MARION COUNTY

Pedestrian Crash Data Report – 2022

I. EXECUTIVE SUMMARY:

Pedestrian deaths from car crashes are symptomatic of an ongoing public health epidemic. After 35 years of declining numbers of pedestrians killed on US roadways, the trend reversed in 2010 according to the National Traffic Safety Bureau. During 2020, an average of nearly 18 pedestrians died per day which was a 4.5% increase over 2019. The Centers for Disease Control estimates, based on 2017 data, that a pedestrian dies every 88 minutes. According to the 2022 *Governors Highway Safety Association's "Pedestrian Traffic Fatalities by State"* report, in 2020 pedestrian fatalities were up 62% since they began steadily rising in 2009 even though there was a significant drop in driving. While this report goes on to note that Indiana is ranked 27th out of 50th for pedestrian fatalities during 2016-2020, pedestrian fatalities in Marion County were higher than the observed amount for the state of Indiana and the US between 2010-2019. In Marion County between 2010 and 2021, drivers struck and killed 243 pedestrians.

The Pedestrian Danger Index (PDI) was developed by Smart Growth America and is a measure of *"how deadly it is for people to walk based on the number of people struck and killed by drivers while walking"* (Smart Growth America, 2021). PDI controls for the number of people that live in a state or metro and the share of people who walk to work.

The PDI was calculated for Marion County, Indiana with the most recent data for 2020. In 2020, there were 38 pedestrian deaths. The average age of the pedestrian was 40 years old with a range of 0 years old to 76 years old. The percentage of walking trips in Marion County during 2020 is based upon the American Community Survey. During 2020 the survey estimated that 1.9% of workers walk to work each day. Using this data, the PDI for Marion County is estimated to be 145. For context, the two most dangerous states identified by Smart Growth America for pedestrians based on PDI are Florida and Alabama with PDIs of 182 and 145, respectively.

PDI:

$\frac{\text{(Pedestrian Deaths/Population) X 100,000}}{\text{Percentage of Walking Trips}}$	$\frac{\text{(38/976,770) X 100,000}}{\text{0.019}} = \mathbf{145}$

The Marion County Annual Pedestrian Crash Data Report is an analysis of crashes using available Automated Reporting Information Exchange System (ARIES) data, the system used by Indiana police to report on crashes. This summary report provides a basis for analyzing ongoing trends and surrounding conditions that affect pedestrian crashes. The report uses an analysis framework identifying where and when crashes are occurring and who is most vulnerable to crashes.

II. PEDESTRIAN FATALITIES & INCAPACITATING CRASHES

Figure 1

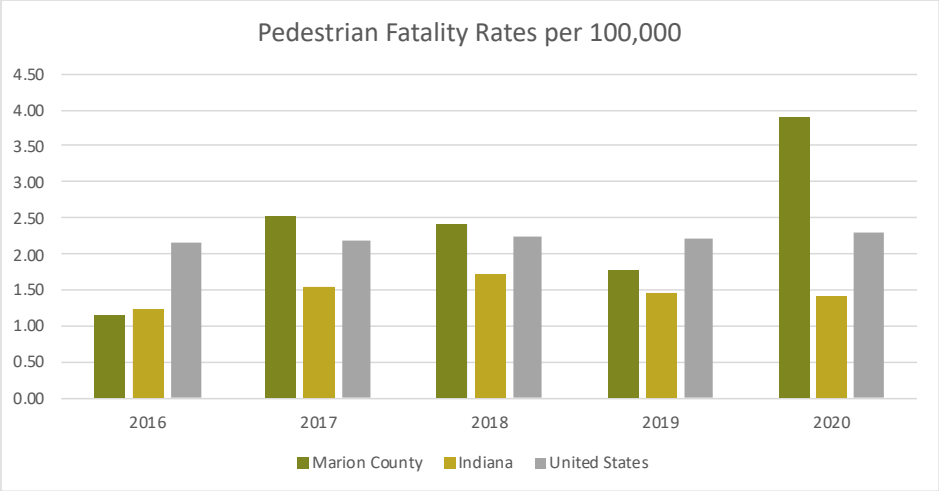


Figure 1 demonstrates the pedestrian fatality rate per 100,000 for 2016-2020 and compares Marion County, Indiana, and the United States. In 2020, Marion County had a fatality rate of 3.89 per 100,000 which was higher than both the United States and Indiana (2.29 per 100,000 and 1.41 per 100,000 respectively.) Note: 2021 data is not available for national fatality rates as of September 2022; it will be updated accordingly when available.

