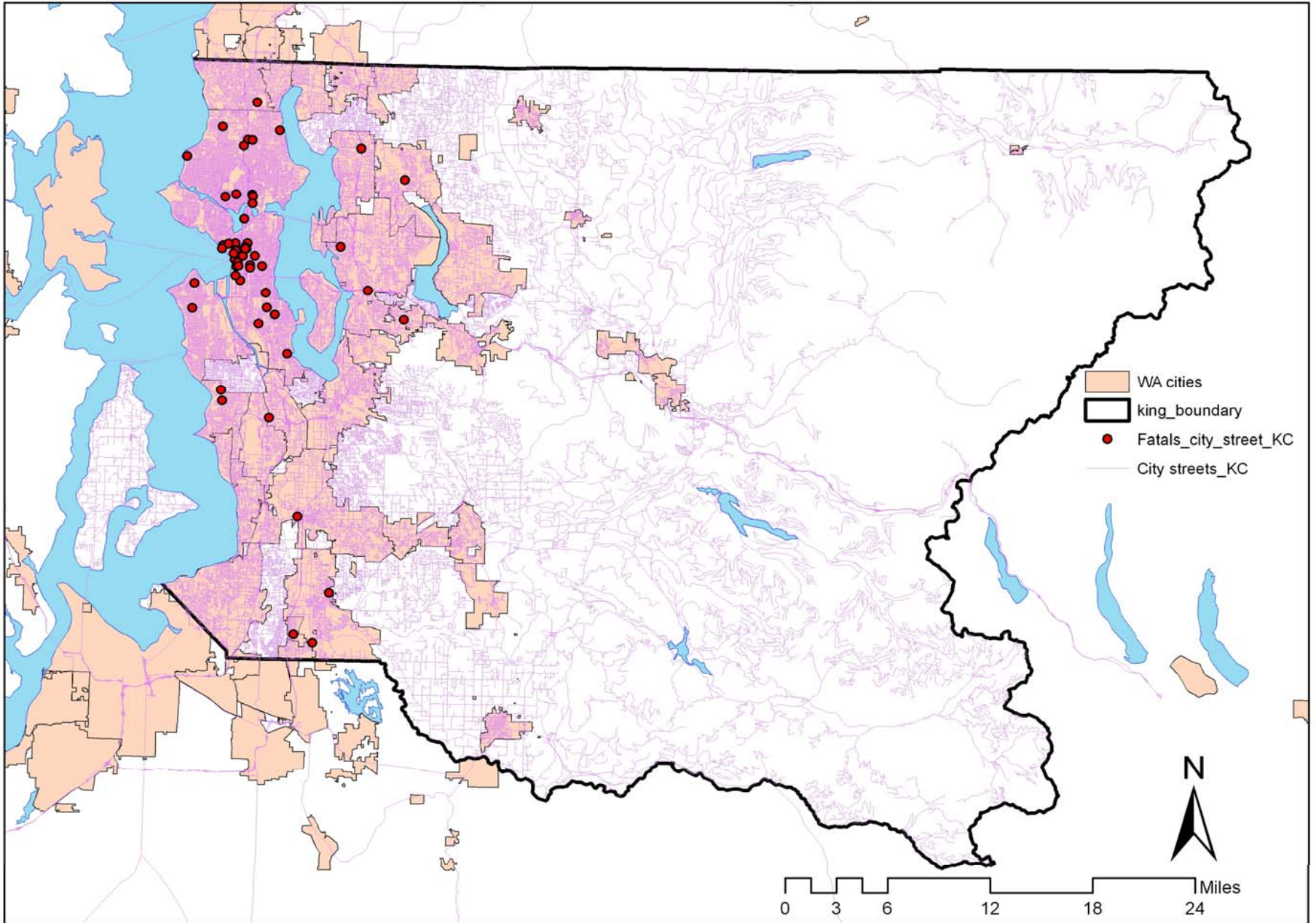
Research Data

- All the data was provided by Washington State Dept of Transportation (WSDOT). WSDOT developed the dataset from the original police officer report.
- 2497 out of 3464 (72.1%) pedestrian collisions had happened on City Streets in King County from 1999-2004.

