



Bicycle Injuries

Vidya Surakanda
MPH Candidate

Illinois Occupational Surveillance Program

University of Illinois at Chicago
School of Public Health
Environmental and Occupational Health
Sciences, SPH

2121 W Taylor, Rm 117, MC 922
www.illinoisinjuryprevention.org

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INTRODUCTION

- Annually 66.9 million Americans ride bicycles, 33 million of which are children (J.Pucher et al., 2010)
- 9 million bike trips everyday in U.S (NHTS, 2009)
- In 2013 in the U.S. there were 623 fatal and 494,430 nonfatal bike-related injuries (CDC)
- Fatality rates increased from 18.7 to 24.6 per 10 billion vehicle miles traveled between 2005 and 2010
- Increased risk at night (6.00 to 8.59 p.m) and if male, non-Hispanic white, and in age groups 6-15 , 35-45 (Stimpson.JP. et al 2013)
- Unintentional injury caused by collision, falls, dooring , slips and rolling off
- Types of injuries:
 - Head injuries, TBI, Genito-urinary (bike bars), kidney damages (adult), Soft tissue injuries, spoke injuries (foot caught in spokes)

INTRODUCTION

Risk factors

- High traffic volume
- Speed > 15 mph
- Lack of streetlights and/or surveillance
- Poor road infrastructure
- Alcohol use

Prevention

- Helmet use reduces fatalities due to head injuries and protects the skull from damage (M.R.Bambach et al, 2013), children in the bike (Miyamoto. S and Inoue. S 2010)
- Clothing (wear long sleeve), Reflectors
- Separate bike lanes , Wider bicycle lanes -12 to 15 feet
- Reduce signal intersection – 3 signal per mile (Srinivas.S and Vidya .T (2014)

STUDY METHODS

- Illinois Hospital data(2011 -2013) -Bike crashes
- Verified the data for missing values
- Grouped the months based on average temperatures in degrees Fahrenheit into cold (<45), moderate (45-65),and warm (>65)
- Conducted descriptive analysis to find distribution of injuries over these three month groupings
- A multivariate model is created to find the outcome variable death is related to season, age.

FINDINGS

- Male
- Place-Street highways and home
- Age group 6-15
- White Hispanics – 70%
- Common Injuries: Superficial, Contusion, fractures (children)
- In fracture-Upper extremities (Warm months)
- Inpatient- 10 %

Fatal- 72

Severe injuries- 692

Severity increases by age

Traumatic Brain injuries – Type 1



DEMOGRAPHIC CHARACTERISTICS

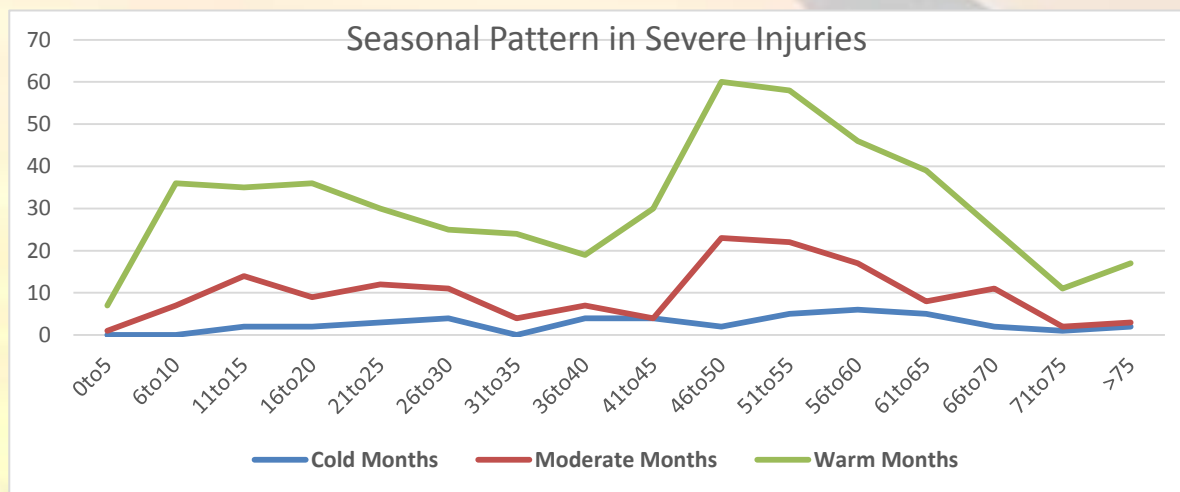
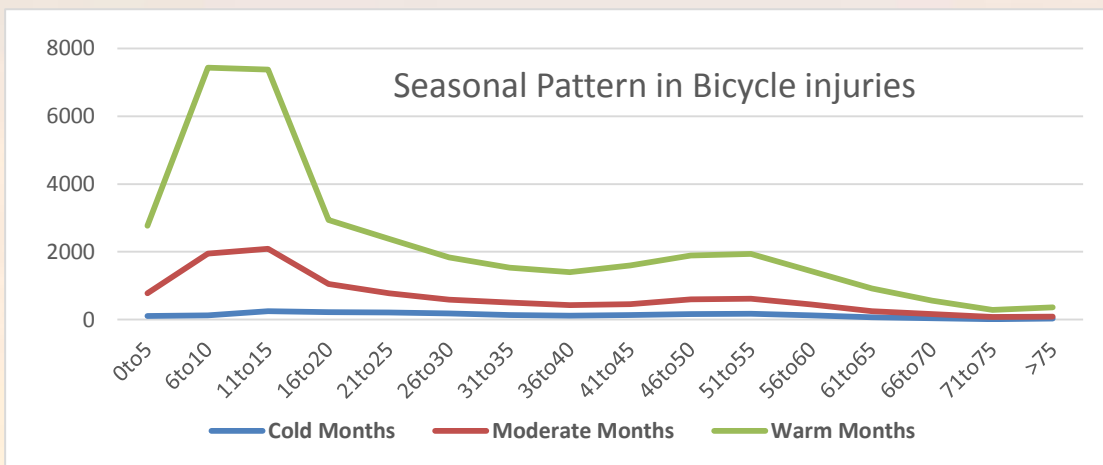
Demographic Distribution Bicycle Injuries by seasonal groups:

