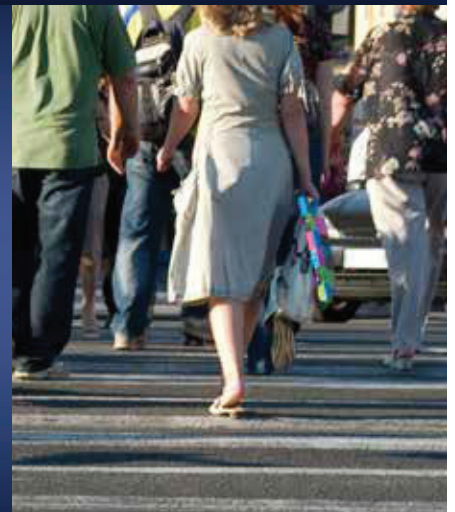


North Carolina Pedestrian Crash Facts

2015 - 2019



Prepared for
The North Carolina Department of Transportation
Division of Bicycle and Pedestrian Transportation



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April 2021

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Project RP 2017-42

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General North Carolina Pedestrian Crash Trends

This report provides a summary of crash trends and crash-related factors (where, when, who was involved, and conditions present) for pedestrian-motor vehicle crashes across the State. The information should help road safety practitioners, partners, and the public understand prevalent crash and injury-related factors. In turn, this understanding can help suggest a focus for potential treatments. The companion *North Carolina Pedestrian Crash Types* summary report provides additional insights and potential treatment targets.

Between 2010 and 2019, at least 29,975 crashes between pedestrians and motor vehicles were reported by North Carolina public safety agencies (Figure 1). The highest total number of crashes for the entire ten-year period occurred in 2018 with 3,390. The five years between 2010 and 2014 averaged 2,798 total pedestrian crashes per year, while the five years between 2015 and 2019 averaged 3,197 per year, a 14 percent increase. Urban crashes accounted for around 75 percent of the total over the 10 years while rural crashes were around 25 percent. Urban areas have reported an average of 19 percent more crashes from 2015-2019 compared with 2010-2014, while rural areas have reported only 2 percent more. Thus, the rise in crashes over the decade has occurred more in urban areas compared with rural ones. Increasing urbanization of the State could potentially contribute to this trend. Other potential factors include possible increases in walking in cities and towns, increased pedestrian activity at night, and other factors, but data are lacking to verify these possible contributing factors. It is also possible that reporting completeness may vary somewhat by year. The data used in these analyses are a snapshot of data developed after reporting for each year is thought to be complete, but there are inevitably more crashes reported.

There has also been a rise in the number of crashes in which a pedestrian was killed or suspected to be seriously injured from a low of 327 crashes in 2011 to 607 such crashes in 2019 (Figure 2). Fatal and serious injury crashes (combined) in rural areas increased from around 22 percent of the total pedestrian crashes during 2010-2014 to around 28 percent during 2015-2019 period. During the past five years, the NC Department of Transportation also revised the definition that reporting agencies use to classify A-type injuries from 'disabling' to 'suspected serious.' This change began to be phased in during 2016, and this change in definition likely contributes to the rising trends in injury and fatal crashes beginning around 2016, as shown in Figure 2. However, the number of fatal pedestrian crashes has also increased steadily (see Table 5 further below), and the rising trends had begun in urban areas starting in 2014, so the change in definition is not the sole explanation for the increase in more injurious crashes happening in North Carolina. These trends are reflected in national data as well.

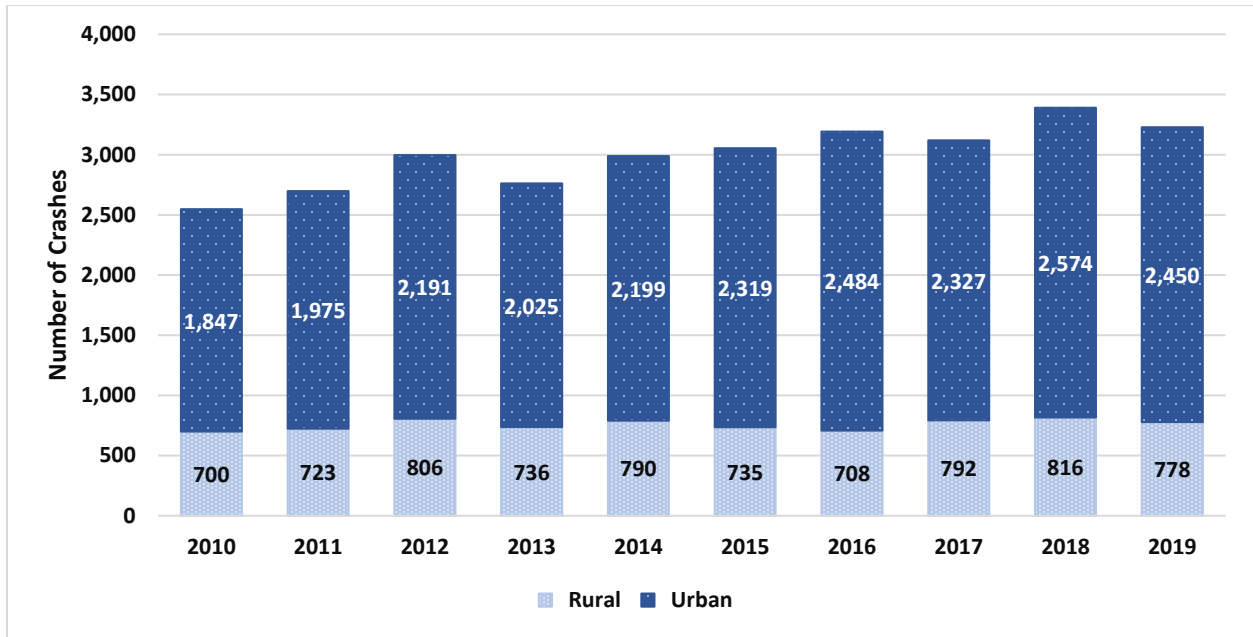


Figure 1 Pedestrian-motor vehicle crashes by rural/urban location¹

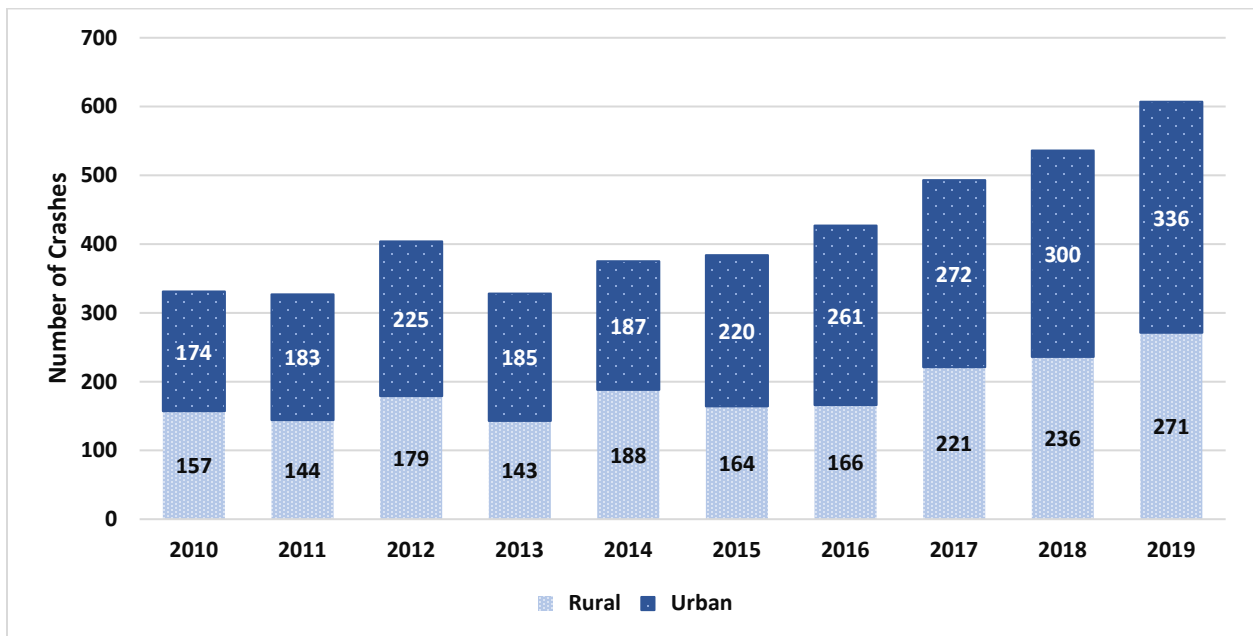


Figure 2 Fatal and suspected serious injury pedestrian crashes by rural or urban location

¹ These data are based on an end-of-year data file provided by DMV to the University of North Carolina. While it is the same file used to produce North Carolina Traffic Crash Reports, the numbers of pedestrian fatalities reported here are different. The reason for the different number of fatalities is not entirely clear but may relate in part the review of crash reports and corrections of people originally mis-coded as bicyclists who were actually pedestrians and vice versa in the data presented here. These data also retain records where no injury was reported.