Figure 2

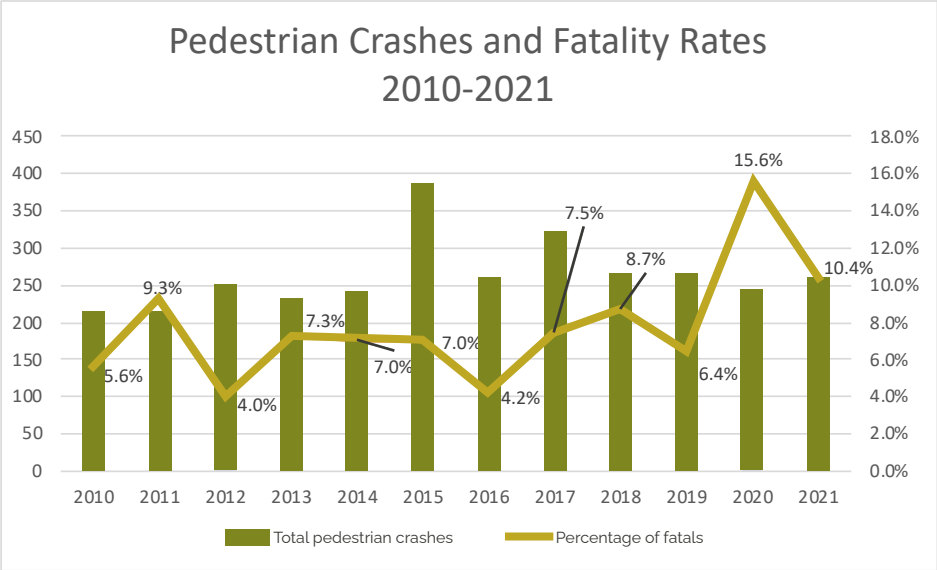
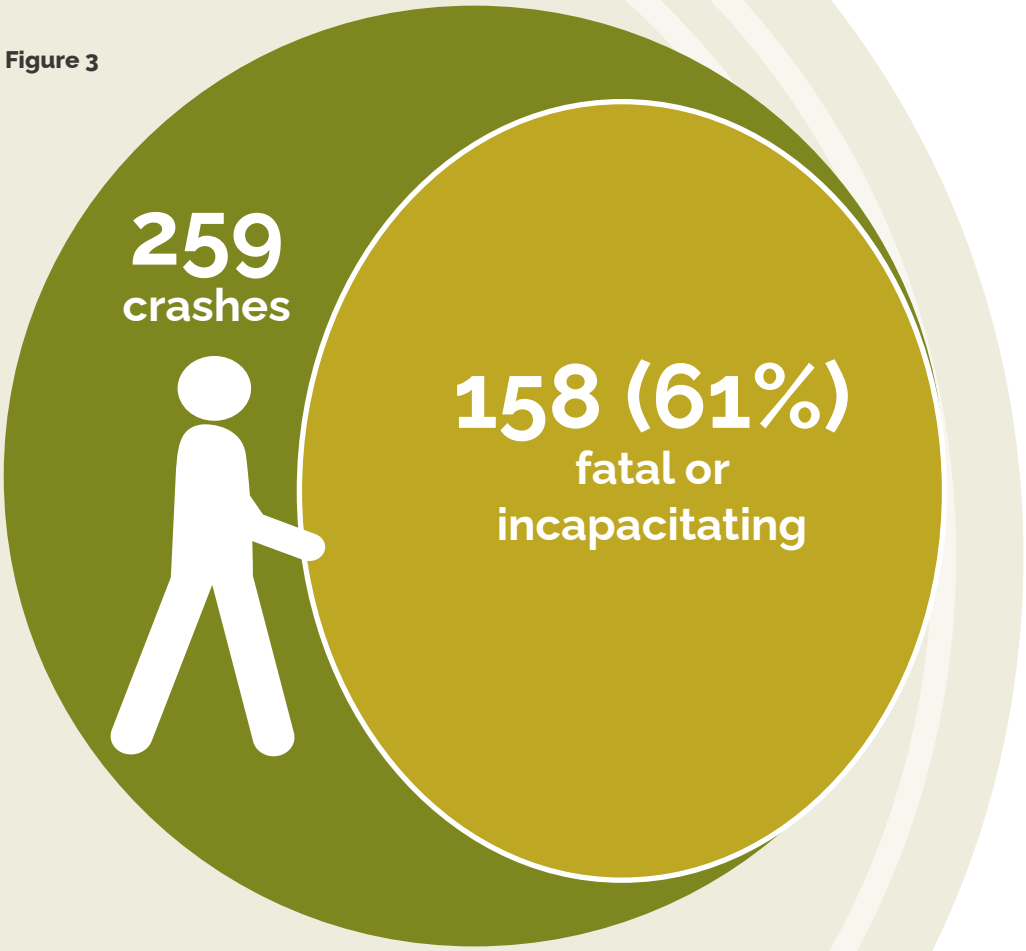


Figure 2 shows the twelve-year trend of pedestrian crashes as well as the percentage of fatalities during each year. The total number of pedestrian crashes stayed almost the same between 2018-2021 with an average number of 258 pedestrian crashes. However, the percentage of pedestrian deaths almost doubled between 2018 to 2020 (8.7% and 15.6% respectively). The overall percentage of deaths is 7.7% for the twelve-year period. During 2021, there were 259 crashes and 61% (158) of the crashes were either fatal or incapacitating.

