

**Pedestrian and Bicyclist Safety Outreach:
Summary of Crash Analysis**

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Introduction

The TxDOT Traffic Safety Grant, *Pedestrian and Bicyclist Safety Outreach*, aims to address the large number of pedestrian and bicyclist crashes in Texas. The premise for this investigation is to address the 8,749 pedestrians and 2,032 bicyclists with fatal or incapacitating injuries over the past 6 years in Texas. The focus area for this initial investigation was Harris County where nearly 20% of Texas pedestrian and bicyclist crashes with these high severities occurred. As part of this effort crash data was analyzed to better understand the conditions under which pedestrians and bicyclists are involved in serious or fatal crashes. This analysis includes a summary of all fatal and incapacitating injury crash data of pedestrians and bicyclists in Harris County from 2010-2015 and is organized into sections based on topic area.

Where are Crashes Occurring in Harris County?

While most severe pedestrian and bicyclist crashes occurred in the City of Houston (**60%**), a surprisingly large number (**31%**) of these crashes occurred outside the Houston city limits in rural Harris County. While the geographic definition of rural Harris County may have changed throughout the 6 years of this analysis, this is still very telling about the conditions under which these crashes occurred; most likely on higher speed roads with little (or possibly absent) pedestrian or bicyclist infrastructure and places where a motorist may not expect to see a pedestrian or bicyclist.

Who are these Pedestrians and Bicyclists?

Age

Table 1 below provides the number of pedestrian and bicyclist fatal and incapacitating injuries from 2010-2015, by age group (in five year age increments). Several crash reports did not provide pedestrian or bicyclist age, which are represented by the “No Data” row in the tables below. The table is color coded to assist in viewing the frequency of crashes by age group. Specifically: green, blue, light orange and dark orange are used to represent the number of fatalities in ascending order.

The highest number of crashes involved pedestrians ages 21-65, and the least number of crashes involved young children and the elderly. The broad age range associated with high occurrences of crashes reveals the age range of common pedestrians. There is a difference between pedestrian and bicyclist crashes with regard to age: for bicyclists, a high number of crashes involved those who are middle-school age up until age 30, and then again with middle-aged adults (46-55). Once again, very young children and older adults are less likely to be involved in crashes. The slight drop in bicyclist crashes for individuals aged 31-45 may indicate that

bicycles are less common than other modes of transportation (such as walking) for these age groups.

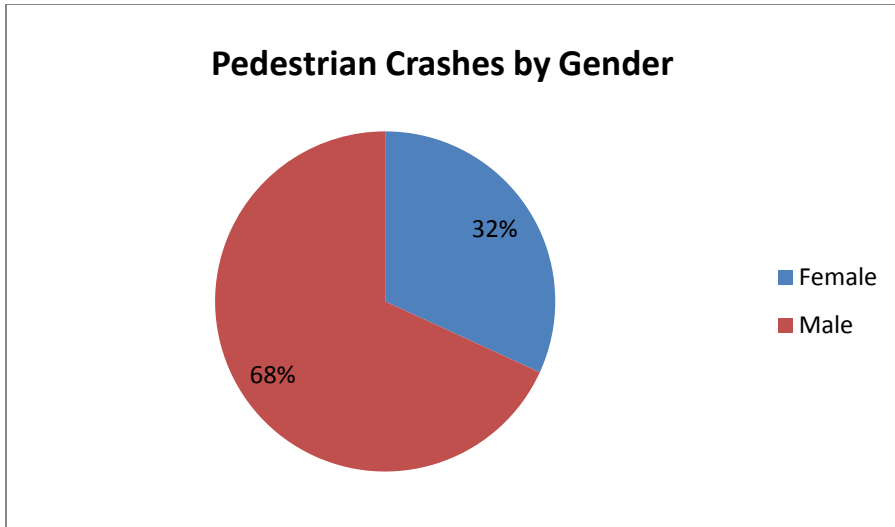
Table 1. Pedestrian and Bicyclist Fatal and Incapacitating Crashes by Age, 2010-2015.