Table 1 presents data for

- the total number of crashes with a fatal injury to any person (pedestrian or vehicle occupant) in the crash,
- the total number of crashes with a fatally-injured pedestrian (which excludes a few crashes where a driver or vehicle occupant was fatally injured),
- the total number of fatally-injured pedestrians, and
- the total pedestrian-motor vehicle crashes identified for all severities.

The numbers of collisions involving multiple pedestrians is relatively small, but identifying the precise numbers killed and injured is not always straight-forward. In some cases, a pedestrian may die within the one-year period following a crash in which a fatality is assumed to be crash-related, but all the data may not be updated in time for inclusion in these records. In other cases, there are errors or inconsistencies in the data that require further inspection to resolve. Despite these issues, the data suggest that for the 2015-2019 period, a total of 1,099 pedestrians were killed in North Carolina in the 15,983 total crashes over these five years (Table 1). Thirteen crashes were indicated to involve multiple pedestrian fatalities during this five-year period.

Table 1 Pedestrian crashes resulting in fatal injuries, 2015-2019

Definitions	2015	2016	2017	2018	2019	Total
Total number of crashes with any fatal injury (may include motor vehicle occupants)	194	212	205	236	241	1,088
Total number of crashes with a fatally injured pedestrian	192	209	204	235	243	1,083
Total number of fatally injured pedestrians	198	213	206	237	245	1,099
Total crashes - all severity included in these analyses	3,054	3,192	3,119	3,390	3,228	15,983

Exposure Notes

The amount, times, locations of walking, traffic volumes, and other conditions present affect collision frequencies and the severity of injuries involving pedestrians, but there is a lack of data on amounts of walking in NC to compare across years. The types of facilities available — the amount of separation from traffic (places and times to safely walk and cross), the availability of lighting, and other factors—also affect the risk of pedestrian crashes and injuries. Other potential risk factors for injury include the size, weight, and other characteristics of the vehicles involved; vehicle speeds; crash types and yielding behaviors of those involved. The age, health, and physical condition of those driving or walking may also affect risk for a crash, or the severity of injuries when a crash occurs.

Data Notes

Crashes are officially reportable to the NC Division of Motor Vehicles (source of these data) if a fatality, injury, or at least \$1,000 property damage occurred. The data in this report and behind the query tool on this website – [North Carolina Pedestrian and Bicycle Crash Data Tool](#) – may include a small number

of non-injury (or non-observed injury) collisions with low property damage that were not officially reportable, but which had nevertheless been reported to the State Division of Motor Vehicles by local agencies. Non-reportable collisions may not be included in other State crash statistics. Because under-reporting of pedestrian crashes is common,² any collisions in the database that involved pedestrians were retained in these data. In addition, injuries, even serious injuries that led to visits to emergency departments or other medical facilities, are sometimes noted after the crash report is filed, but crash reports may not be updated with such information.

As with all crash data, the reported numbers in the crash characteristics that follow undoubtedly reflect some error. Errors or gaps in reporting, as well as errors made during data entry or coding may have affected the trends presented above and in the following tables and charts.³ Potential updates to the data in future years may, therefore, affect the trends and statistics presented in this summary.

The sections below summarize the person, location types, time, environmental and roadway characteristics for the pedestrian-motor vehicle crashes identified statewide. This information, and similar information developed for local communities, can be used to identify potential safety issues, and aid in the targeting of resources and countermeasures to address pedestrian safety factors. See the companion *North Carolina Pedestrian Crash Types* summary report for descriptions of crash groups, along with an analysis of the most common and deadly group of pedestrian crash types in North Carolina. This specific crash information can also aid in identifying and developing appropriate treatments. Further investigation and diagnosis are essential before any remedies or treatments are developed.

Pedestrian Characteristics

Although, as noted, there were a few crashes involving more than one pedestrian, the following characteristics are associated with the most severely injured pedestrian reported on in the crash, or, in cases where the injury is the same, the youngest-aged pedestrian involved. The numbers and percentages in the tables below also exclude cases with missing or unknown data for the pedestrian.

Pedestrian Age

Table 2 shows pedestrian crashes by age group for each year of the study period. Adults between 35 and 64 accounted for the highest proportion of these crashes with 42 percent. Both the number and percentage of crashes involving seniors 65 and older have increased every year through the five-year study period.

² Stutts and Hunter, 1999. Injury to Pedestrians and Bicyclists: An analysis based on hospital emergency department data. Report No. FHWA-RD-99-078. US Department of Transportation, Federal Highway Administration.

³ Note that each crash report was reviewed for the data described in these reports and available on the NCDOT-DBPT website for query. This review offered the opportunity to correct some types of detectable errors.

Table 2 Age group of pedestrians involved in crashes ⁴

Pedestrian Age	2015	2016	2017	2018	2019	Total
<16	314	336	308	284	292	1,534
	10.3% ^a	10.5%	9.9%	8.4%	9.0%	9.6% ^b
16-34	1,219	1,269	1,167	1,279	1,183	6,117
	39.9%	39.8%	37.4%	37.7%	36.6%	38.3%
35-64	1,248	1,285	1,336	1,462	1,365	6,696
	40.9%	40.3%	42.8%	43.1%	42.3%	41.9%
65+	273	302	308	365	388	1,636
	8.9%	9.5%	9.9%	10.8%	12.0%	10.2%
Total	3,054	3,192	3,119	3,390	3,228	15,983 ^d
	19.1% ^c	20.0%	19.5%	21.2%	20.2%	

Considering the rate of age groups per population gives a more in-depth picture of pedestrian crash involvement by population and how it has changed over time (Table 3 and Table 4). After accounting for estimated population growth, pedestrians 65 years and older had 1.25 times the rate of crashes per 10,000 residents between 2015-2019 (2.0 per 10,000) compared to the earlier five years (2010-2014; 1.6 per 10,000 residents). Between 2015-2019, as well as from 2010-2014, young adults ages 16 to 34 had, however, the highest yearly crash rate per 10,000 residents (4.7 crashes per 10,000). However, the rate of increase was not as high as that for older adults (1.07 times higher). It is notable that the crash rate for all age groups age 16 and older increased significantly between both 5-year periods while the rate for youth 16 years and under declined. Clearly, population is not a perfect proxy for amounts of walking and crash risk by different age and other demographic groups.

Table 3 Pedestrian age group crash rate by population, 2015-2019

Pedestrian age group	Total crashes, 2015-2019	Avg. 1-year Count	July 2017 population estimate ⁵	Avg. yearly crash rate / 10,000
< 16	1,534	306.8	2,037,904	1.5
16-34	6,117	1,223.4	2,614,202	4.7
35-64	6,696	1,339.2	4,002,400	3.3
65+	1,636	327.2	1,616,294	2.0
Total	15,983	3,196.6	10,270,800	3.1

⁴ In this and each subsequent table, unless otherwise denoted, the formatting is as follows: The top row for each variable level is the count of crashes with that characteristic. The lower row in each category is that category's percentage of the yearly (or other column) total.

^a = Row percent of column total

^b = Row total percent of total

^c = Column total percent of total

^d = Total includes total crashes minus any cases with missing or unknown data for that variable

⁵ Population estimates are from North Carolina Office of State Budget and Management website:

https://files.nc.gov/ncosbm/demog/statesingleage_2010_2019.html

Table 4 Pedestrian age group crash rate by population, 2010-2014

Pedestrian age group	Total crashes, 2010-2014	Avg. 1-year Count	July 2012 population estimate	Avg. yearly crash rate / 10,000
< 16	1,810	362.0	2,034,045	1.8
16-34	5,517	1,103.4	2,497,319	4.4
35-64	5,577	1,115.4	3,875,939	2.9
65+	1,088	217.6	1,341,820	1.6
Total	13,992	2,430.6	9,749,123	2.5

Pedestrian Injury

Table 5 shows the data for 2015-2019 pedestrian crashes.⁶ Pedestrian crashes tend to be especially serious, with close to 7 percent resulting in fatal injury in NC over this period. By comparison, around 0.5 percent of all motor vehicle crashes in NC resulted in fatal injuries.⁷ Additionally, 8.5 percent of all pedestrian crashes resulted in suspected serious (A-type) injuries over the five-year period. The number and percentage of fatal pedestrian crashes for 2019 was the highest for the five-year period. The larger numbers of unknown injury crashes in 2016 and other years was the result of missing data from some jurisdictions.

