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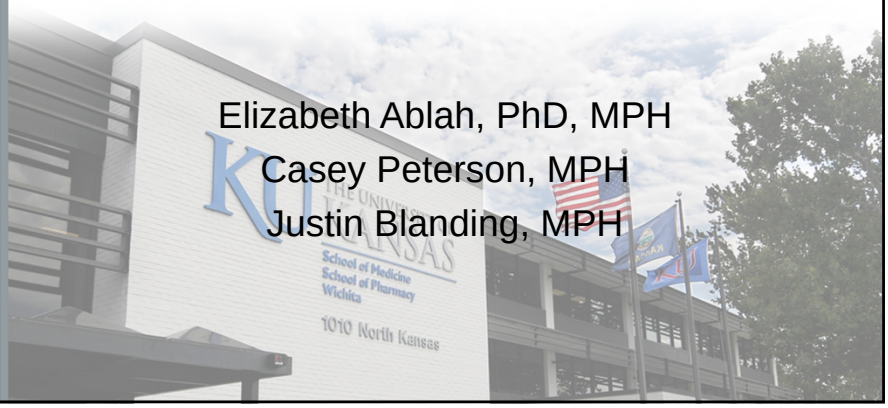
Bicycle and Pedestrian Crashes in Wichita, KS



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Justin Blanding, MPH

Acknowledgments

THANK YOU!

Thank you, City of Wichita Police Department!

Thank you, City of Wichita GIS Staff!

Thank you, Wichita-Sedgwick County Planning Department!

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Introduction

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Introduction

- Walking and biking can improve health of individuals and the environment.[1]
- 28% of motor vehicle trips are one mile or less.[2]
- In the United States, walking and biking account for 11.9% of all trips.[3]
- In Wichita,
  - 2,402 people walk to work regularly.[4]
  - 476 people ride a bike to work regularly.[4]

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Introduction

- In 2014, in the United States, 4,884 pedestrians and 720 bicyclists were killed in crashes involving motor vehicles.[7]
- Crashes involving vehicles and pedestrians are the leading cause of unintentional injury-related deaths.[6]
- Fear of being struck by a vehicle is the primary barrier to biking to work.[5]

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Purpose

- To identify bicycle and pedestrian crash trends and patterns.
- To identify opportunities to prevent and reduce severity of crashes.

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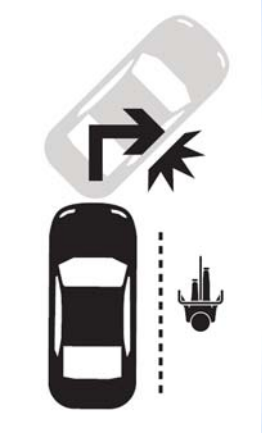
Methods

Participants

Any crash in Wichita, KS involving a bicyclist or pedestrian with a motor vehicle between 2009 and 2016.



Instrument

Crash reports provided by the Wichita Police Department from Jan 2009 to Feb 2016. Crash reports included the following variables:

- Date of crash
- Injury
- Fatality
- Pedestrian
- Bicyclist
- Age
- Sex
- Crash type
- Area of town (Quadrant)
- Time of day
- Citation issued and to whom
- Crash location
- Location of pedestrian/cyclist in the roadway

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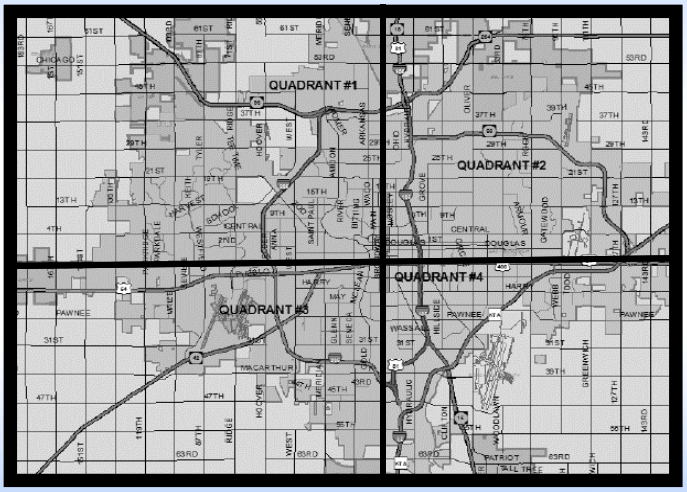
City of Wichita Map in Quadrants



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Procedures

- Approved to proceed, considered 'not human subjects' research by the Human Subjects Committee at the University of Kansas School of Medicine-Wichita.
- Data were collected from Wichita, KS to include all pedestrian and cyclist crashes from Jan 2009 to Feb 2016.
- Data were abstracted from police-reported State of Kansas Motor Vehicle Accident Reports

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Data Analysis

- Crash data were entered into an Excel database.
- All statistical analyses were performed using SAS Version 9.4

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Results

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All Crashes in Wichita from 2009 to 2016

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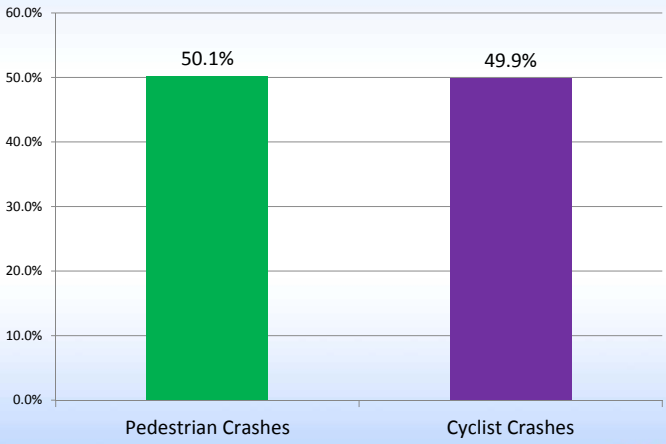
Crashes Involving Pedestrians or Cyclists (N=1,128)



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Injuries and Deaths Characteristics (2009-2016)

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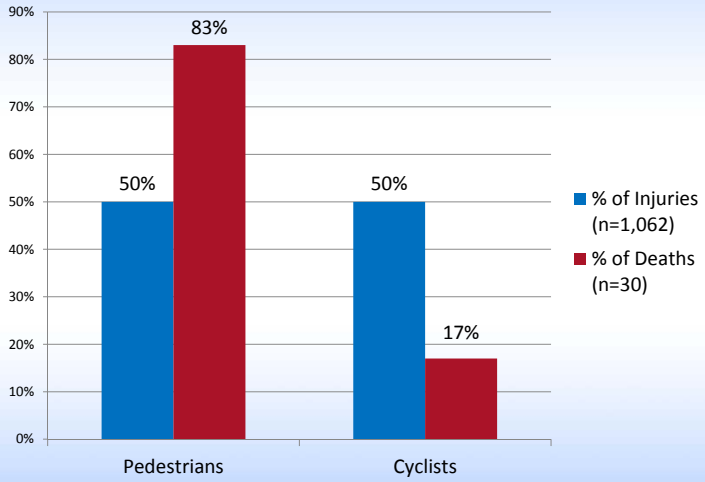
Injuries and Deaths by Crash Type



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Rate of Injuries

- The rate of cyclist injuries was **48.5** per 100 crashes.
- The rate of pedestrian injuries was **47.8** per 100 crashes.
- There was no statistical difference in the relative risk of injury among cyclists and pedestrians (RR: 1.02; 95% CI: 0.9973, 1.0447).