Figure 3



III. WHO IS AT RISK?

An analysis of age and gender of pedestrians struck in Marion County during 2021 was completed. The average age of the pedestrian struck in Marion County during 2021 was 37 years old with a range of 2-87. However, a quarter (25%) of people struck were between the ages of 51-70. (See Figure 4 below). When looking at 2010-2021, the most common age group of pedestrians struck is age 21-30 (see Figure 5 below). Additionally, males represented approximately 68% of the pedestrians involved in crashes during 2021 as well as overall between 2010-2021.

Figure 4

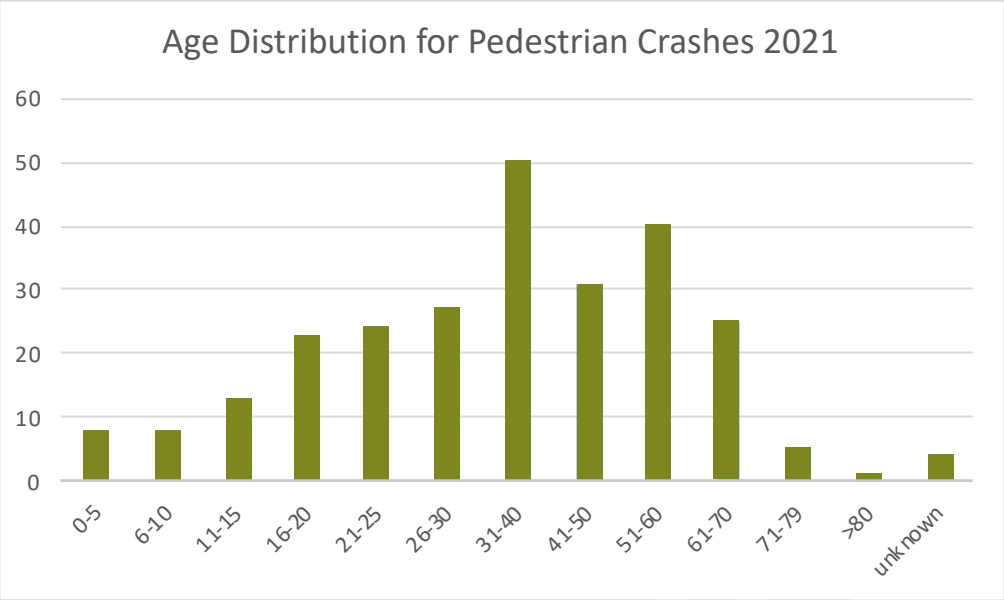


Figure 5

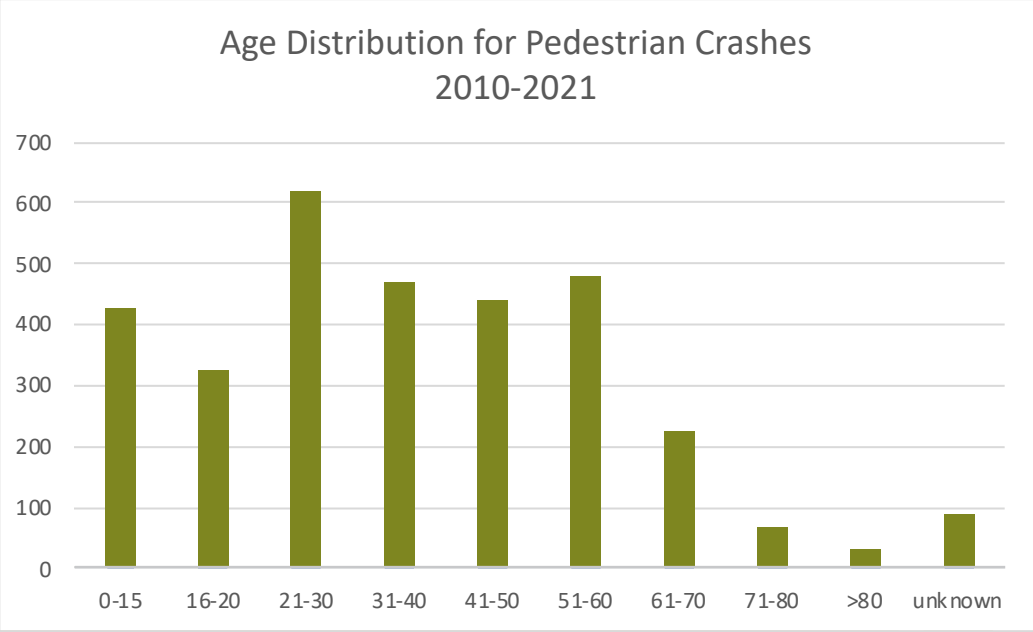


Figure 6

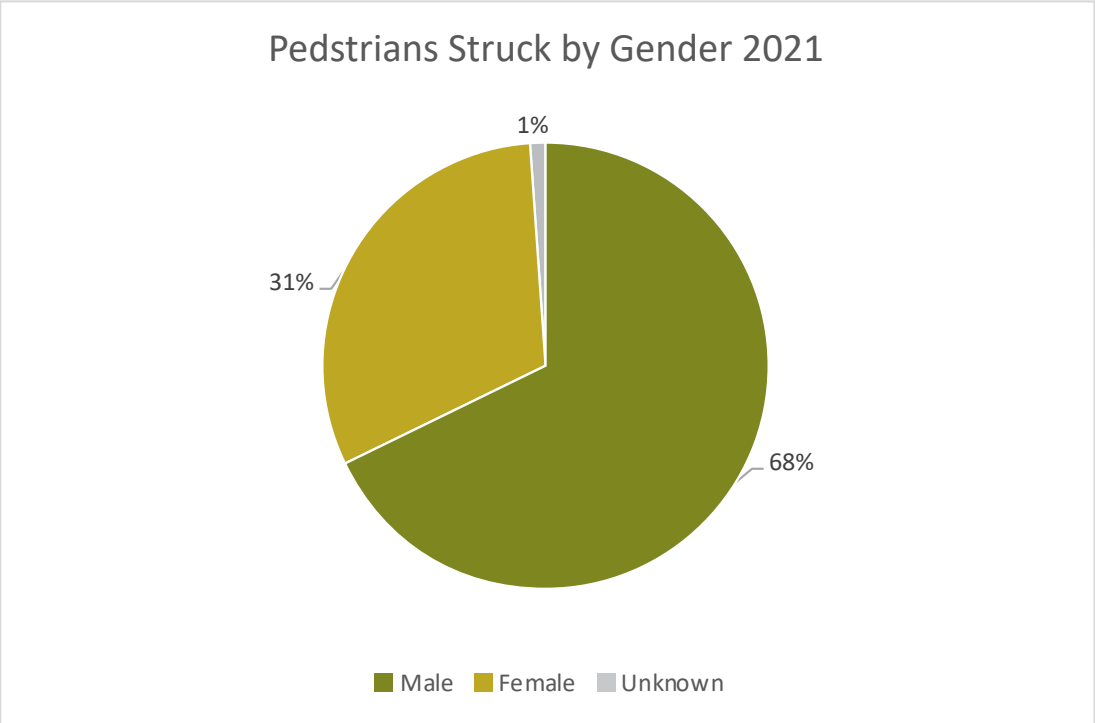
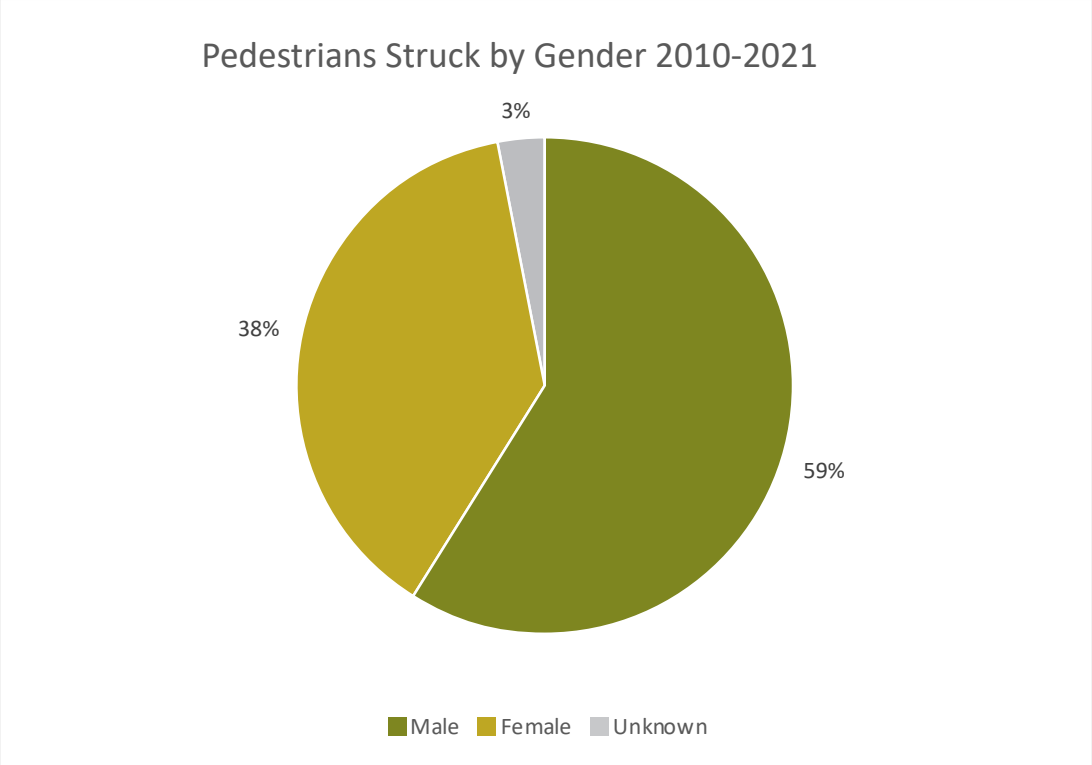