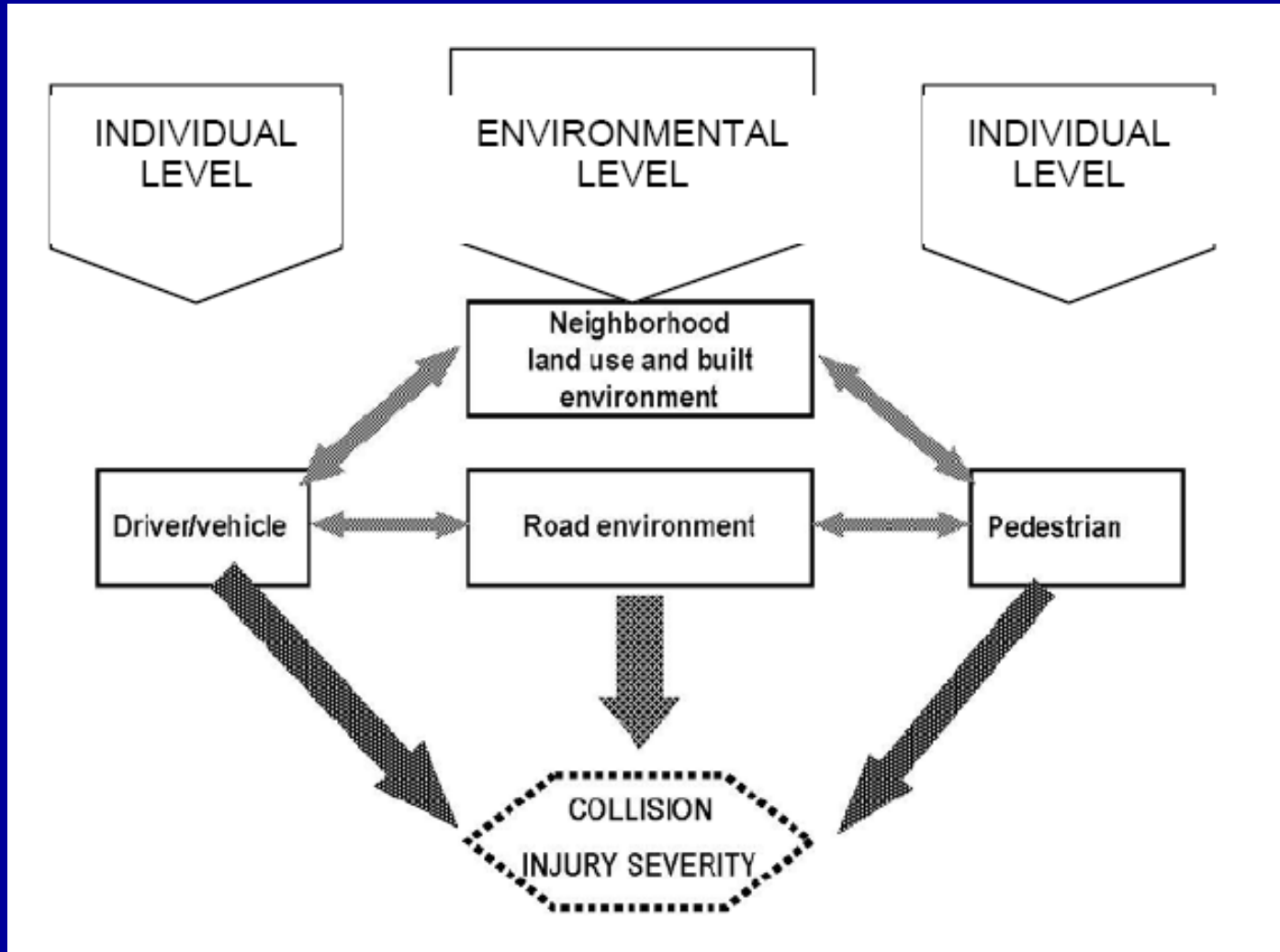
Research Data

Injury severity classifications		Police records [BASE]	Frequency of pedestrian collisions by injury class (n = 2457)			
2 classes	5 classes		5 classes		2 classes	
			Frequency	Percent	Frequency	Percent
Low injury severity	1 No Injury (O)	Unknown No injury	63	2.6	2068	84.2
	2 Possible Injury (C)	Possible injury	959	39.0		
	3 Evident Injury(B)	Evident Injury	1046	42.6		
Fatal/High injury severity	4 Disabling Injury(A)	Disabling Injury	324	13.2	389	15.8
	5 Fatal (K)	Died at hospital, Dead on arrival, Dead at scene	65	2.6		
	Total		2457	100.0	2457	100.0

Pedestrian Fatalities on City Street in King County from 1999-2004



Research Method



(Moudon, Lin et al. 2007)

Data processing

Dependent variables	Data Source	Data Measurement	Independent variables	Data Source	Data Measurement
High/Low injury	Police officer report	Categorizing data (0/1)	Individual level variable (age, gender...)	Police officer report	1. Categorizing data, or 2. Using natural log transformation.
Five Categories injury	Police officer report	Categorizing data (five scales)	Road Environment variables (daily traffic volume, speed limit, road category...)	1. Geo-coding, 2. Run Arcview extension written by Phil.	1. Categorizing data, or 2. Using natural log transformation.
			Neighborhood Environmental (surrounding average home value, distance to bus stops...)	1. Geo-coding, 2. Run Arcview extension written by Phil.	1. Categorizing data, or 2. Using natural log transformation.