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Rate of Deaths

- The rate of cyclist deaths was **4.5** per 1,000 crashes
- The rate of pedestrian deaths was **22.4** per 1,000 crashes
- Cyclists were 80% less likely to die in crashes compared to pedestrians. This was statistically significant (RR: 0.20; 95% CI: 0.0774, 0.5205).

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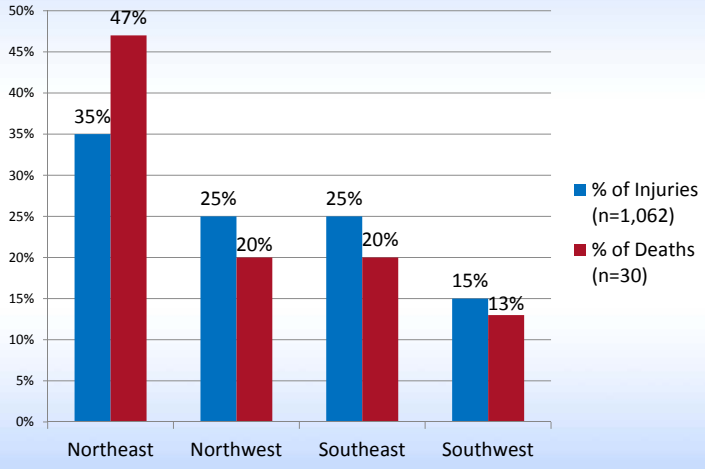
Injuries and Deaths by City Quadrant



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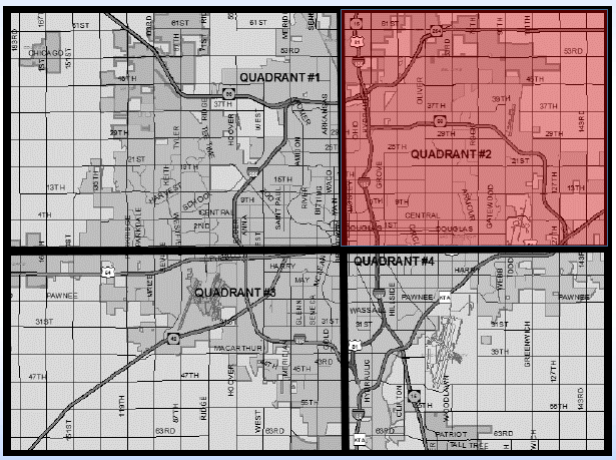
Location in Wichita of Injuries and Deaths



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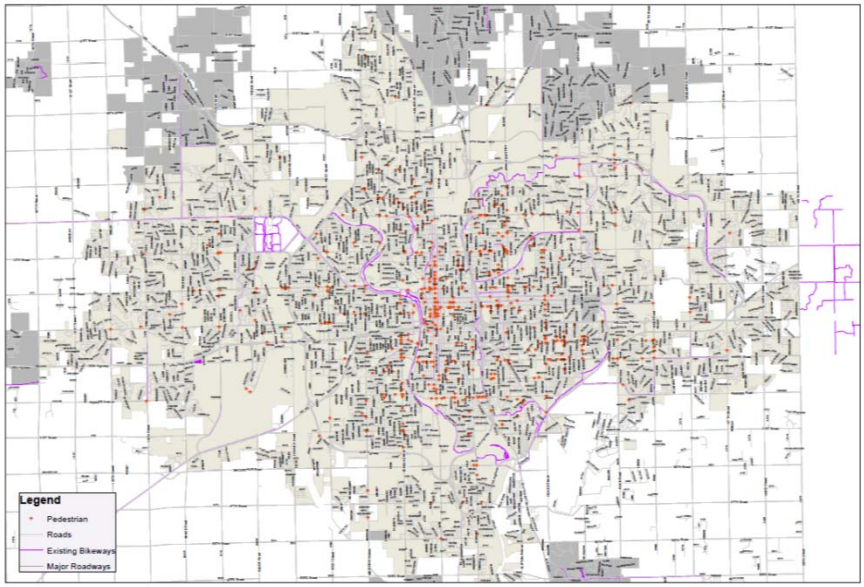
City of Wichita