Pedestrians	Fatal & Incapacitating	Bicyclists	Fatal & Incapacitating
0 to 5	4	0 to 5	2
6 to 10	38	6 to 10	14
11 to 15	47	11 to 15	30
16 to 20	80	16 to 20	40
21 to 25	147	21 to 25	32
26 to 30	154	26 to 30	38
31 to 35	170	31 to 35	29
36 to 40	124	36 to 40	26
41 to 45	125	41 to 45	23
46 to 50	121	46 to 50	38
51 to 55	127	51 to 55	36
56 to 60	151	56 to 60	27
61 to 65	110	61 to 65	16
66 to 70	40	66 to 70	6
71 to 75	40	71 to 75	5
76 to 80	27	76 to 80	3
81 to 85	0	81 to 85	0
86 to 90	1	86 to 90	1
91 and older	0	91 and older	0
No Data	55	No Data	8
Total	1561	Total	374

Gender

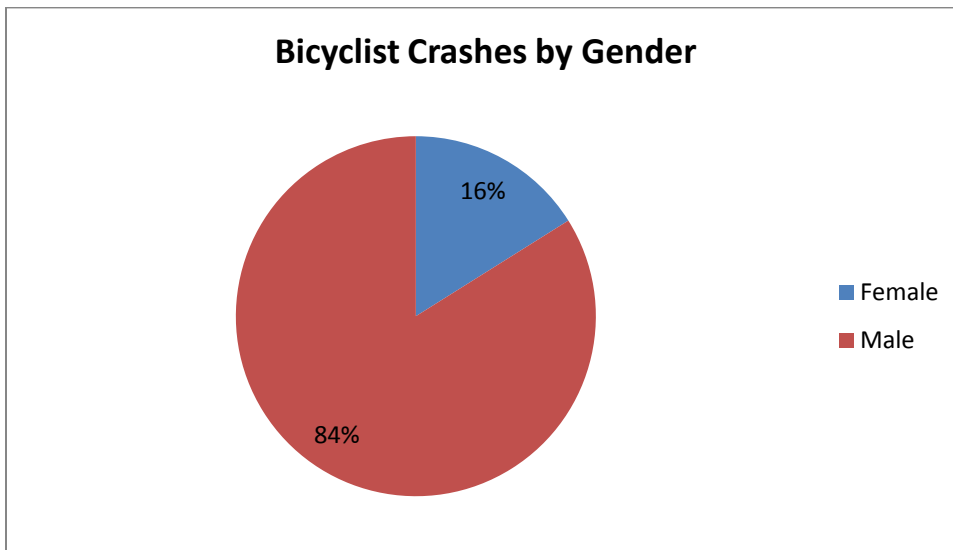
Males are overrepresented in pedestrian crashes, making up **68%** of the total number of crashes in Harris County (Figure 1).

Figure 1. Pedestrian Crashes by Gender.



Males are also overrepresented in bicyclist crashes, making up **84%** of crashes in Harris County (Figure 2). Previous research has found that males typically ride bicycles more than females (Baker, 2009; U.S. Department of Transportation, 2010).