Table 5 Five-year pedestrian crash injury levels

Pedestrian injury	2015	2016	2017	2018	2019	Total
K: Killed	192	209	204	235	243	1,083
	6.3%	6.5%	6.5%	6.9%	7.5%	6.8%
A: Suspected Serious Injury	192	218	289	301	364	1,364
	6.3%	6.8%	9.3%	8.9%	11.3%	8.5%
B: Suspected Minor Injury	1,067	1,097	1,059	1,232	1,159	5,614
	34.9%	34.4%	34.0%	36.3%	35.9%	35.1%
C: Possible Injury	1,372	1,243	1,199	1,298	1,197	6,309
	44.9%	38.9%	38.4%	38.3%	37.1%	39.5%
O: No Injury	154	208	217	222	173	974
	5.0%	6.5%	7.0%	6.5%	5.4%	6.1%
Unknown Injury	77	217	151	102	92	639
	2.5%	6.8%	4.8%	3.0%	2.9%	4.0%
Total	3,054	3,192	3,119	3,390	3,228	15,983
	19.1%	20.0%	19.5%	21.2%	20.2%	

⁶ Counts are of crashes with the most severe pedestrian injury reported.

⁷ North Carolina 2019 Traffic Crash Facts:

<https://connect.ncdot.gov/business/DMV/CrashFactsDocuments/2019%20Crash%20Facts.pdf>

Analyzing the data by age group shows that pedestrians 35 and older were more highly represented in fatal or suspected serious injury crashes compared with their involvement in all crashes (Table 6). Analytical studies have also identified a relationship between injury severity in a crash and pedestrian age. These tendencies may reflect differences in frailty and physical condition associated with age, as well as differences in the typical walking environments or times of walking compared to younger aged pedestrians.

Table 6 Pedestrian injury severity by age group

Pedestrian age group	Fatal or Suspected Serious Injury	Suspected Minor, Possible, No, or Unknown Injury	Total
< 16	198	1,336	1,534
	8.1%	9.9%	9.6%
16-34	843	5,274	6,117
	34.5%	39.0%	38.3%
35-64	1,118	5,578	6,696
	45.7%	41.2%	41.9%
65+	288	1,348	1,636
	11.8%	10.0%	10.2%
Total	2,447	13,536	15,983
	15.3%	84.7%	

Pedestrian Sex

Males accounted for around 60 percent of pedestrian crashes while females were around 40 percent, when sex was reported. This rate remained fairly consistent through the five-year study period. Males were even more highly represented in the most serious crashes with 70 percent of fatal or suspected serious injury crashes having a male victim (Table 7).

Table 7 Gender by injury level

Pedestrian Gender	Fatal or Suspected Serious Injury	Suspected Minor, Possible, No, or Unknown Injury	Total
Female	574	5,318	5,892
	30.0%	41.7%	40.2%
Male	1,338	7,441	8,779
	70.0%	58.3%	59.8%
Total	1,912	12,759	14,671
	13.0%	87.0%	

Pedestrian Race/Ethnicity

White and Black pedestrians accounted for the vast majority of pedestrian crashes in the State. White pedestrians were involved in more crashes (45 percent from 2015-2019), and more fatal and serious injury crashes (53 percent) than any other race or ethnic group (Table 8 and Table 9), but they also represented a lower rate of crashes relative to population proportion (71 percent of NC population in

2017). Black pedestrians accounted for 41 percent of total crashes and a lower percentage (34 percent) of fatal and serious injury crashes between 2015 and 2019; both are high relative to the population proportion of Blacks in NC (22 percent in 2017). However, the interpretation of these trends is complicated by a lack of data on amounts of walking by different groups, as well as potential differences in safety of the areas and times of walking. For example, some demographic groups may travel more at night for work, or they may reside in areas close to busier, larger roads.

Total and injury crash rates increased for all racial and ethnic groups from the total for 2010-2014 to the numbers for 2015-2019. Reported Hispanic involvement in pedestrian crashes increased by 34 percent for total crashes, and by nearly 51 percent for fatal and serious injury crashes. Crashes for Whites and Blacks increased at lower rates. Other groups had much lower rates of involvement; note that rates per population for smaller groups may be strongly affected by relatively small changes in crash counts. However, the number of fatal and serious injury crashes among Native Americans increased from 21 to 50 (more than doubling) between these two periods. (The number of fatal crashes for Native Americans nearly doubled from 12 between 2010-2015 to 23 between 2015-2019). The frequency of total and serious and fatal injury crashes for Unknown/Missing and Other (non-specified) racial or ethnic groups also increased substantially between these two time periods, but the numbers with unknown or missing information was the lowest compared to other groups. As mentioned earlier, the higher counts of fatal and suspected serious injury crashes between 2015 and 2019 is partly explained by the updated crash severity definitions implemented beginning in 2016.

Table 8 All crashes by race of pedestrian, comparing 2010-2014 with 2015-2019

Pedestrian Race/Ethnicity	2010-2014	2015-2019	Percent Change
Asian American	161	207	28.6%
Black	5,665	6,501	14.8%
Hispanic (of any race)	760	1,016	33.7%
Native American	140	141	0.7%
Other	145	241	66.2%
Unknown/Missing	322	615	91.0%
White	6,799	7,262	6.8%
Total	13,992	15,983	14.2%

Table 9 Fatal and suspected serious injury crashes by race of pedestrian, comparing 2010-2014 with 2015-2019

Pedestrian Race/Ethnicity	2010-2014	2015-2019	Percent Change
Asian American	18	29	61.1%
Black	602	825	37.0%
Hispanic (of any race)	130	196	50.8%
Native American	21	50	138.1%
Other	22	38	72.7%
Unknown/Missing	12	24	100.0%
White	960	1,285	33.9%
Total	1,765	2,447	38.6%

When considering the crash rates per population, Black North Carolinians were disproportionately involved in crashes with motor vehicles in all three of NC’s regions. The crash rate for Black pedestrians was highest in both periods, and increased between 2010-2014 and 2015-2019 in both the Coastal and Piedmont regions while decreasing in the Mountains region. The rates of pedestrian crashes for other racial/ethnic groups were considerably lower than for Blacks, and trends varied somewhat by region. See the Appendix: Crash Involvement and Population-based Rates by Race/Ethnicity for supporting data and more information on crash trends by racial/ethnic group by region. Note that when either crash counts or populations are low, as they are for some groups in some regions, crash rates may vary widely based on relatively small changes in either number, so the time trends shown in the appendix should be interpreted cautiously.

Pedestrian Alcohol/Drug Use

The investigating officer indicated alcohol or both alcohol and drug use by an average of 11 percent of pedestrians struck (where use was known) (Table 10). Suspected alcohol or drug use does not imply that a pedestrian was intoxicated, but that evidence of alcohol or drug use was detected or suspected by an investigating officer and may have played a role. There is no clear evidence of an increasing role of drugs in pedestrian crashes as shown by these data, but it is uncertain how well officers are able to detect the presence of many types of potentially impactful drugs when investigating crashes. More in-depth studies including medical data or test results are needed to assess the potential role of opioids and other drugs.

Table 10 Pedestrian use of alcohol or drugs

Pedestrian alcohol/drug use suspected or detected	2015	2016	2017	2018	2019	Total
No	2,501	2,665	2,558	2,777	2,676	13,177
	82.2%	83.7%	82.5%	82.3%	83.5%	82.8%
Alcohol and Drug Impairment Suspected or Detected	21	19	19	32	20	111
	0.7%	0.6%	0.6%	0.9%	0.6%	0.7%
Alcohol Impairment Suspected or Detected	312	289	273	317	256	1,447
	10.2%	9.1%	8.8%	9.4%	8.0%	9.1%
Drug Impairment Suspected or Detected	19	22	29	26	30	126
	0.6%	0.7%	0.9%	0.8%	0.9%	0.8%
Unknown	191	190	222	222	223	1,048
	6.3%	6.0%	7.2%	6.6%	7.0%	6.6%
Total	3,044	3,185	3,101	3,374	3,205	15,909
	19.1%	20.0%	19.5%	21.2%	20.1%	

Crashes involving pedestrian use of alcohol were more highly represented among those resulting in fatal or suspected serious injury (Figure 3). While intoxicant use was identified in close to 8.5 percent of minor, possible, and unknown injury collisions (when intoxicant use was known), alcohol and/or drug use was indicated in over 22 percent of fatal and suspected serious injury crashes.