Pedestrian and Motor Vehicle Crash Locations

2010 - June 2016

9/30/2016



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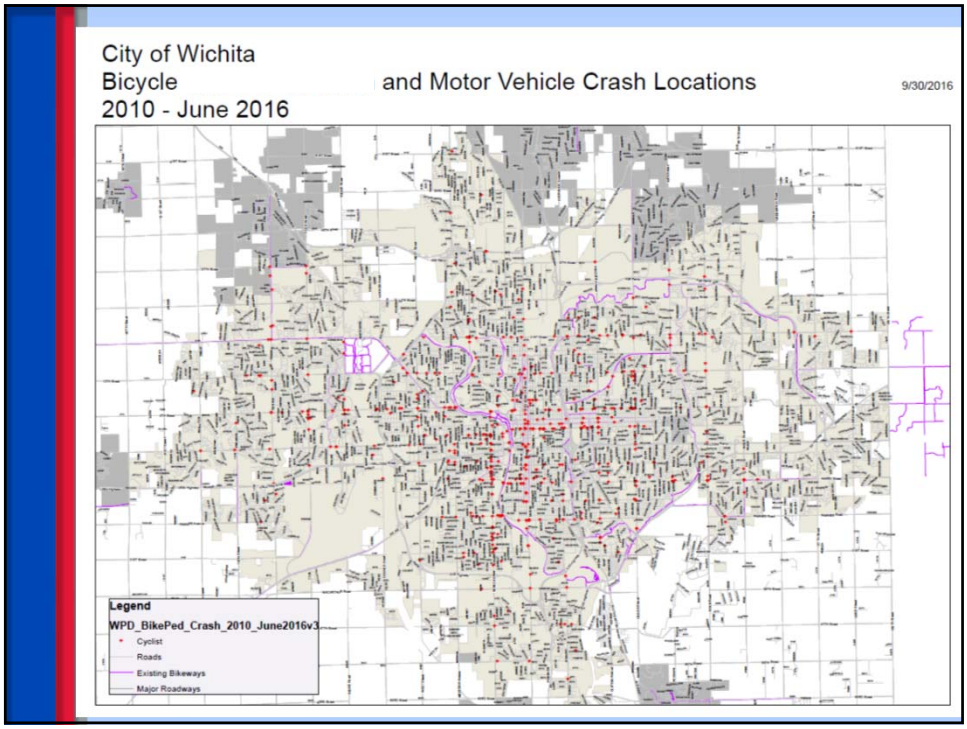
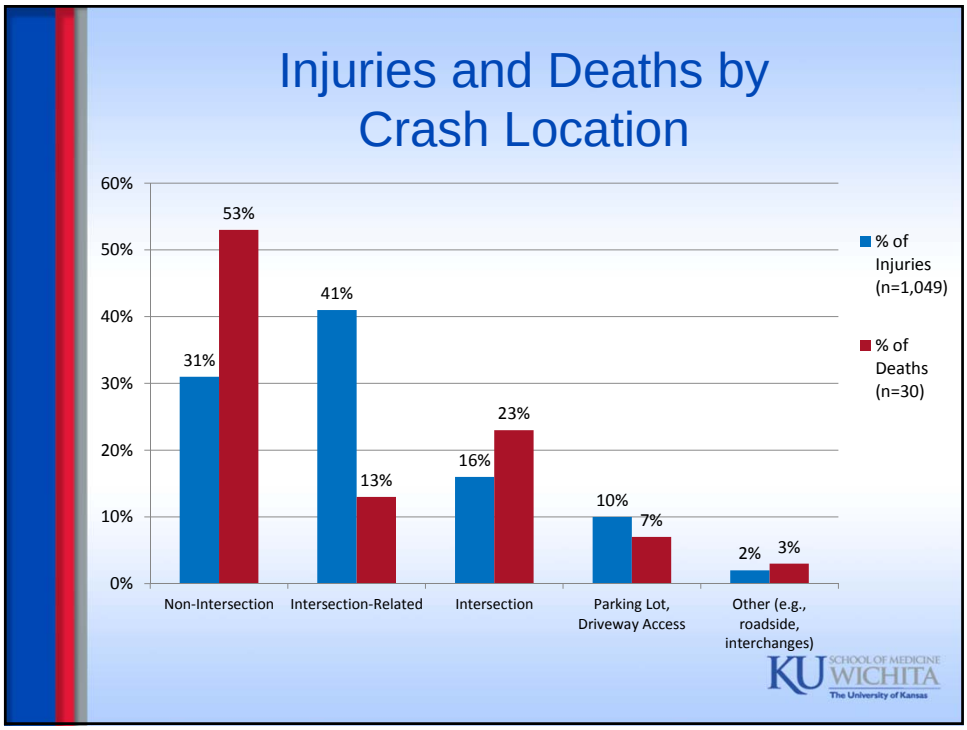

City of Wichita
Bicycle
2010 - June 2016
and Motor Vehicle Crash Locations
9/30/2016
Legend
WPD_BikePed_Crash_2010_June2016v3
Cyclist
Roads
Existing Bikeways
Major Roadways


Injuries and Deaths by Crash Location
60%
50%
40%
30%
20%
10%
0%
53%
31%
41%
13%
16%
23%
10%
7%
2%
3%
Non-Intersection
Intersection-Related
Intersection
Parking Lot, Driveway Access
Other (e.g., roadside, interchanges)
% of Injuries (n=1,049)
% of Deaths (n=30)
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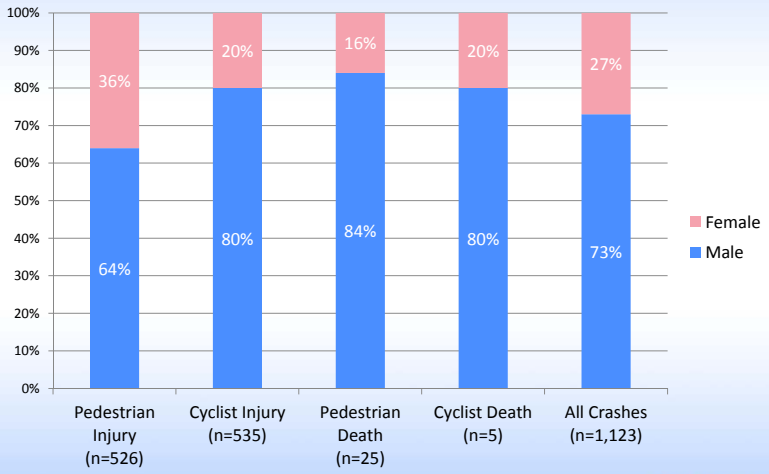
Pedestrians and Cyclists Characteristics (2009-2016)

Gender, Ages of Pedestrians and Cyclists

- The majority (72.1%) of injury crashes involved males.
- The majority (83.3%) of deaths involved males.
- Crash victims ranged in age from 1 year to 91 years.
- The mean age of pedestrians and cyclists injured was 28 years (SD 18.9).
- The mean age of pedestrians and cyclists fatalities was 53 years (SD 22.1).

Gender of Pedestrians and Cyclists by Crash Type



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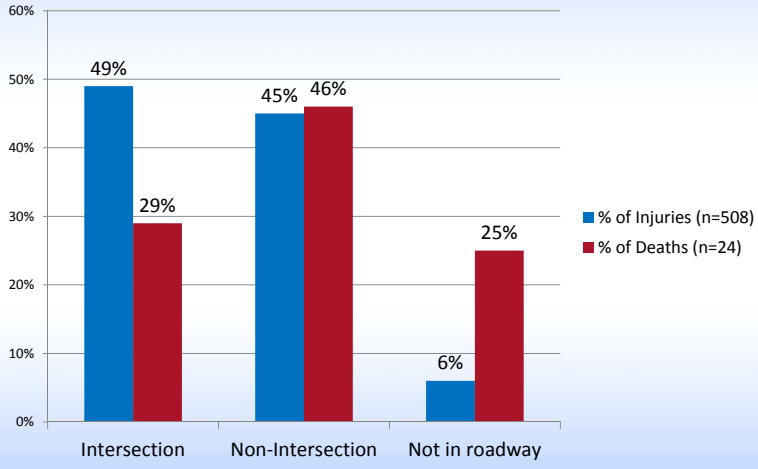
Location of Pedestrians at Time of Crash



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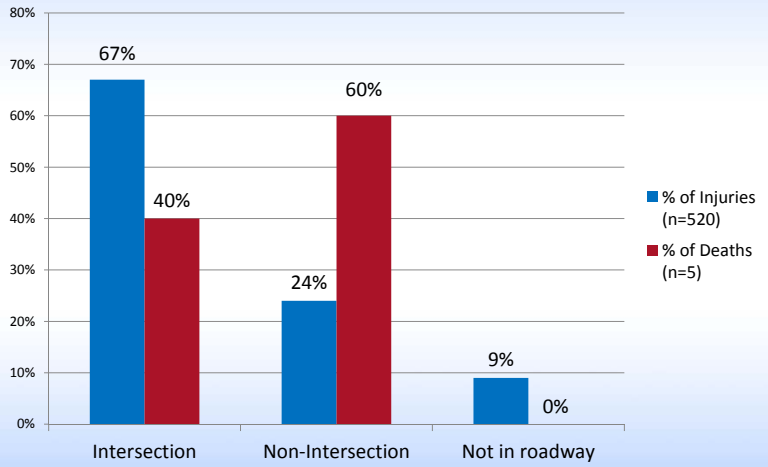
Location of Cyclists at Time of Crash