Data analysis: High/Low model

High/Low Injury Model		
Analysis Processes	Statistic Methods	Objectives
Base model test	Binary Logistic Regression	Test commonly used individual level & road related variables
Bi-variate test	Chi-square, ANOVA	Test selected road & neighborhood related variables
Base model one-one test	Binary Logistic Regression	Test selected road & neighborhood related variables
Final model test	Binary Logistic Regression	Test all the variables in the base model and significant variables in the above two tests.

Data analysis: Five scale model

Five Categories Injury Model		
Analysis Processes	Statistic Methods	Objectives
Base model test	Ordinal Regression model	Test commonly used individual level & road related variables
Bi-variate test	Chi-square, ANOVA	Test selected road & neighborhood related variables
Base model one-one test	Ordinal Regression model	Test selected road & neighborhood related variables
Final model test	Ordinal Regression model	Test all the variables in the base model and significant variables in the above two tests.

Research Findings: High/Low model

Significant variables In base model test	Significant variables In the bi-variate test	Significant variables In one by one test	Significant variables In the final test
Age of Pedestrian			Age of Pedestrian
Gender of pedestrian (male)			Gender of pedestrian (male)
PED walking along roadway			PED walking along roadway
More than one PED involved			More than one PED involved
Drivers have been drinking			Drivers have been drinking
VEH going straight ahead			VEH going straight ahead
VEH making right turn			VEH making right turn
			VEH making left turn
Dark/unknown/other			Dark/unknown/other
		Median home value in 0.5-km buffer) (dollars)	68,001 – 120,000 dollars of median home
	Average daily traffic in 0.5-km buffer) (number of cars)	Average daily traffic in 0.5-km buffer) (number of cars)	Average daily traffic in 0.5-km buffer) (number of cars)

Significant level: 0.05

Research Findings: Five-scale model

Significant variables in base model test	Significant variables in the bi-variate test	Significant variables in one by one test	Significant variables in the final test
Age of Pedestrian			Age of Pedestrian
			Gender of pedestrian (male)
PED walking along roadway			PED walking along roadway
			PED xing_non intersection
More than one PED involved			More than one PED involved
Drivers have been drinking			Drivers have been drinking
VEH going straight ahead			VEH going straight ahead
Road_calss (minor)			Road_calss (minor)
		Number of restaurants in 0.5km buffer	Number of restaurants in 0.5km buffer
	Average daily traffic in 0.5-km buffer) (number of cars)	Average daily traffic in 0.5-km buffer) (number of cars)	Average daily traffic in 0.5-km buffer) (number of cars)
	Total length of sidewalk in 0.5km buffer		Total length of sidewalk in 0.5km buffer

Significant level: 0.05

Research Findings: summary of models

High/Low final test	Directions	5 scale final test	Directions
Age of Pedestrian	+	Age of Pedestrian	+
Gender of pedestrian (male)	-	Gender of pedestrian (male)	-
PED walking along roadway	-	PED walking along roadway	-
		PED xing_non intersection	+
More than one PED involved	+	More than one PED involved	+
Drivers have been drinking	+	Drivers have been drinking	+
VEH going straight ahead vs all other actions	+	VEH going straight ahead vs all other actions	+
VEH making right turn vs all other actions	-		
VEH making left turn vs all other actions	-		
Dark/unknown/other	+		
Median home value in 0.5-km buffer) (dollars)	-		
Average daily traffic in 0.5-km buffer) (number of cars)	+	Average daily traffic in 0.5-km buffer) (number of cars)	+
		Total length of sidewalk in 0.5km buffer	-
		Road_calss (minor) vs (primary)	-
		Number of restaurants in 0.5km buffer	-

Significant level: 0.05

Conclusion

- Comparing to Moudon, Lin et al. (2007) findings on State Route (SR), PED age, action, number of PED involved, VEH action, ADT, Average home values are significant in both SR and City Streets (CS).
- PED being inebriated, Time (Afternoon off-peak vs. evening off peak) are only significant in SR research.
- Gender of PED, Driver being inebriated, Light (dark/unknown/others), Road class (minor), total length of sidewalk, and Number of restaurant are only significant in CS research.

Discussion: How can you walk safely?

- Don't drink.
- Don't walk around restaurant or bar areas.
- Don't walk on major streets.
- Don't walk in night.
- Use sidewalks.
- Walk in wealthy neighborhood.
- Ask urban form people!!!!

Thank you 😊