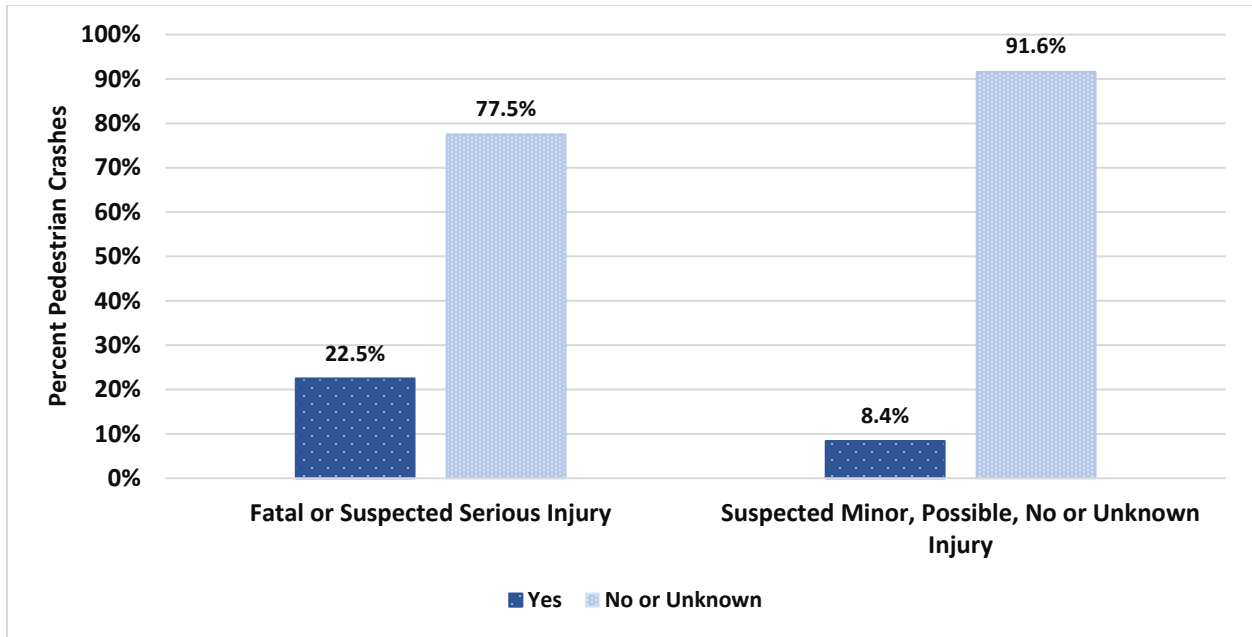


Figure 3 Alcohol or drug use by pedestrian injury level

Driver Characteristics

This section describes characteristics of drivers involved in crashes with pedestrians. One of the characteristics is that more than 21 percent of drivers were involved in hit and run crashes with pedestrians, on its own a serious problem. Traits for hit and run drivers, and some additional drivers are unknown, so the numbers of drivers reported on in the following sections is lower than for the number of crashes and pedestrians.

Crashes where the driver left the scene are more likely to result in suspected minor, possible, no, or unknown injury for pedestrians (Table 11) with around 22 percent of these crashes being hit and run compared with close to 17 percent of more severe injury and fatal crashes.

Table 11 Hit and Run crashes and pedestrian injury

Hit and Run	Fatal or Suspected Serious Injury	Suspected Minor, Possible, No, or Unknown Injury	Total
Yes	407	3,032	3,439
	16.6%	22.4%	21.5%
No	2,040	10,504	12,544
	83.4%	77.6%	78.5%
Total	2,447	13,536	15,983
	15.3%	84.7%	

Driver Age

Drivers aged 35 to 64 had the highest proportion of crashes for any age group over the study period with around 46 percent of crashes where the driver’s age was known (Table 12). However, younger drivers up to age 34 had the highest rate of crashes relative to their proportion of the population with over 19 per 10,000 people (Data not shown).

Table 12 Age of drivers involved in crashes with pedestrians

Driver Age Group	2015	2016	2017	2018	2019	Total
<35	998	1,000	971	1,095	1,015	5,079
	40.1%	38.8%	38.1%	40.1%	38.6%	39.1%
35 - 64	1,134	1,208	1,180	1,238	1,180	5,940
	45.6%	46.8%	46.3%	45.4%	44.9%	45.8%
65+	357	371	399	396	435	1,958
	14.3%	14.4%	15.6%	14.5%	16.5%	15.1%
Total	2,489	2,579	2,550	2,729	2,630	12,977
	19.2%	19.9%	19.7%	21.0%	20.3%	

Driver Race/Ethnicity

As with pedestrians, White drivers were most involved in crashes with pedestrians in the State followed by Black drivers (Table 13). Crashes increased for all racial and ethnic groups of drivers from 2010-2014 period to 2015-2019, with the highest percentage increases for Hispanic drivers (62 percent).

Similar to the pedestrian rate data, Black drivers had a higher rate (based on population) of being involved in pedestrian crashes in all three regions of the State. These data are also shown in the Appendix: Crash Involvement and Population-based Rates by Race/Ethnicity. Other racial/ethnic groups had lower driver crash rates that varied among regions. As for pedestrians, interpretation of these differences by different demographic groups is complicated by a lack of data on amounts, locations, and times of driving by different groups, and numbers of pedestrians walking in the same areas. For example, some populations may have more nighttime work shifts and therefore be more exposed to driving and walking under nighttime conditions.

Table 13 All crashes by race of driver, 2010-2014 and 2015-2019

Driver Race/Ethnicity	2010-2014	2015-2019	Percent Change
Asian American	149	194	30.2%
Black	3,878	4,609	18.8%
Hispanic (of any race)	480	775	61.5%
Native American	110	112	1.8%
Other	178	247	38.8%
Unknown/Missing	2,468	2,917	18.2%
White	6,729	7,129	5.9%
Total	13,992	15,983	14.2%

Driver Alcohol/Drug Use

Alcohol and/or drug use was suspected or detected in an average of 4 percent of drivers involved in pedestrian crashes over the study period (Table 14). This does not necessarily imply that alcohol or drug use was a factor in the crash. The rate was slightly higher in 2015 and 2016 compared with other years. It is possible that the use of ride sharing services in recent years has led to a reduction in the prevalence of driver impairment in pedestrian crashes; however further research is needed. Additionally, due to the many types of drugs and potential interactions, along with difficulty in detecting diverse types of drugs and/or their effects, the roles of drug and alcohol use as risk factors may be complex. However, with increasing concerns about opioids and other classes of drugs, there may be interest in tracking and better-understanding these and additional data relating to pedestrian crashes.

Table 14 Driver use of alcohol or drugs

Driver alcohol / drug use suspected or detected	2015	2016	2017	2018	2019	Total
No	2,300	2,373	2,377	2,522	2,407	11,979
	88.2%	87.2%	88.4%	86.3%	85.0%	87.0%
Alcohol and Drugs Impairment Suspected or Detected	8	10	9	8	4	39
	0.3%	0.4%	0.3%	0.3%	0.1%	0.3%
Alcohol Impairment Suspected or Detected	93	87	79	84	88	431
	3.6%	3.2%	2.9%	2.9%	3.1%	3.1%
Drug Impairment Suspected or Detected	11	20	13	16	18	78
	0.4%	0.7%	0.5%	0.5%	0.6%	0.6%
Unknown	197	230	212	291	316	1,246
	7.6%	8.5%	7.9%	10.0%	11.2%	9.0%
Total	2,609	2,720	2,690	2,921	2,833	13,773
	18.9%	19.7%	19.5%	21.2%	20.6%	

Considering crashes which led to a fatal or disabling injury for a pedestrian, alcohol/drug use was suspected or detected in more than 9 percent of drivers in these crashes (Table 15). This is more than twice the overall rate for drivers involved in pedestrian crashes (4 percent) and nearly three times those with suspected minor, possible, or unknown injuries (3 percent).

Table 15 Driver use of alcohol or drugs by pedestrian injury level

Driver alcohol / drug use suspected or detected	Fatal or Suspected Serious Injury	Suspected Minor, Possible, No, or Unknown Injury	Total
Yes	194	348	542
	9.4%	3.3%	4.3%
No	1,861	10,118	11,979
	90.6%	96.9%	95.8%
Total	2,055	10,446	12,501
	16.4%	83.6%	

Where Pedestrian Crashes Occurred

Development Extent

As shown in Figure 1, urban areas accounted for around 75 percent of pedestrian-motor vehicle crashes between 2010 and 2019, while rural areas accounted for around 25 percent. Rural-urban coding may not fully reflect land use or development extent. When looking at development density, as coded by crash reporting agencies, crashes were even more heavily weighted toward areas that are at least somewhat developed (Figure 4). Over 87 percent of crashes occurred in areas that are at least 30 percent developed, with close to 13 percent in areas less than 30 percent developed.

Areas between 30 and 70 percent developed may represent areas in transition, where infrastructure is often still more rural in nature and traffic speeds remain high, while traffic volumes and roadway complexity are increasing. These mixed areas accounted for a higher percentage increase between 2010-2014 and 2015-2019 (22 percent) compared with rural and urban areas (4 and 19 percent, respectively). However, due to the larger numbers overall, the most urbanized areas accounted for the largest numeric increase as well as the highest percentage of pedestrian crashes.