Figure 7



IV. WHEN DO CRASHES OCCUR?

A monthly analysis of when crashes occur was performed for both a range of years (2010-2021) and for 2021 alone. The trend during 2010-2021 demonstrated that October had the highest number of crashes (316). The lowest number of crashes occurred in July with 216 crashes. When analyzing 2021 alone, October and November were observed to have the highest number of crashes at 33 and 34 crashes respectively (Figures 8-9 below), while February had a low number of pedestrian crashes (8).

Figure 8

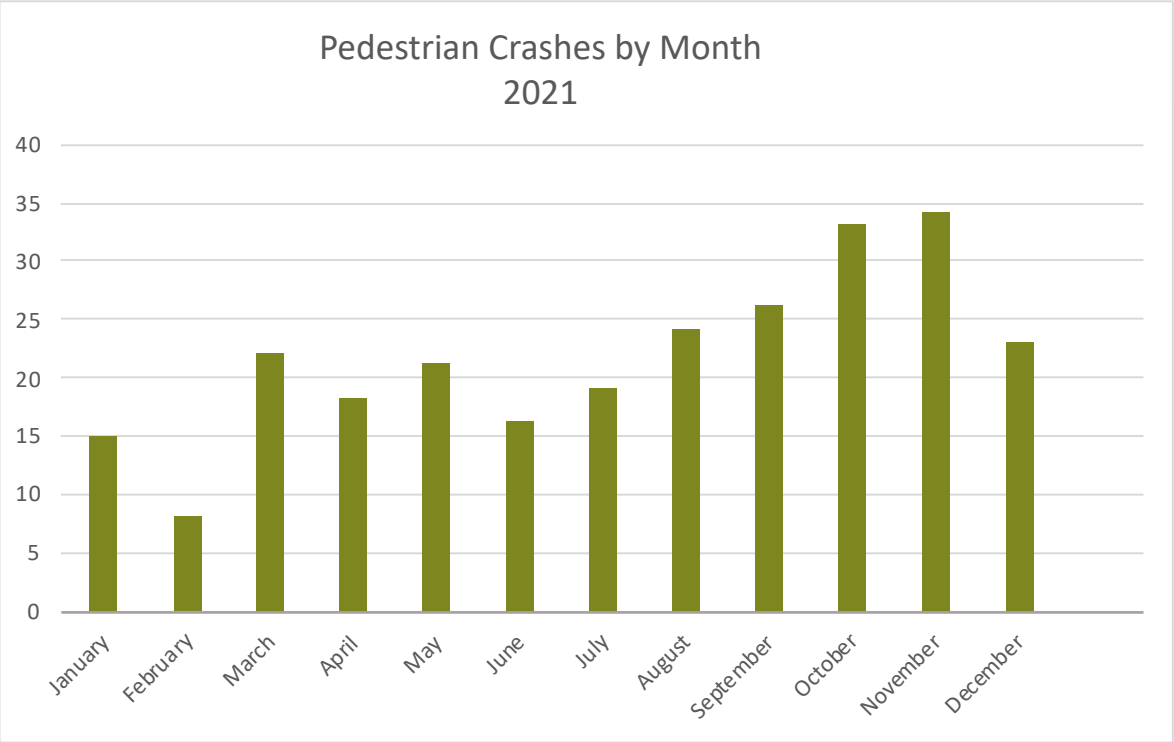
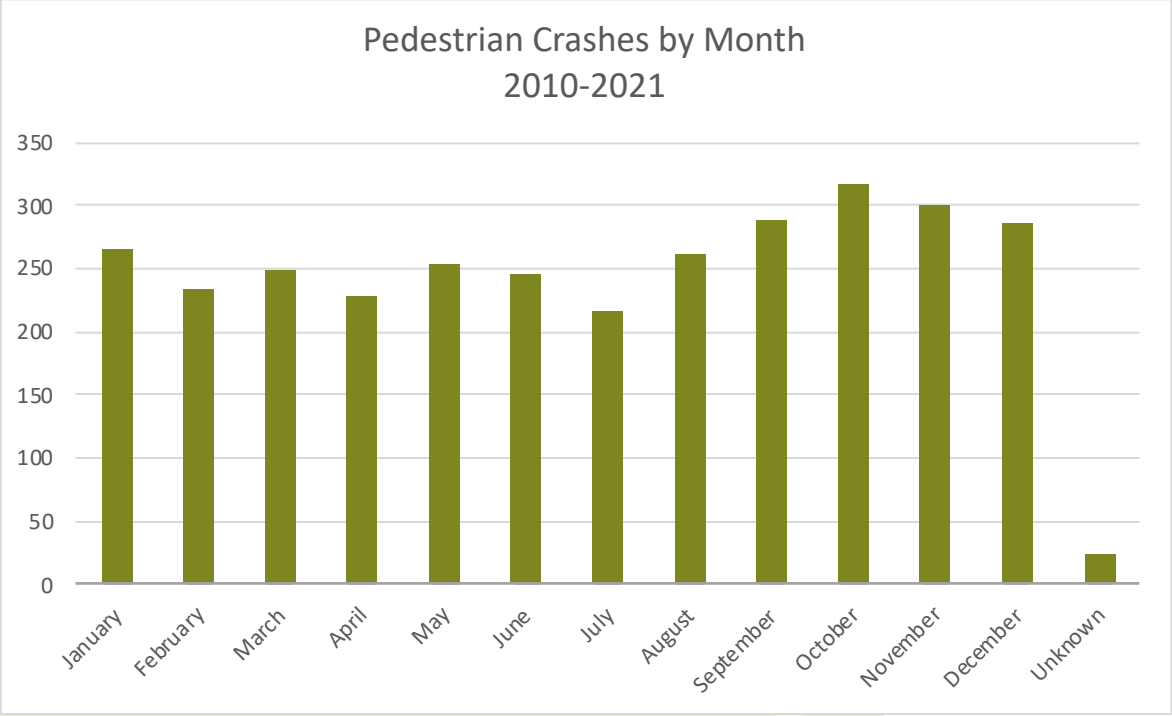