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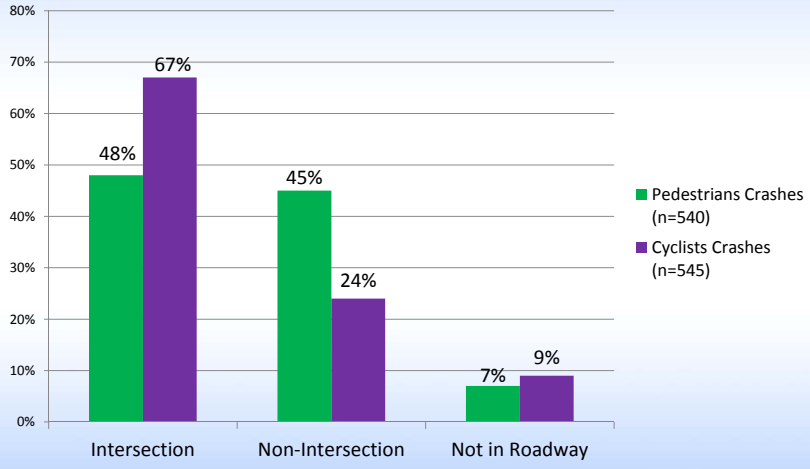
Location of Pedestrians and Cyclists: All Crashes



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Vehicle Characteristics (2009-2016)

Gender, Age of Vehicle Operators

- The majority (53%) of vehicle operators were males in injury crashes.
- The majority (54%) of vehicle operators were male in fatal crashes.
- Vehicle operators ranged in age from 3 years to 91 years.
- The mean age of vehicle operators involved in a crash was 43 years (SD 18.3).

Self-Report Speed of Vehicles

- The majority (59.8%) of crashes did not identify how fast the driver believed to be traveling at impact.
- Of those with self-reported speeds, vehicle operators were most likely to report (23.6%) traveling between 5-10 miles per hour.

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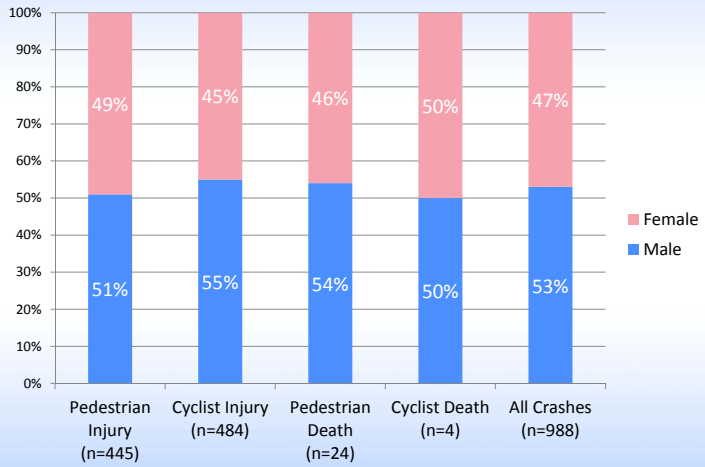
Gender of Vehicle Operator by Crash Type



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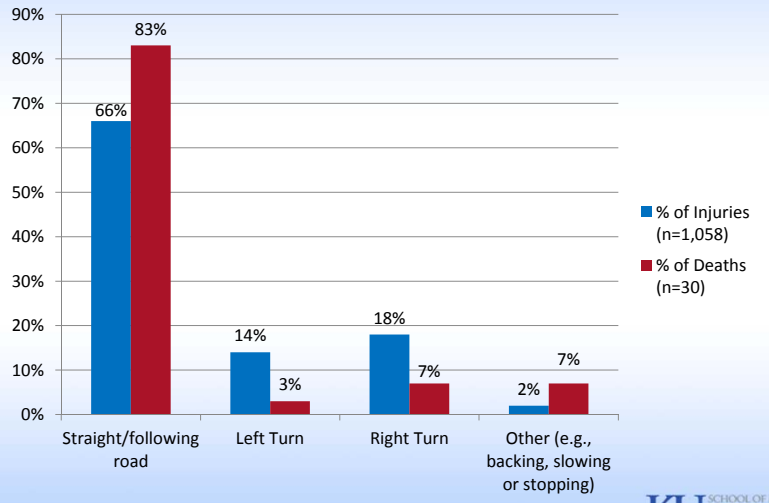
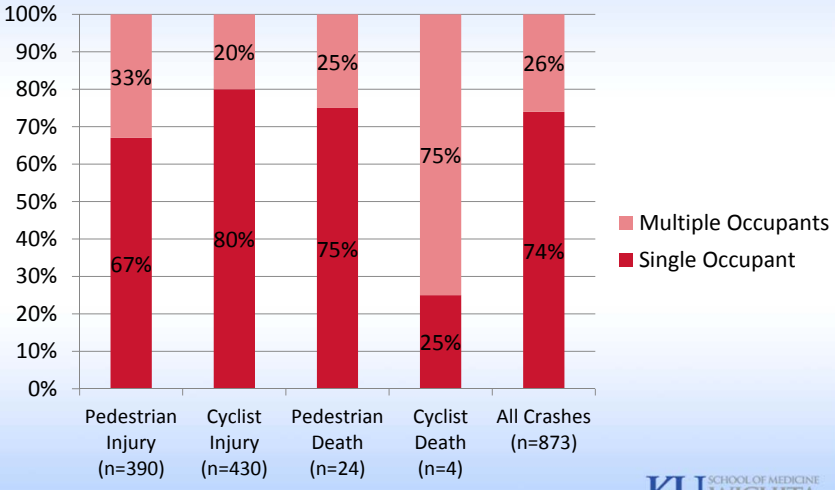
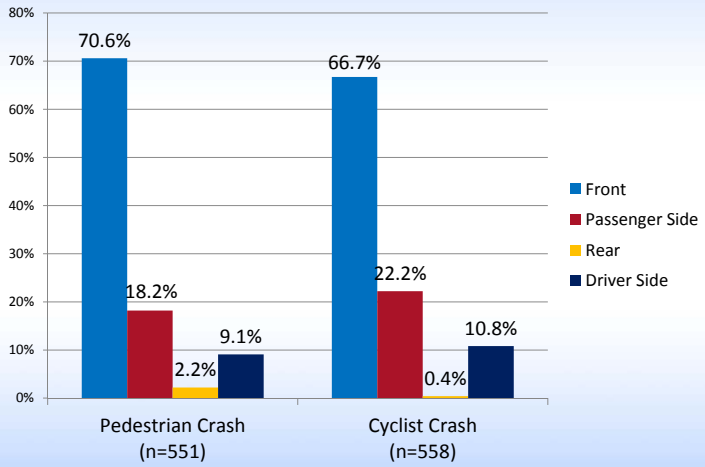
Vehicle Maneuver by Crash Type