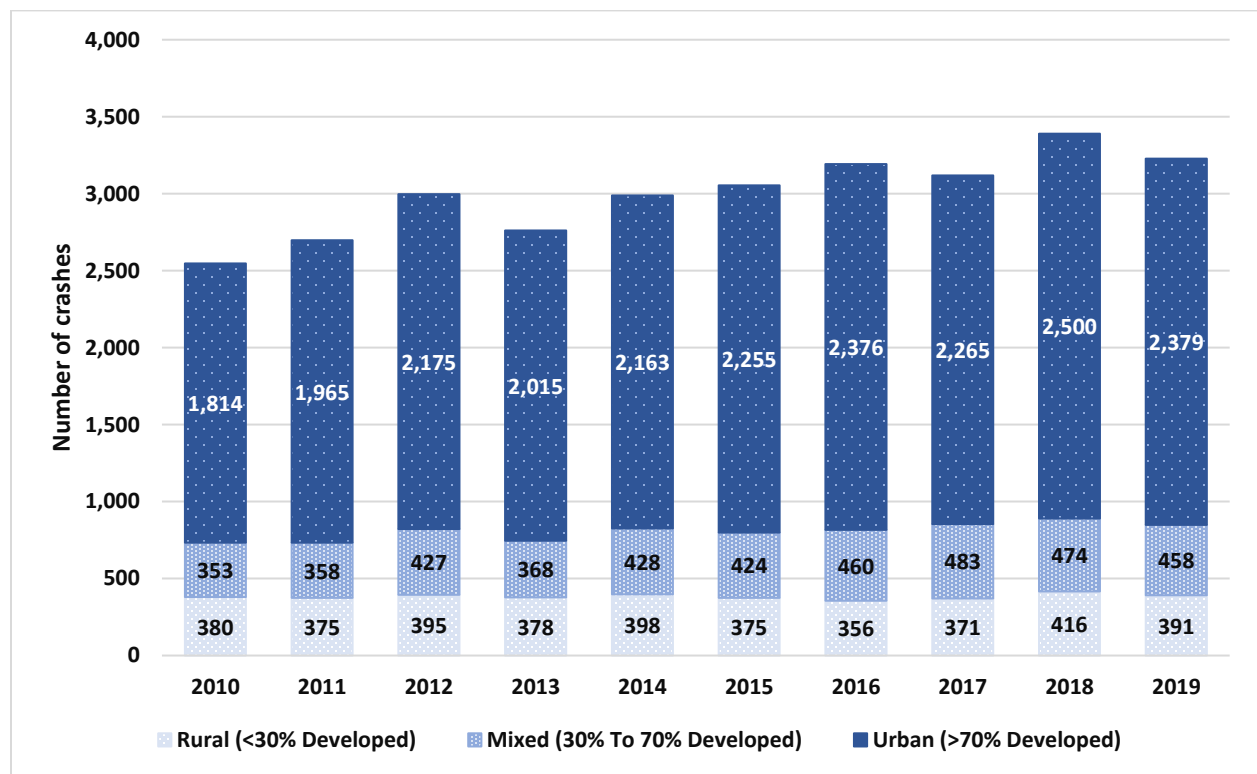


Figure 4 Pedestrian crashes by development extent

Development Type

On average, 53 percent of pedestrian crashes occurred in areas indicated as commercial districts, 34 percent in residential areas, around 10 percent in areas designated as farms, woods, or pastures, 3

percent in institutional areas, and less than 1 percent in industrial areas (Figure 5). Much of the rise is observed in commercial districts.

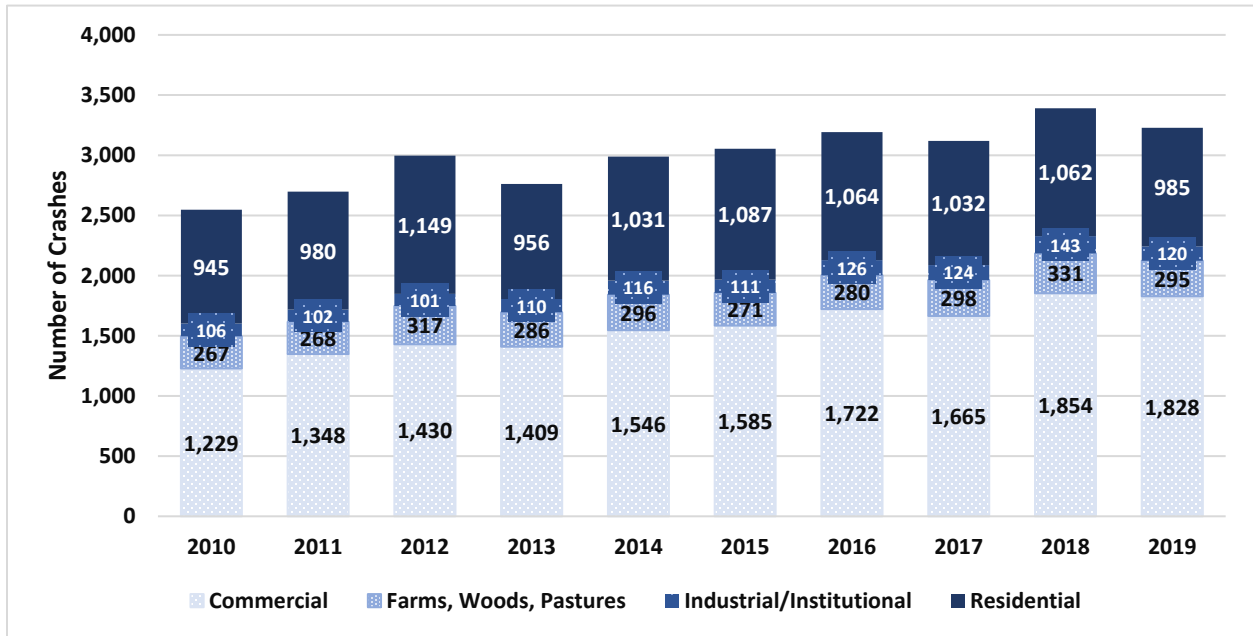


Figure 5 Pedestrian crashes by development type

Environment and Time Factors

Day of Week and Time of Day

Overall, Wednesday evenings between 6 and 9 pm had the highest number of crashes during the study period, followed by Fridays between 6 and 9 pm. Sunday mornings between 6 and 9 am had the fewest (Table 16). Friday was the day of the week with the most crashes—around 16 percent overall—while evening between 6 and 9 pm was the time period with the most crashes (across every day of the week); 6 to 9 pm accounted for over 21 percent of all pedestrian crashes.

Table 16 Pedestrian crashes by time of day and day of week, 2015-2019

	Sun	Mon	Tues	Weds	Thurs	Fri	Sat	Time of Day Total
12 am to 6 am	366	140	154	152	162	173	293	1,440
6 am to 9 am	55	309	260	295	292	267	113	1,591
9 am to 12 pm	141	281	283	271	248	295	232	1,751
12 pm to 3 pm	228	372	383	353	387	410	314	2,447
3 pm to 6 pm	262	487	502	477	515	511	352	3,106
6 pm to 9 pm	381	458	501	556	520	530	486	3,432
9 pm to 12 am	231	254	301	277	308	434	411	2,216
Day of Week Total	1,664	2,301	2,384	2,381	2,432	2,620	2,201	15,983

Light Conditions

During the study period, around 55 percent of crashes happened during daylight hours. However, there are significant differences between rural and urban locations for dark roadway crashes (Figure 6). Around 60 percent of crashes that occurred on dark, unlighted roads are in rural areas; this light condition makes up 42 percent of all rural crashes. By contrast, around 9 percent of crashes in urban areas occurred on dark, unlighted roadways. According to NHTSA’s Traffic Safety Facts report, nationally 76 percent of all pedestrians killed were killed in collisions at night in 2018 (National Center for Statistics and Analysis, 2020) – this figure includes both unlighted as well as lighted roads. However, even lighted roadways may not have sufficient or correctly-designed lighting to help motorists detect pedestrians crossing roadways at night in time to avoid a collision.

Lighting, lower speeds, and crossing enhancements may help to reduce the risk of nighttime serious crashes. (See Gibbons et al. 2008 FHWA report on lighting design for midblock crossings <https://www.fhwa.dot.gov/publications/research/safety/08053/> for more information.)