Figure 9

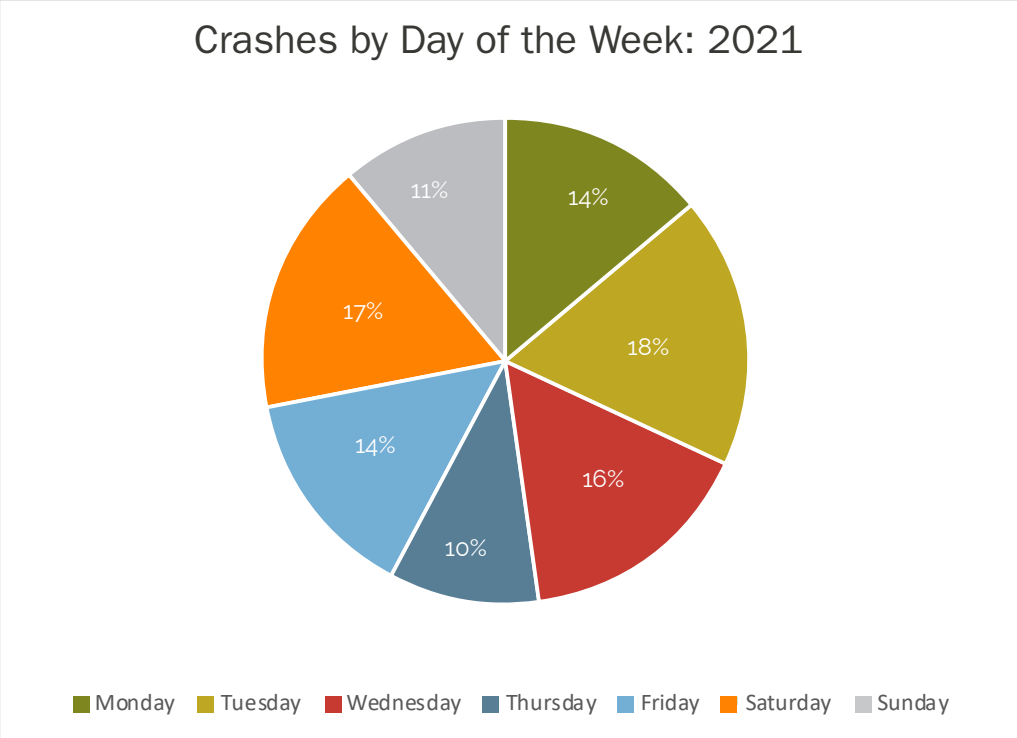


An analysis of days of the week and times of crashes was also conducted for 2021. Table 1 provides the percentage of crashes that occurred each day during different timeframes. If the percentage of crashes for a given day was above 25% of the total for the day of the week, the percentage is highlighted. The timeframe between 4:00pm and 8:00pm had the highest rate of pedestrian crashes for most days of the week. The most prevalent time of being struck as a pedestrian was between 4:00pm-8:00pm on Monday, Tuesday, Thursday, Friday, and Saturday. On Wednesday and Sunday, the most prevalent time was between 12:01pm and 4:00pm and 8:00pm and 12:00am respectively. Sunday also had almost one-third of crashes occurring between 12:00am-4:00am. Figure 10 shows which days are most prevalent. Tuesday had the highest percentage of pedestrian crashes with almost one-fifth of all crashes (18%, 46/259).

Table 1

Time of Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
12 – 4 am	14%	11%	3%	0%	8%	14%	28%
4:01 – 7:59 am	14%	20%	20%	4%	22%	2%	7%
8 am – noon	11%	13%	15%	19%	8%	14%	10%
12:01 – 4 pm	11%	9%	25%	12%	16%	5%	14%
4:01 – 8 pm	38%	28%	20%	46%	27%	34%	10%
8:01 – 11:59 pm	14%	20%	18%	19%	19%	32%	31%
Total	100%	100%	100%	100%	100%	100%	100%

Figure 10



V. CRASH CONDITIONS AND PEDESTRIAN INJURY TYPE/FATALITY

Table 2

Year	Total Pedestrian Crashes	Number of Deaths	Percentage of Fatal	Number in Dark Conditions	Percentage in Dark	Number not at Intersection Roadway Junction Type	Percentage not at Intersection Roadway Junction Type
2010	215	12	5.6%	10	83%	12	100%
2011	214	20	9.3%	17	85%	17	85%
2012	251	10	4.0%	9	90%	8	80%
2013	232	17	7.3%	13	76%	12	71%
2014	242	17	7.0%	13	76%	8	47%
2015	386	27	7.0%	17	63%	18	67%
2016	260	11	4.2%	11	100%	9	82%
2017	322	24	7.5%	20	83%	14	58%
2018	264	23	8.7%	21	91%	14	61%