Number of Vehicle Occupants by Crash Type



Point of Impact with Position of Vehicle by Crash Type



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Environmental Characteristics (2009-2016)

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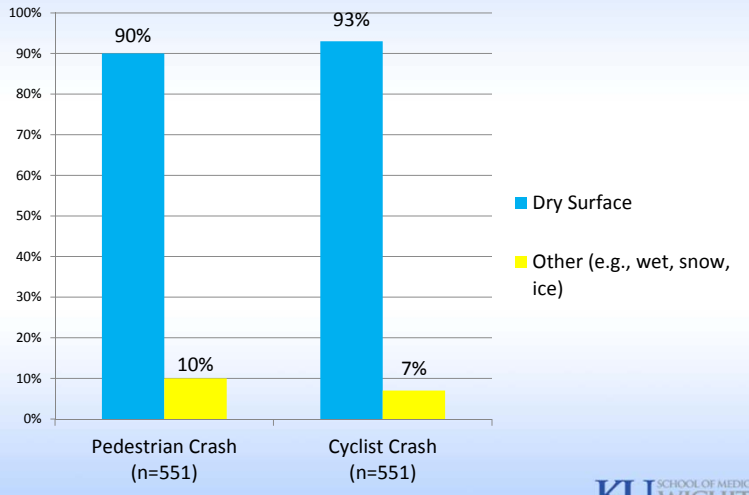
Road Surface Conditions



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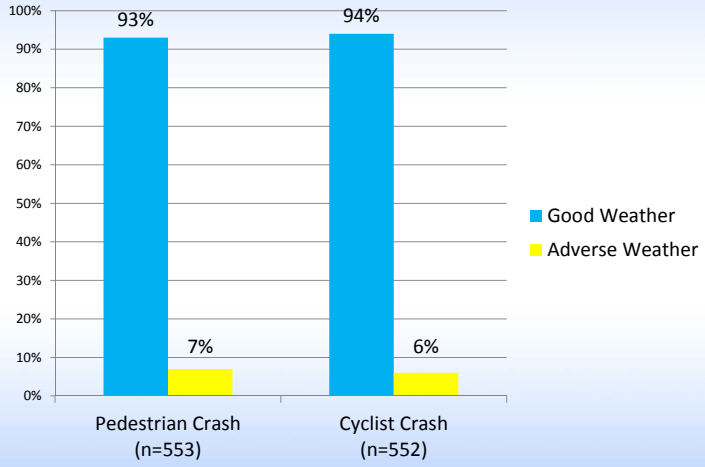
Adverse Weather Conditions



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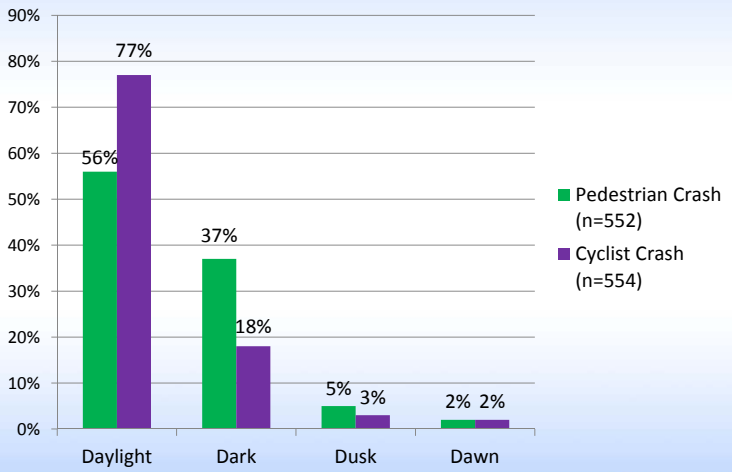
Light Conditions at Time of All Crashes



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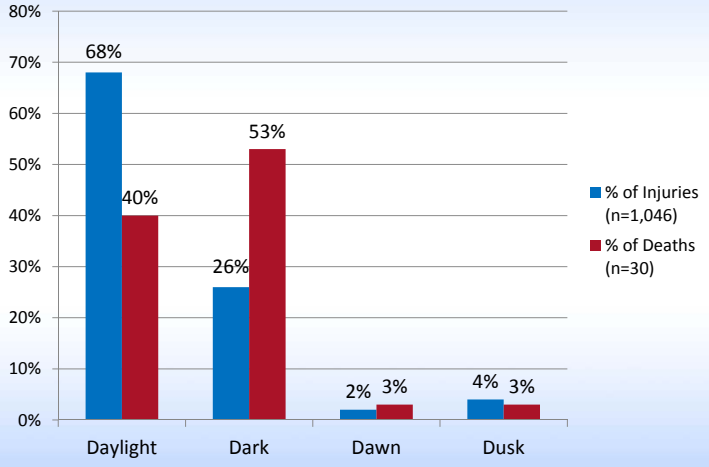
Light Conditions by Crash Type



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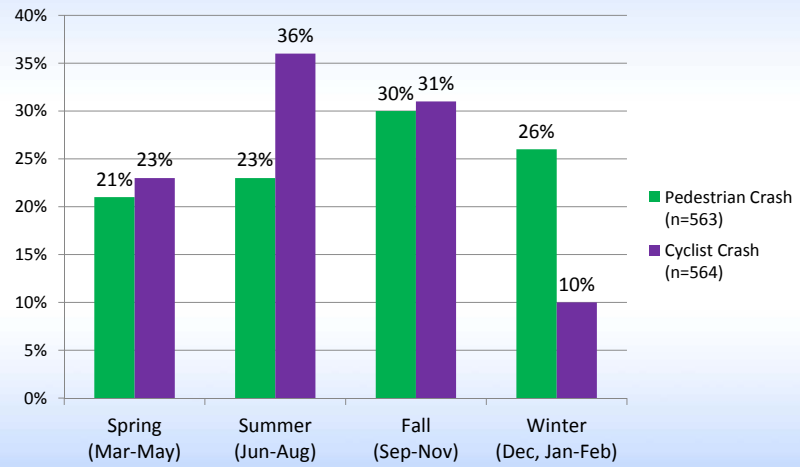
Season of All Crashes