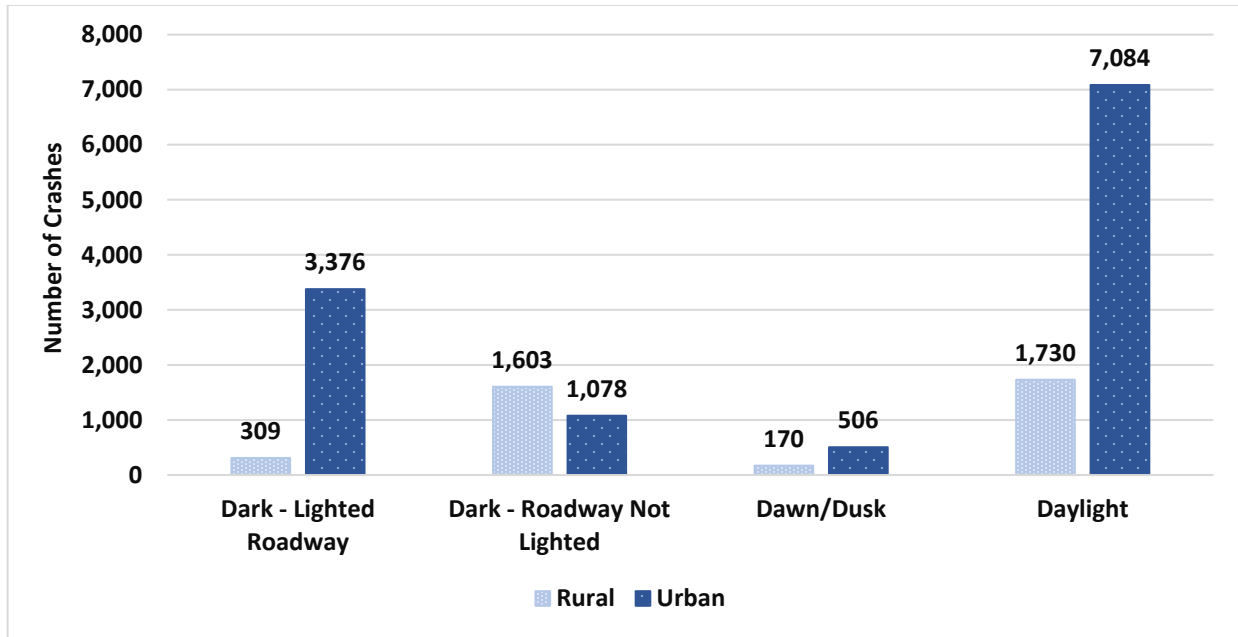


Figure 6 Rural/Urban crashes by light condition, 2015-2019

Month of Year and Light Conditions

Pedestrian crashes occur throughout the year but on average over the five year period, were highest in the fall months (Figure 7). October through December reflect decreasing daylight periods among other factors, and accounted for 30 percent of all crashes between 2015 and 2019. By comparison, June through August accounted for 23 percent. Additionally, 35 percent of all crashes that occurred in dark or unknown lighting conditions occurred between October through December.

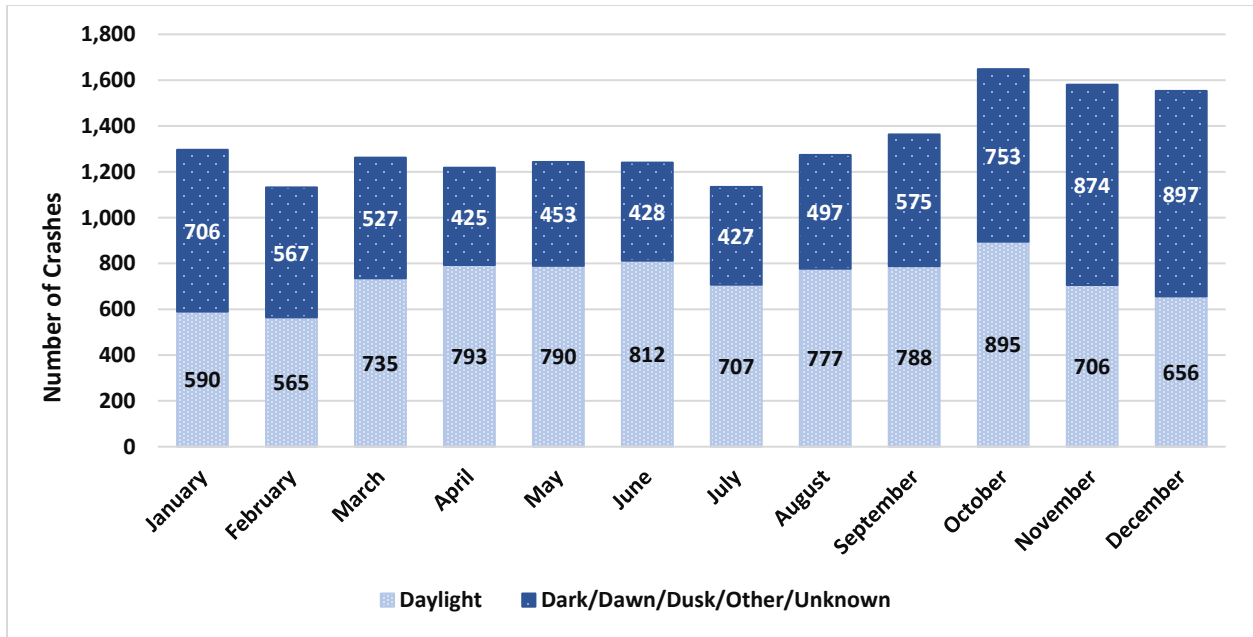


Figure 7 Pedestrian crashes by month and light conditions, 2015-2019

Weather

Close to 78 percent of all pedestrian crashes occurred during clear weather, cloudy weather accounted for 12 percent, and rainy conditions accounted for close to 9 percent (Figure 8). Relatively few crashes occurred in snowy, icy, foggy, or other weather conditions during the study period. Any year-to-year variations in the number occurring during poor weather is partially related to exposure (e.g., more rainy weather crashes occurring during wetter years).

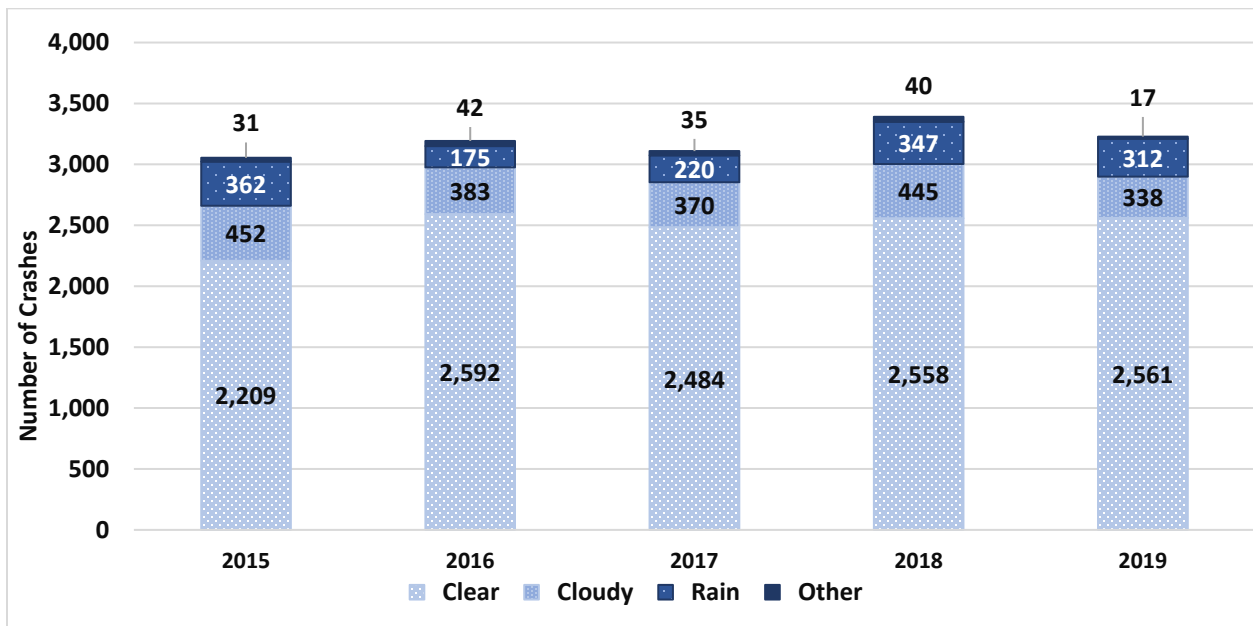


Figure 8 Pedestrian crashes by weather conditions

Roadway Characteristics

Speed Limit

When speed limits were known and reported, around 70 percent of pedestrian crashes occurred on roads of 35 mph or lower. These statistics likely reflect the fact that urban streets and commercial thoroughfares, where more pedestrians tend to walk, generally have limits of 35 mph or lower.

However, pedestrian crashes on higher speed roads are typically more severe (Figure 9). On average, around 5 percent of people struck on roads with a 25 MPH speed limit or lower suffered a fatal or suspected serious injury. The proportion of severe crashes begins to climb rapidly with higher speed limit roads, and 56 percent of those struck on roads with speeds limits 60 mph or greater were killed or suffered a suspected serious injury. Roadways with speed limits of 40 mph or greater accounted for 28 percent of pedestrian crashes of all severities over the study period, but 72 percent of the fatal crashes (784 out of 1,083) occurred on roads with speed limits of 40 mph or greater.⁸