2019	266	17	6.4%	16	94%	15	88%
2020	243	38	15.6%	32	84%	29	76%
2021	259	27	10.4%	24	89%	22	81%

An in-depth analysis of the fatalities was also completed. Table 2 provides the number and percentage of fatalities that occurred in the dark as well as the number and percentage of fatalities that did not occur at a roadway intersection. On average during 2010-2021, 84% of fatalities occurred when it was dark (Range 63%-100%). The average percentage of fatalities that didn't occur at an intersection was 71% (Range 47%-100%). Speed is a primary factor related to pedestrian crashes, and the likelihood of surviving a crash decreases significantly as speeds increase past 30 miles per hour (mph). A study conducted by the European Transport Safety Council found that 5% of pedestrians struck by a vehicle at 20 mph are fatally injured. This likelihood increases to 45% at 30 mph, and 85% at 40 mph.

Furthermore, age also plays a factor in the severity of pedestrian crashes. According to the AAA Safety foundation, the average risk of severe injury or death for a 70-year-old pedestrian struck by a car traveling at 25 mph is similar to the risk for a 30-year-old pedestrian struck at 35 mph. During 2014-2018, the average posted speed (when known) was 36.9 mph with a range of 25-45 mph. Speed limits are often set by statute, in Indiana it is primarily a local ordinance issue. However, adjustments are often based on observations of the 85th percentile of operating speed for a given segment. This means setting the speed limit based on how fast 85% of the vehicles passing travel during free flow conditions.

VI. PRE-CRASH VEHICLE AND DRIVER ACTIONS

The vehicle action just prior to the crash was reviewed for 2021. Sixty-seven percent of the vehicles were going straight prior to the pedestrian crash and 15% of the vehicles were turning left when the pedestrian crash occurred. See table 3.