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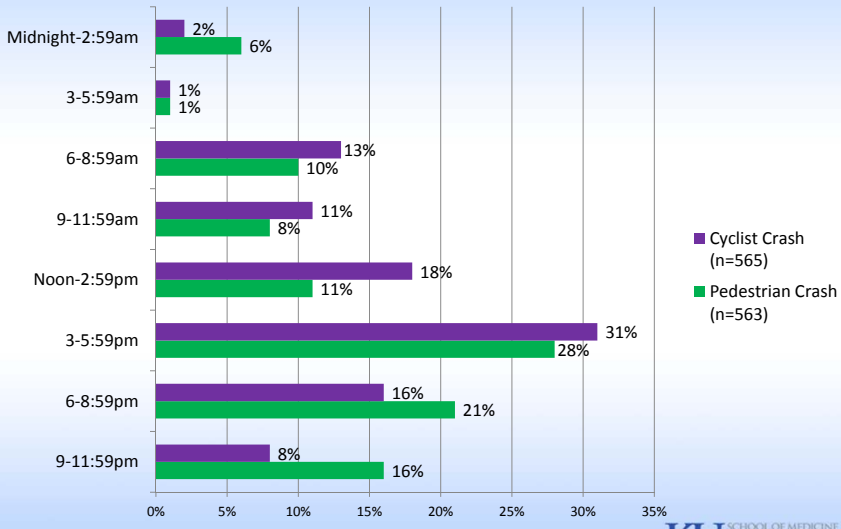
Time of Day by Crash Type



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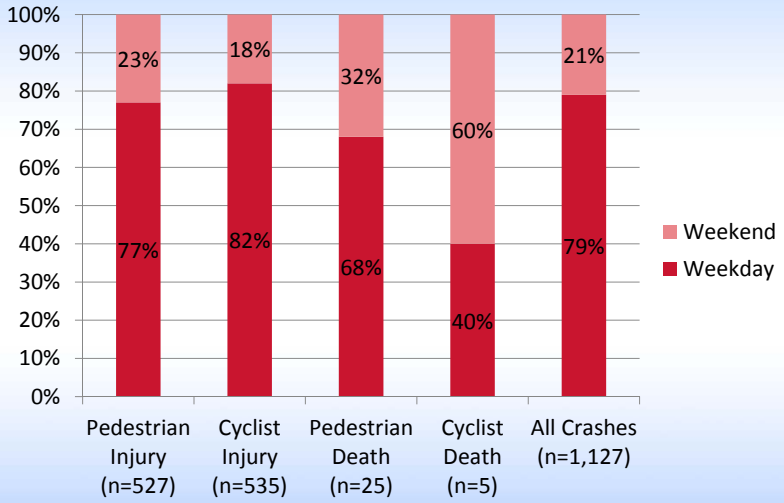
Day of Week by Crash Type



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Other Characteristics
(Citation, Impairment, Hit and Run)

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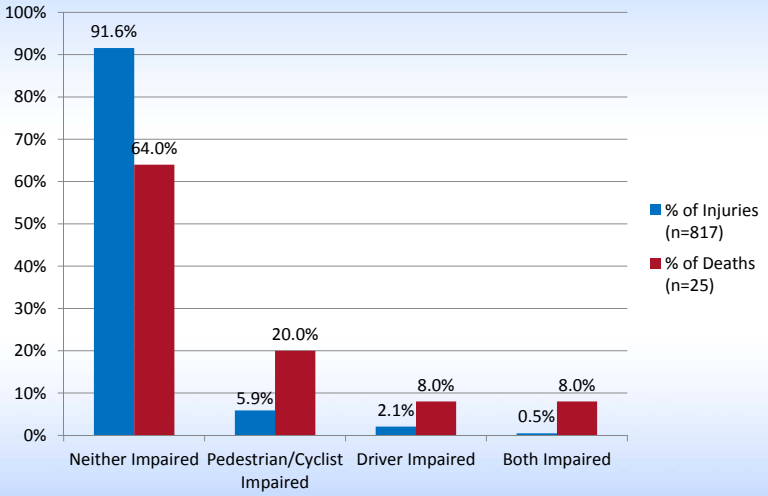
Injuries and Deaths by Impairment



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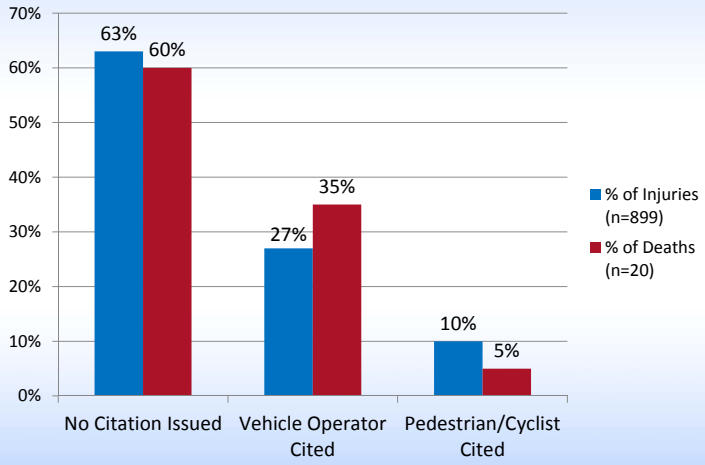
Injuries and Deaths by Citation Status



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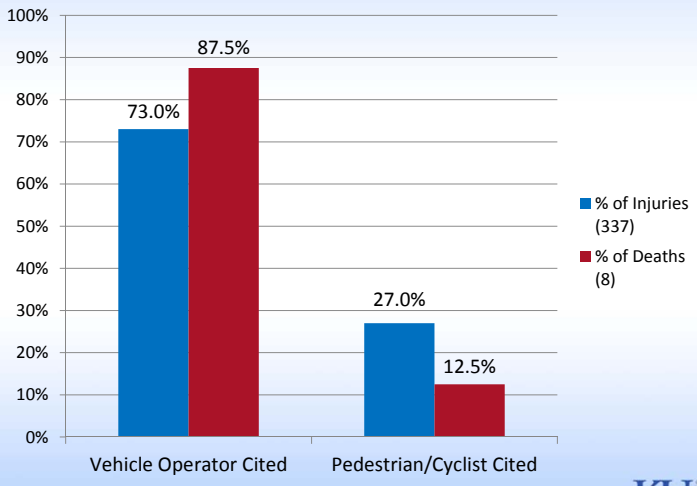
Operator Cited When Citation Issued



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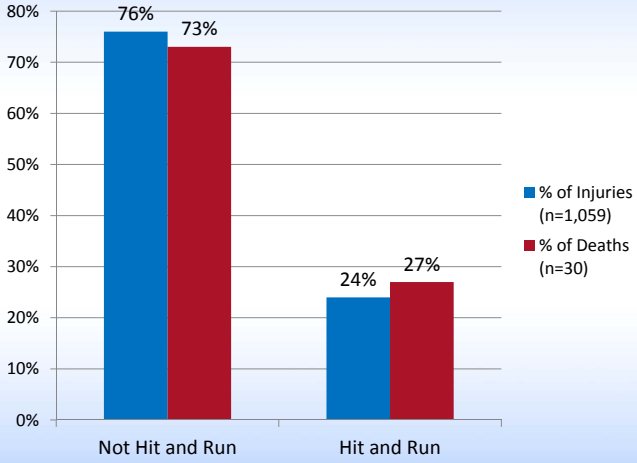
Hit and Run by Crash Type



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Comparisons to National Fatality Crashes (2014)

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Cyclist and Pedestrian Fatality Rates, 2014