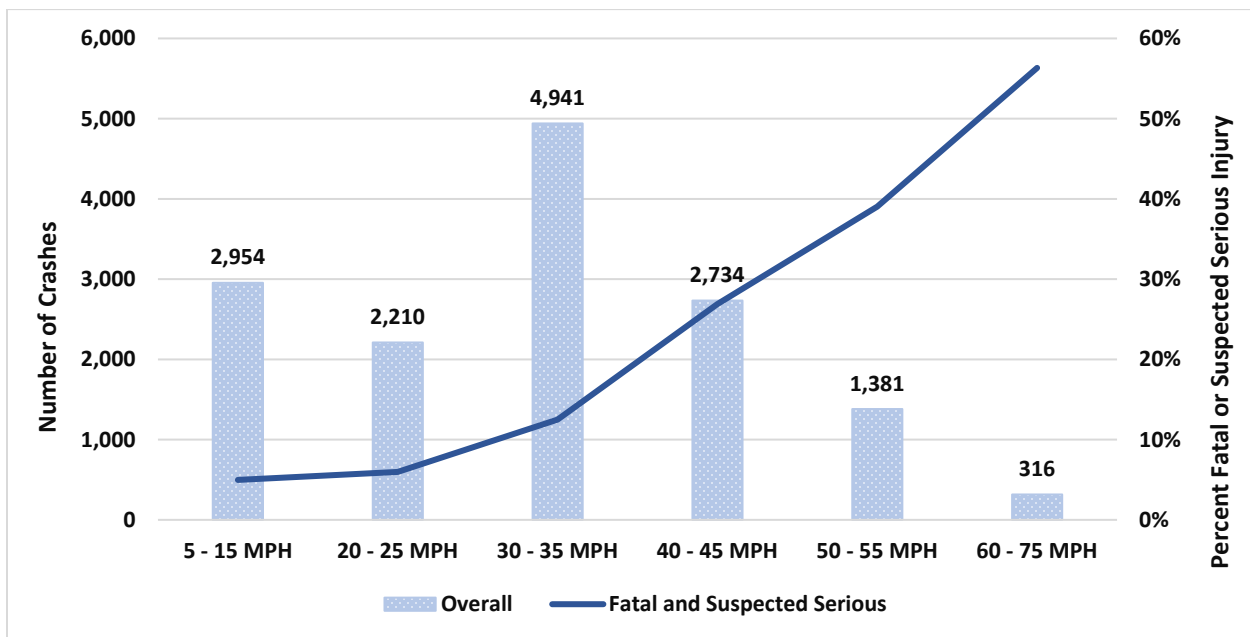


Figure 9 Pedestrian crashes and fatal/suspected serious injury by posted speed limit of roadway, 2015-2019

The crash factors discussed in this summary provide information to characterize types of problems associated with pedestrian crashes and more severe pedestrian injury crashes across North Carolina. The information can be used to help identify strategies to improve safety such as lowering speeds in areas frequented by pedestrians, especially at night. Resources such as the North Carolina Pedestrian and Bicycle Road Safety Assessment Guide (Thomas et al., 2018), PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System (2013), Federal Highway Administration’s Safe Transportation for

⁸ Crash data do not provide good information on actual travel speeds of the striking vehicle, but the speed limit of the roadway provides general information about the prevailing travel speeds.

Every Pedestrian website, NCHRP Report 926: Guidance to Improve Pedestrian and Bicyclist Safety at Intersections (Sanders, 2020), and others can provide additional assistance with diagnosing and identifying appropriate treatments for pedestrian safety issues.

For more information about pedestrian crashes and potential countermeasures in North Carolina and events leading up to the crashes, see the companion *North Carolina Pedestrian Crash Types* summary report.

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Appendix: Crash Involvement and Population-based Rates by Race/Ethnicity

Table 17 presents population estimates by geographic region for the mid-point year (2017), and crash involvement by race/ethnic identity of pedestrians and drivers (when available) for the period 2015-2019.

Table 17 Racial/Ethnic group population and pedestrian crash involvement by geographic region, 2015-2019

Racial / Ethnic group	Coastal			Mountains			Piedmont		
	Population (2017)	Peds.	Drivers	Population (2017)	Peds.	Drivers	Population (2017)	Peds.	Drivers
Asian American	41,776	26	24	16,223	10	9	237,578	171	161
Black	781,829	1,674	1,182	71,733	154	131	1,414,123	4,673	3,294
Native American	96,699	113	88	17,189	7	4	61,351	21	19
Hispanic (of any race)	280,862	185	126	91,639	51	44	693,223	780	605
White	1,873,733	1,817	1,753	1,241,079	1,074	1,060	4,147,133	4,371	4,308

Table 18 presents population estimates by geographic region for the mid-point year (2012) and crash involvement by race/ethnic identity of pedestrians and drivers (when available) for the period 2010-2014.

Table 18 Racial/Ethnic group population estimates and crash involvement by region, 2010-2014

Race/ ethnicity	Coastal			Mountains			Piedmont		
	Population (2012)	Peds.	Drivers	Population (2012)	Peds.	Drivers	Population (2012)	Peds.	Drivers
Asian American	38,371	20	22	14,214	5	4	197,403	136	119
Black	782,908	1,602	1,086	71,808	200	123	1,290,430	3,863	2,596
Native American	92,316	110	85	15,485	10	7	49,047	20	14
Hispanic (of any race)	239,240	164	92	80,004	53	30	576,540	543	351
White	1,821,970	1,681	1,687	1,205,542	1,135	1,043	3,969,479	3,983	3,796

The rates per 10,000 persons are illustrated in Figure 10, Figure 11 and Figure 12 for pedestrian crash involvement by race/ethnicity in each geographic region, and in Figure 13, Figure 14, and Figure 15 for driver involvement by race/ethnicity per region. As mentioned in the main text, keep in mind that that when either crash counts or populations are low as they are for some of these groups, crash rates may vary widely based on relatively small changes in either number, so trends should be interpreted cautiously.

Pedestrians

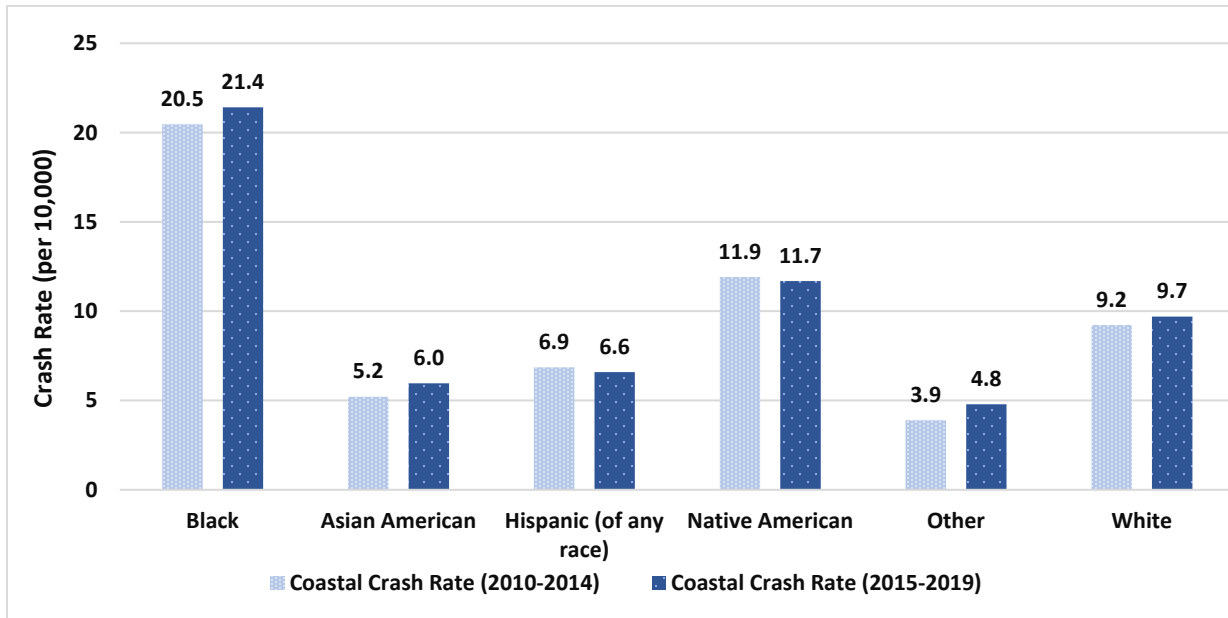


Figure 10 Crash rate by race of pedestrian for 2010-2014 and 2015-2019, Coastal region