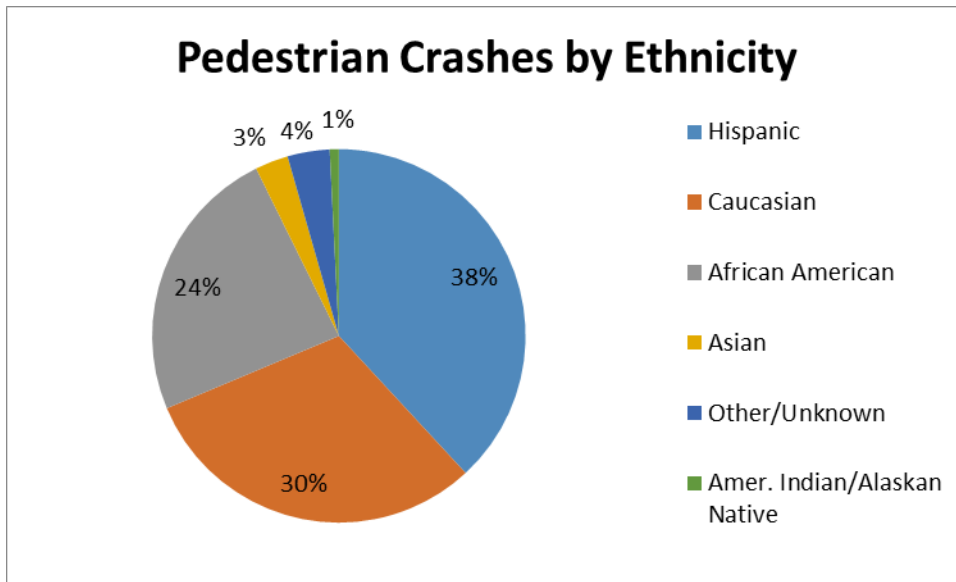
Figure 2. Bicyclist Crashes by Gender



Ethnicity

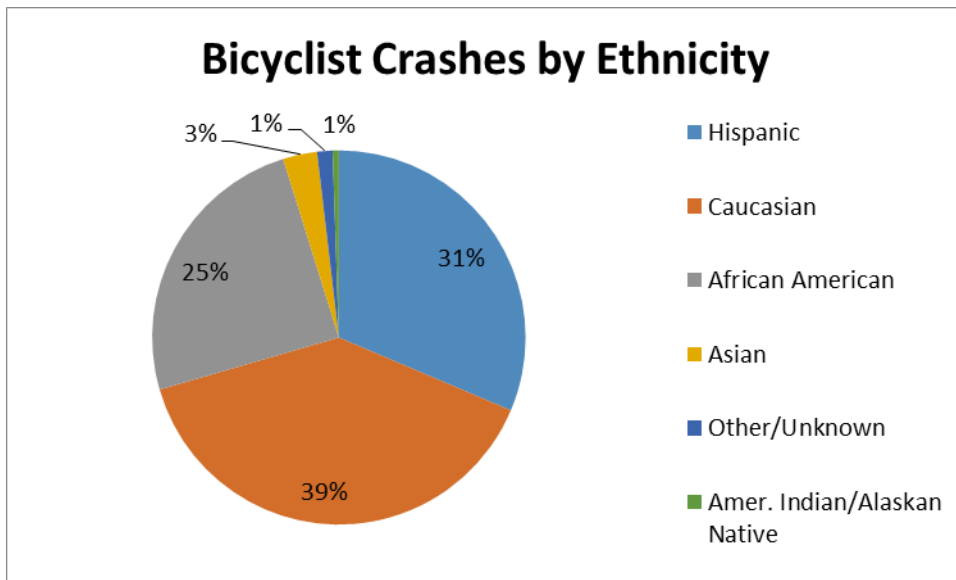
Hispanic pedestrians make up **38%** of fatal and incapacitating crashes. Caucasian (**30%**) and African American (**24%**) pedestrians are the second and third most common pedestrian ethnicities of these crashes.

Figure 3. Pedestrian Crashes by Ethnicity



Alternatively, Caucasian bicyclists make up **39%** of fatal and incapacitating crashes. Hispanic (**31%**) and African American (**25%**) pedestrians are the second and third most common bicyclist ethnicities of these crashes. Although there are slight differences in the percentages of ethnicities involved in fatal and incapacitating crashes for pedestrians and bicyclists, the top three ethnicities overrepresented in these crashes remain the same.

Figure 4. Bicyclist Crashes by Ethnicity



Helmet use

Of the bicyclists where helmet use was known, only **12.6%** were wearing a helmet at the time of the crash. When broken down by age group (Table 2), the highest percentage of helmet use was for bicyclists aged 26-30; however, only **21.1%** of this age group (roughly 1 in 5) wore helmets.

Table 2. Bicyclist Helmet Use by Age.

Bicyclists	Helmet Use			Total Bicyclists
	Yes	No	Unknown	
0 to 5	0%	100%		2
6 to 10	7.1%	85.7%	7.1%	14
11 to 15	0%	86.7%	13.3%	30
16 to 20	2.5%	80%	17.5%	40
21 to 25	9.4%	75%	15.6%	32
26 to 30	21.1%	57.9%	21.1%	38
31 to 35	13.8%	69%	17.2%	29
36 to 40	15.4%	73.1%	11.5%	26
41 to 45	0%	82.6%	17.4%	23
46 to 50	15.8%	60.5%	23.7%	38
51 to 55	13.9%	63.9%	22.2%	36
56 to 60	0%	85.2%	14.8%	27
61 to 65	18.8%	62.5%	18.8%	16
66 to 70	16.7%	50%	33.3%	6
71 to 75	20.0%	60%	20.0%	5
76 to 80	0%	100%	0%	3
81 to 85				0
86 to 90	0%	100%	0%	1
91 and older				0

When are Crashes Occurring?