City	Resident Population	Cyclist Fatalities	Pedestrian Fatalities	Fatality Rate per 1,000,000 Population	
				Cyclist	Pedestrian
Wichita, KS	388,812	2	3	5.14	7.72
Oklahoma City, OK	620,602	2	10	3.22	16.11
Denver, CO	663,862	3	13	4.52	19.58
Fort Wort, TX	812,238	1	19	1.23	23.92
Austin, TX	912,791	0	12	0.00	13.15
Houston, TX	2,239,558	6	60	2.68	26.79
U.S. Total	**318,857,056**	**726**	**4,884**	**2.28**	**15.32**

National Highway Traffic Safety Administration, 2016
U.S. Census Bureau, 2016

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Wichita Cyclist and Pedestrian Fatality Rates

Year	Resident Population Estimates	Cyclist Fatalities	Pedestrian Fatalities	Fatality Rate per 1,000,000 Population	
				Cyclist	Pedestrian
2009	380,115	1	5	2.63	13.15
2010	383,872	0	3	0.00	7.82
2011	383,818	0	3	0.00	7.82
2012	385,865	1	4	2.59	10.37
2013	387,419	0	4	0.00	10.32
2014	388,812	2	3	5.14	7.72
2015	389,965	1	2	2.56	5.13
7-Year Average	**385,695**	**1**	**3**	**2.59**	**7.78**

U.S. Census Bureau, 2016
NHTSA

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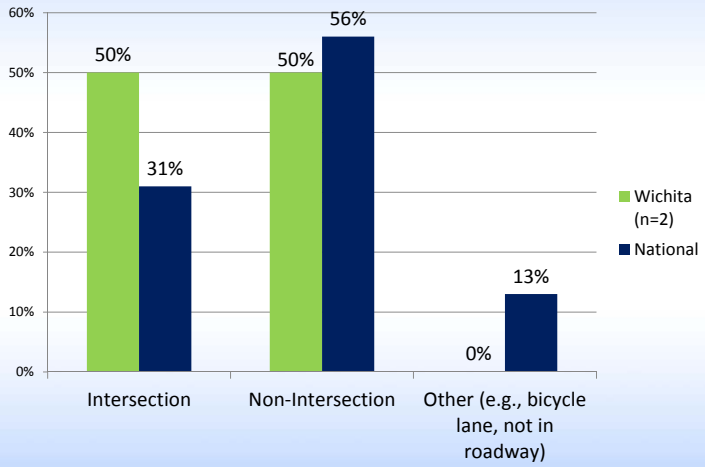
Cyclist Location-Deaths, 2014



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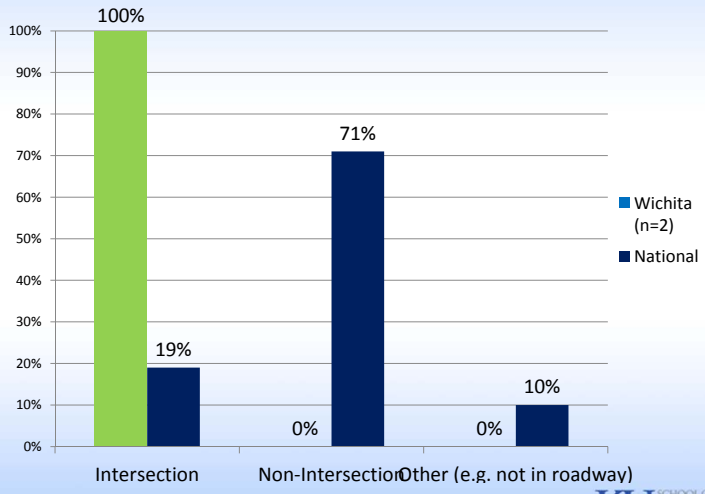
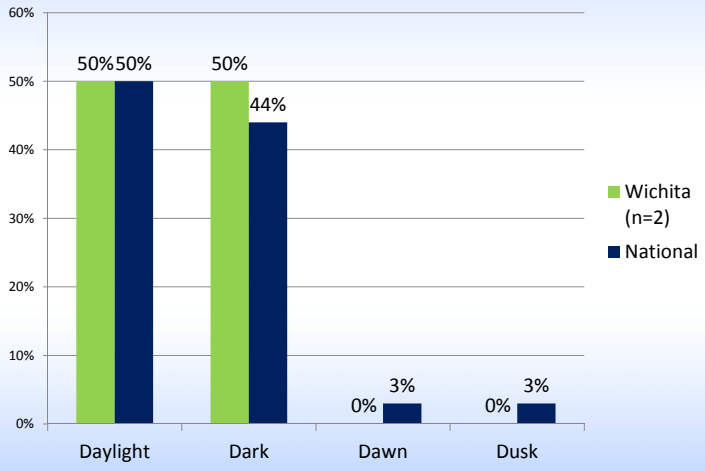
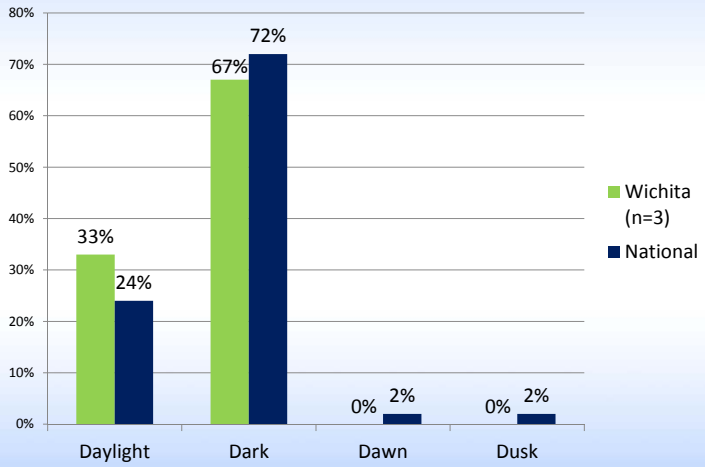
Pedestrian Location-Deaths, 2014



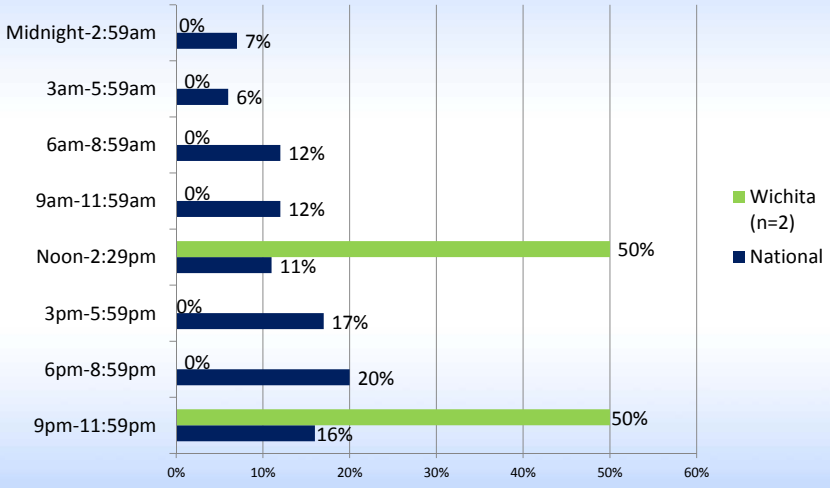
Light Condition of Fatal Cyclist Crashes, 2014