Table 3		
Pre-Crash Vehicle Action		
Going Straight	174	**67%**
Turning Left	39	**15%**
Unknown	20	**8%**
Turning Right	11	**4%**
Entering Traffic/Starting in Traffic/Slowing in Traffic	5	**2%**
Changing Lanes (overtaking/passing)	4	**2%**
Other (avoiding objects, crossing median, making u turn, etc.)	3	**1%**
Leaving Traffic Lane/driving left of center	2	**1%**
Backing	1	**0%**

Other information from the police record was also reviewed. In 2021, 73% of the police reports determined the primary factor of pedestrian crashes was either pedestrian action (51%) or failure to yield by the driver (22%). A few examples of what the police data has included in pedestrian action include if a pedestrian steps into the roadway in the path a vehicle, if a pedestrian ran across the road after coming out between two cars, etc. The use of 'pedestrian action' as a 'primary factor' when evaluating the cause of crashes illustrates a bias against non-motorized vehicle roadway users and leans toward victim blaming. It also highlights the need for better infrastructure design, safety countermeasures, and protections; the safe system approach, along with increased awareness for motorized vehicle drivers.

Also, during 2021, 20% of the pedestrian crashes (53/259) were hit and run. The hit and run pedestrian crashes were reviewed and 68% of the crashes occurred when the light conditions were dark (39) or at dusk/dawn (4).

VII. SUMMARY

A. Limitations to data

i. Unreported crashes:
Unreported crashes are a significant limitation to developing a comprehensive pedestrian crash database. Underreporting of pedestrian crashes is more likely to occur for less severe crashes. Sciortino et al. reported that there is a 21% underreporting of pedestrian injuries (2005). A lack of information reported for a crash that occurs means that some crashes are missing from the data and the numbers presented are an under-representation of the total numbers of pedestrians struck. We are currently looking at determining the true extent of the pedestrian crash problem by including EMS data for Marion County.

ii. Equity:
Currently, accurate race and ethnicity data is not readily available through ARIES and other crash report data sources. There may be methodologies to merge census tract data information with proximity to crash locations to infer some correlations. Additionally, EMS and trauma center data may be reviewed to draw conclusions about some populations being disproportionately more vulnerable to pedestrian crashes. That data was not available at the time of this report.

Nationally, we know that pedestrians in lower-income areas are struck and killed at higher rates. Pedestrians with incomes below $43,000 annually die at a rate of 3.3 per 100,000 people compared to 1.8 with income ranging from $55-70,000 annually (Smart Growth America, 2022). We also know that between 2010 and 2019, Black people were hit and killed 82% more often that White, non-Hispanic people across the US. This rate is more than double, 221%, for American Indiana and Alaska Native populations *(Smart Growth America, 2021)*.

iii. Exposure:
One of the limitations to this data and analysis is the inability to account for exposure. The data used cannot account for all factors that relate to pedestrian safety and pedestrian crashes. For example, some zones identified that have higher occurrences of crashes might still be safer due to the prevalence of pedestrian travel and use. A more robust mode split, or travel use dataset would be needed to properly analyze the occurrence of crashes relative to pedestrian use.

iv. Injury severity levels recorded by law enforcement officers:
Law enforcement officers document the injury status of pedestrian crash victims based upon visual assessment and if the victim needs to go to the hospital. Many internal injuries may not be initially realized by the law enforcement officer based on basic visual inspection. However, a Wisconsin report indicated that law enforcement officers overestimate severe injuries more often than found at a hospital by medical personnel for traffic crashes. The report indicated that this statistic applied to all traffic crashes, and it was not known if the same issue applied to pedestrian crashes alone. Also, many times, the injury status field is not completed, so any conclusions based upon minor injuries are difficult to assess. Trauma center data is starting to be included to further analyze the actual injury severity of pedestrian crash victims.

v. ARIES and reporting
The ARIES crash reporting system and associated crash reports are not always complete and reports in general do not provide full/complete information. Crash reports for a portion of analyzed crashes do not have information regarding primary factors or pre-crash actions of motorists and pedestrians. This makes a robust analysis difficult and limits understanding of factors contributing to pedestrian crashes. The availability of this information, when accurate and consistent can lead to organizing crashes into types and the development of countermeasures.

B. What next?
While this report does provide in depth analysis of the data available, it is noted above where there are areas for improved analysis. Specifically, a deeper exploration of equity and other factors that are difficult to glean from the available data is needed. This type of analysis and any desired next steps would also benefit from additional data that focuses on equity issues and other social determinants of health. This would generate a more robust analysis and allow for a more comprehensive exploration of multiple factors contributing to pedestrian crashes. The availability of this information, when accurate and consistent, can lead to better classification of crash types and the development of more impactful and community specific countermeasures.

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