Lighting conditions are noteworthy with regard to pedestrian and bicyclist crashes. In Harris County, **79%** of pedestrian deaths or incapacitating injuries from 2010-2015 occurred in the dark. This accounts for nearly 4 out of every 5 crashes. This may not be simply a lighting issue, but more specifically a visibility issue. For bicyclists, **37%** of bicyclist deaths and incapacitating injuries occurred in the dark.

In addition to lighting, the hours of the day and days of the week when crashes occurred were also examined. Related to lighting conditions is the high concentration of pedestrian crashes that occurred between the hours of 6pm and 11pm. For several months of the year, all of these hours are within the hours of darkness, but in the parts of the year when it is not dark until later in the evening, there may still be visibility issues due to the sun's angle in the sky. Additionally, these hours could also be hours when a larger number of people choose to go for a walk or run (due to

the time frame being outside traditional working hours). In terms of day of the week, a large percentage of crashes occur on Sunday morning, particularly from 2am to 3am, which coincides with the closing of bars on Saturday evenings.

What Road Types do Crashes Occur on?

Nearly half (**47%**) of pedestrian deaths and serious injuries for which road type was known were on an “urban principal arterial (other)” road. An urban principal arterial “other” is a major road with multiple lanes in each direction with high traffic volumes, but not a limited access highway. Table 3 below provides the percentage of fatal and incapacitating injuries for which road type was known.

“Urban principal arterial (other)” roads were also the most common for bicyclist fatal and incapacitating injuries, with over **60%** of these crashes occurring on this road type. Table 4 below provides the percentage of fatal and incapacitating crashes for which road type was known.

Table 3. Pedestrian Fatal and Incapacitating Injuries by Road Type.

Road Type	Fatal & Incapacitating
Rural Major Collector	0.2%
Rural Minor Arterial	0.4%
Rural Principal Arterial	0.2%
Urban Collector	1.2%
Urban Minor Arterial	2.0%
Urban Principal Arterial (IH)	32.9%
Urban Principal Arterial (Other Freeway)	15.9%
Urban Principal Arterial (Other)	47.3%

Table 4. Bicyclist Fatal and Incapacitating Injuries by Road Type.

Road Type	Fatal & Incapacitating
Rural Principal Arterial	1.8%
Urban Collector	1.8%
Urban Minor Arterial	1.8%
Urban Principal Arterial (IH)	21.4%
Urban Principal Arterial (Other Freeway)	12.5%
Urban Principal Arterial (Other)	60.7%

Where on the Roadway do Crashes Occur?

Table 5 below provides the percentage of crashes that occurred on different parts of the roadway. The majority of pedestrian fatal and incapacitating injury crashes occurred on the roadway itself (92%). Additionally, 71% of pedestrian deaths or serious injuries that occurred on a limited access highway (freeway) occurred on the main lanes of the freeway (not a service/frontage road, exit/entrance ramp or other location). This could indicate pedestrians that were killed or injured while at the scene of a crash or attending to a broken down vehicle. These are sometimes referred to as “unintended pedestrians.”

Table 5. Pedestrian Fatal and Incapacitating Injuries by Roadway Location.

Location	Fatal & Incapacitating
Median	1%
Off Roadway	5%
On Roadway	92%
Shoulder	2%

Bicyclist fatal and incapacitating injury crashes were also predominantly located on the roadway itself (98%). Table 6 below provides the percentage of crashes that occurred on different parts of the roadway.

Table 6. Bicyclist Fatal and Incapacitating Injuries by Roadway Location.

Location	Fatal & Incapacitating
Median	0%
Off Roadway	1%
On Roadway	98%
Shoulder	1%

Summary

Pedestrian and bicyclist fatal and incapacitating crash data from 2010-2015 in Harris County were analyzed to uncover the demographics of vulnerable road users, commonalities of when crashes occurred (i.e., time and day), which road types, and where on the road crashes occurred. The most common ages of pedestrians and bicyclists were uncovered, as well as gender and ethnicity types. The crash data also revealed the noteworthy low percentage of bicyclists who wore helmets at the time of the crash. Additionally, the most frequent road type and location on the road for which crashes occurred were also exposed. The information gathered from analysis of the crash data combined with the observational survey analysis, will guide the outreach campaign efforts of the project.

REFERENCES

Baker, L. (2009, October 1). How to get more bicyclists on the road: To boost urban bicycling, figure out what women want. *Scientific American Magazine*.

U.S. Department of Transportation. (2010). National Household Travel Survey, 2009. Washington, D.C.: Federal Highway Administration.