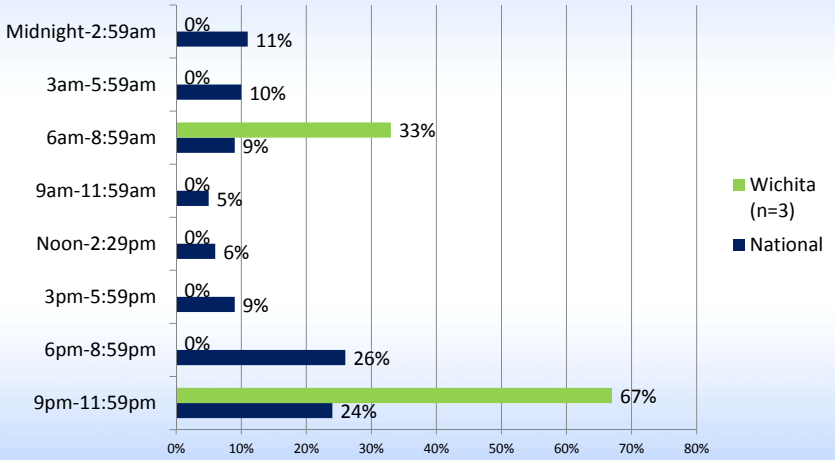
Light Condition of Fatal Pedestrian Crashes, 2014



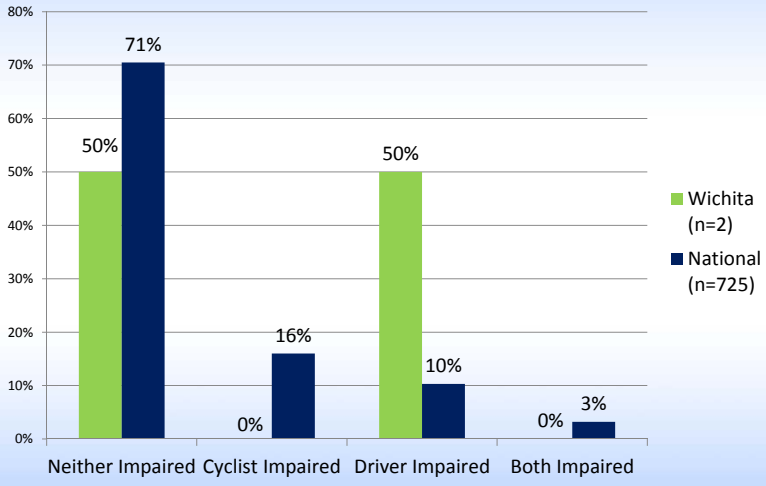
Time of Fatal Cyclist Crashes, 2014



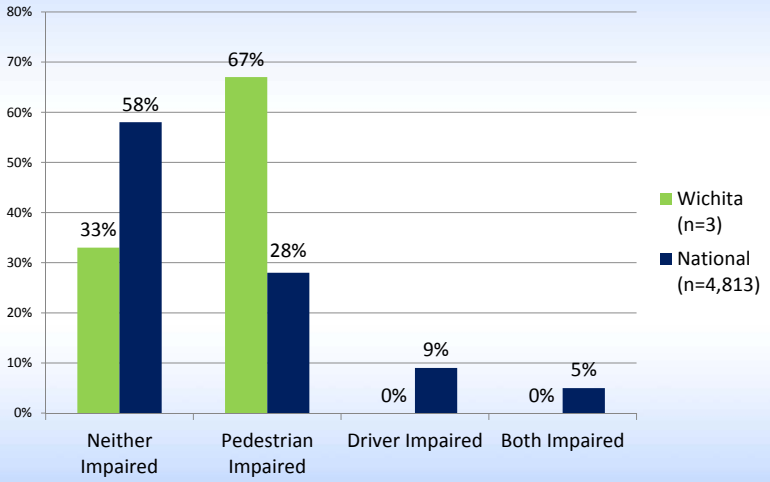
Time of Fatal Pedestrian Crashes, 2014



Cyclist Deaths by Impairment, 2014



Pedestrian Deaths by Impairment, 2014



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Discussion, Conclusions

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Discussion

- The purpose of the study was to examine trends in pedestrian and bicycle crashes.
- This study suggests that most crash victims were men, and the mean age of victims was 28. This is similar to previous research findings.[7]

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Discussion

- From this study, most injuries and deaths occurred in northeast Wichita, which includes downtown Wichita.
- This may be due to an increased population density, more people biking and walking in this area, or something about the built environment.
- Further research is necessary to determine why this might be the case.

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Discussion

- Multiple factors (e.g., impaired operator, intersection with no crosswalk, time of day, time of week) contribute to pedestrian and cyclist crashes.
- Most crashes occurred during the weekday between 3 pm to 5:59 pm. The increase in traffic volume may be associated with the increase in crashes.
- Citations were only issued in 37% of injury crashes and 40% of fatalities. This may be possible due to the multiple factors that contribute to the crash and officer discretion/approval of supervisor.

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Discussion

- Most injury crashes occurred when it was light. Half of all fatal crashes occurred when visibility was reduced (i.e. when it was dark).
- Nationally, fatal crashes are highest between 4 pm and 12 am.
- Vehicle speed, the number of lanes, and traffic volume all play in role in crashes and injuries, making it incumbent upon the built environment to protect pedestrians and cyclists, as well as vehicle operators.

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Discussion

- Wichita reported the highest cyclist death rate in 2014 compared to major metropolitan areas in the region and the national average.
- The built environment (e.g., bike lanes, intersections with crosswalks) is a contributing factor that may be associated with Wichita's higher rate.

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Recommendations

- We need to continue encouraging walking and cycling by improving environments that promote walking and cycling.
- Drivers need to be more cautious. In fatal crashes where a citation was issued, the driver was cited 87.5% of the time and 73.1% of the time in injury crashes.

Recommendations

- Injury and fatal crashes occurred most often in the northeast quadrant of Wichita. Efforts need to focus on improvements in this area to reduce crashes.

Recommendations

- Officers did not issue citations for most crashes.
- Further instruction could be given to officers, as it appears that supervisor approval is required for issuance of a citation, and officers may not uniformly issue citations when similar crash characteristics are presented.

Limitations

- Injury severity was not reported
- All crash reports were unique, and reports were not always completed, or completed differently by officers.
- Citations alone do not equate fault.
  - Both operators could be at fault
  - Fault could not be established (hit and run, no cooperation)
  - Operator may have been cited for something unrelated to the crash

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Implications

- Building better environments more conducive to walking and cycling would protect people.
- Planners can reduce additional injuries and deaths by addressing areas where crashes are known to occur.

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Questions?

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