Illinois Hospital Discharge Data 2011 -2013

	Cold Months	Percentage	Moderate Months	Percentage	Warm Months	Percentage
Gender						
Male	1695	81.96%	7967	73.41%	25390	69.31%
Female	373	18.04%	2886	26.59%	11240	30.69%
Age years						
0 to 5	103	4.98%	779	7.18%	2771	7.56%
6 to 10	126	6.09%	1948	17.95%	7437	20.30%
11 to 15	244	11.79%	2088	19.24%	7377	20.14%
16 to 20	222	10.73%	1051	9.68%	2936	8.01%
21 to 25	208	10.05%	780	7.19%	2385	6.51%
26 to 30	177	8.55%	586	5.40%	1835	5.01%
31 to 35	130	6.28%	503	4.63%	1532	4.18%
36 to 40	110	5.32%	426	3.93%	1401	3.82%
41 to 45	138	6.67%	458	4.22%	1599	4.36%
46 to 50	158	7.64%	595	5.48%	1887	5.15%
51 to 55	173	8.36%	611	5.63%	1935	5.28%
56 to 60	128	6.19%	448	4.13%	1427	3.90%
61 to 65	71	3.43%	247	2.28%	913	2.49%
66 to 70	41	1.98%	163	1.50%	563	1.54%
71 to 75	11	0.53%	81	0.75%	280	0.76%
Above 75	29	1.40%	89	0.82%	356	0.97%
Race/Ethnicity						
American Indian /Alaska Native	10	0.48%	30	0.28%	141	0.39%
Asian	32	1.55%	191	1.76%	617	1.69%
African American	229	11.09%	1228	11.34%	4741	12.96%
Pacific Islander	5	0.24%	27	0.25%	90	0.25%
White	1511	73.21%	7898	72.93%	25644	70.11%
Other Race	277	13.42%	1456	13.44%	5346	14.61%



SEASONAL PATTERN



Note: Months are grouped based on average temperature

Cold (December, January, February)

Moderate (March, April, October, November)

Warm (May, June, July, August, September)

Table 2:
Relationship of death due to bicycle crashes in cold, moderate months, age and gender compared to warm month

Outcome --> Death	Odds Ratio	Confidence interval
Warm/Hot Months	1	
Moderate Months	0.96	0.54, 1.71
Cold Months	2.29	1.15, 4.57
Overall	1.63	1.42, 1.88
Age	1.03	1.02, 1.04
Male	2.62	1.29, 5.29

* Possibilities of death after bicycle crash in winter months(December, January and February) is two fold higher than warm and moderate months.

LIMITATIONS

- Minor injuries (self treated) are not included
- Instant deaths at accident site are not included
- Did not control for bikers' behavior/conditions (alcohol, disability)

RECOMMENDATIONS

- Further studies should include temperature, precipitation and miles traveled
- Should conduct a similar study in other cities where there winter is less cold than Illinois



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Thank You