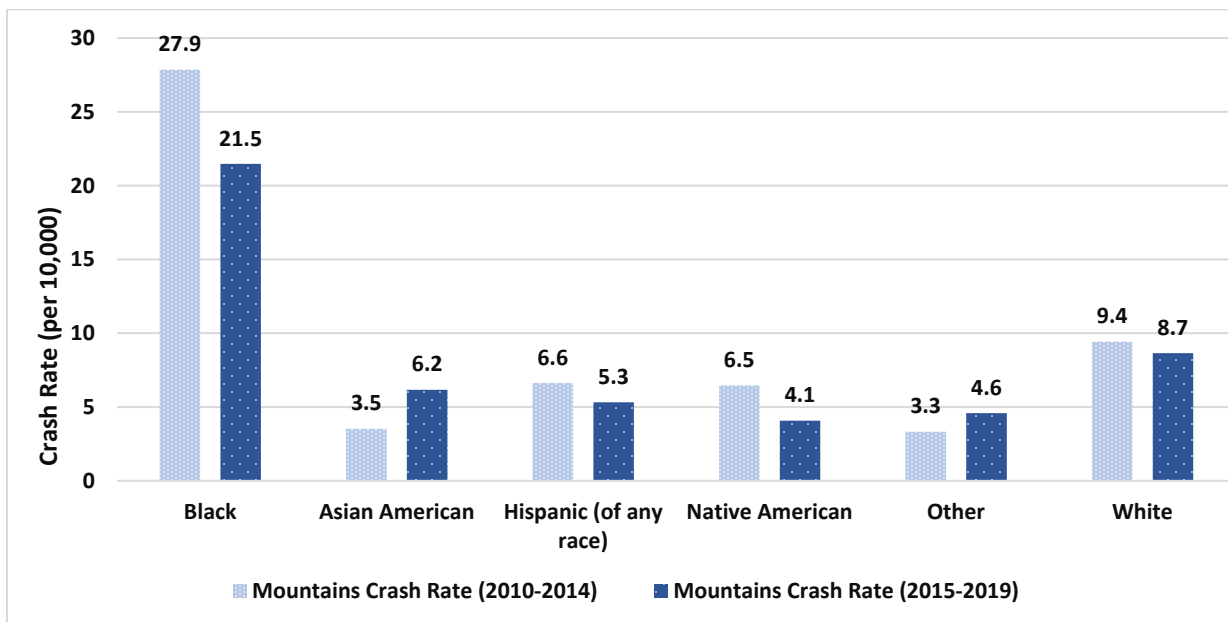


Figure 11 Crash rate by race of pedestrian for 2010-2014 and 2015-2019, Mountain region

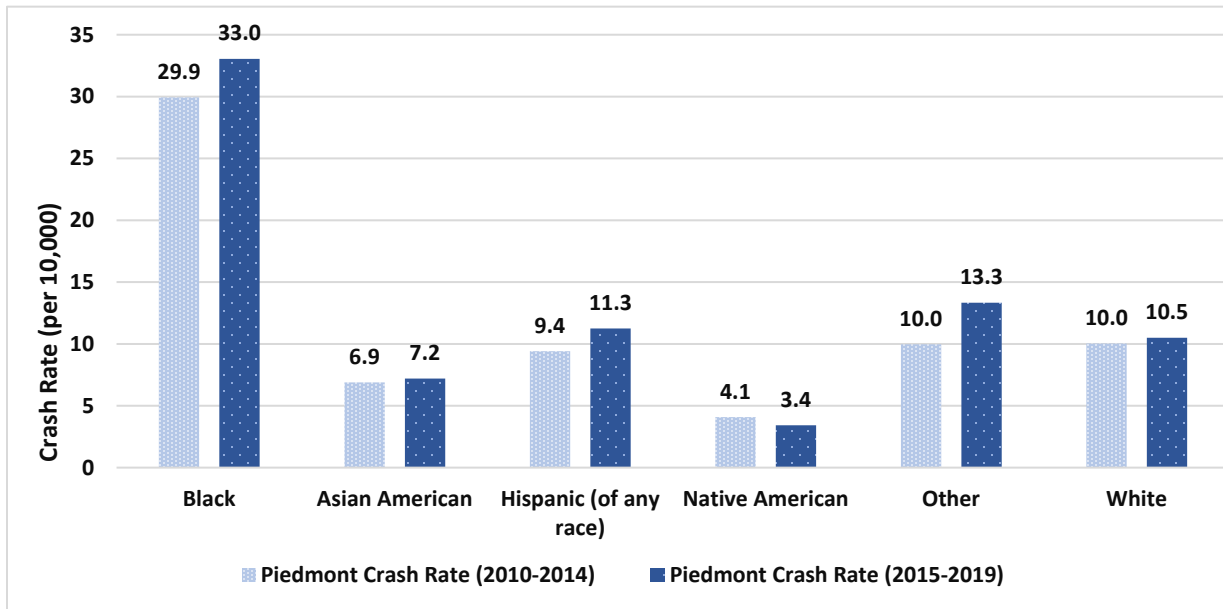


Figure 12 Crash rate by race of pedestrian for 2010-2014 and 2015-2019, Piedmont region

Drivers

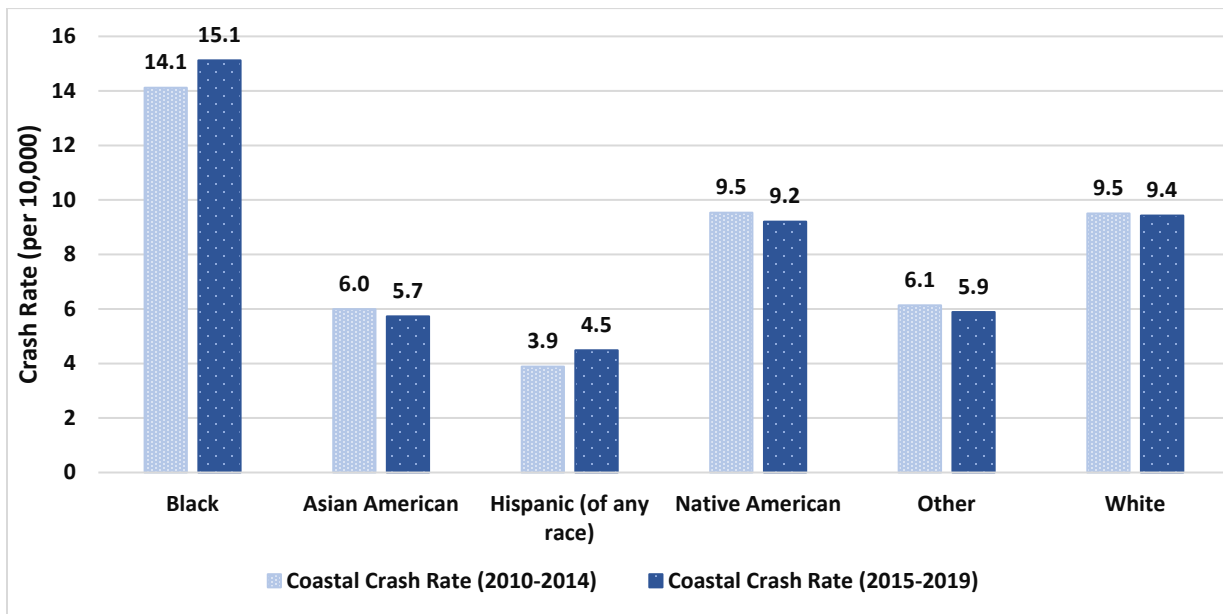


Figure 13 Crash rate by race of driver for 2010-2014 and 2015-2019, Coastal region

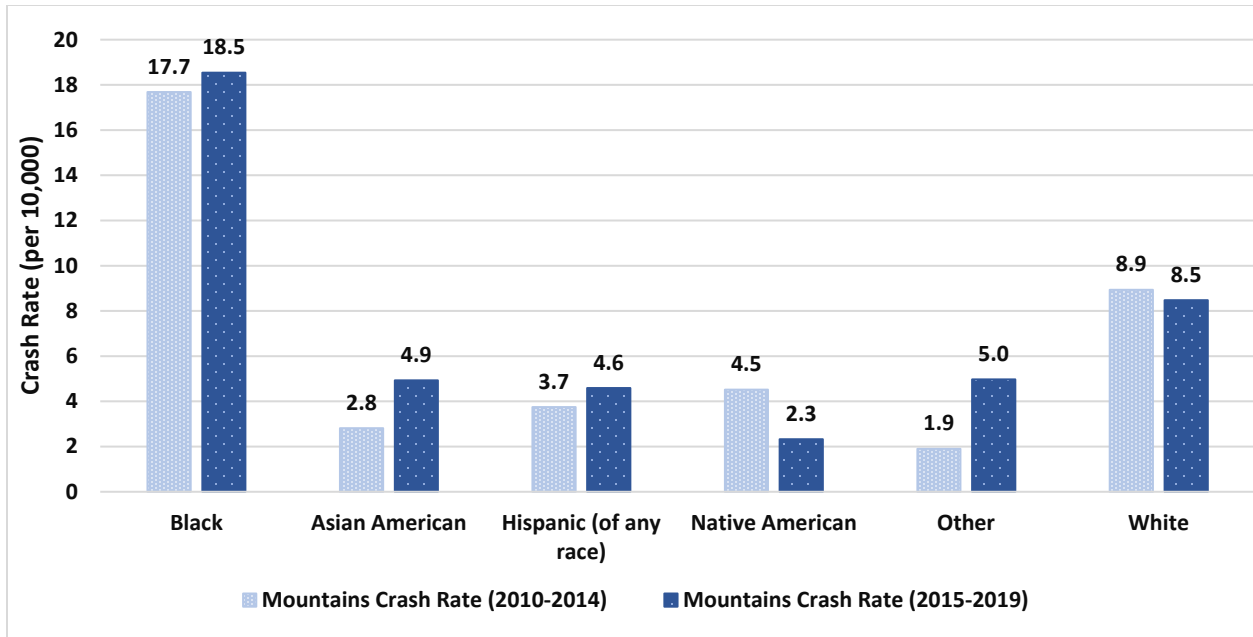


Figure 14 Crash rate by race of driver for 2010-2014 and 2015-2019, Mountain region

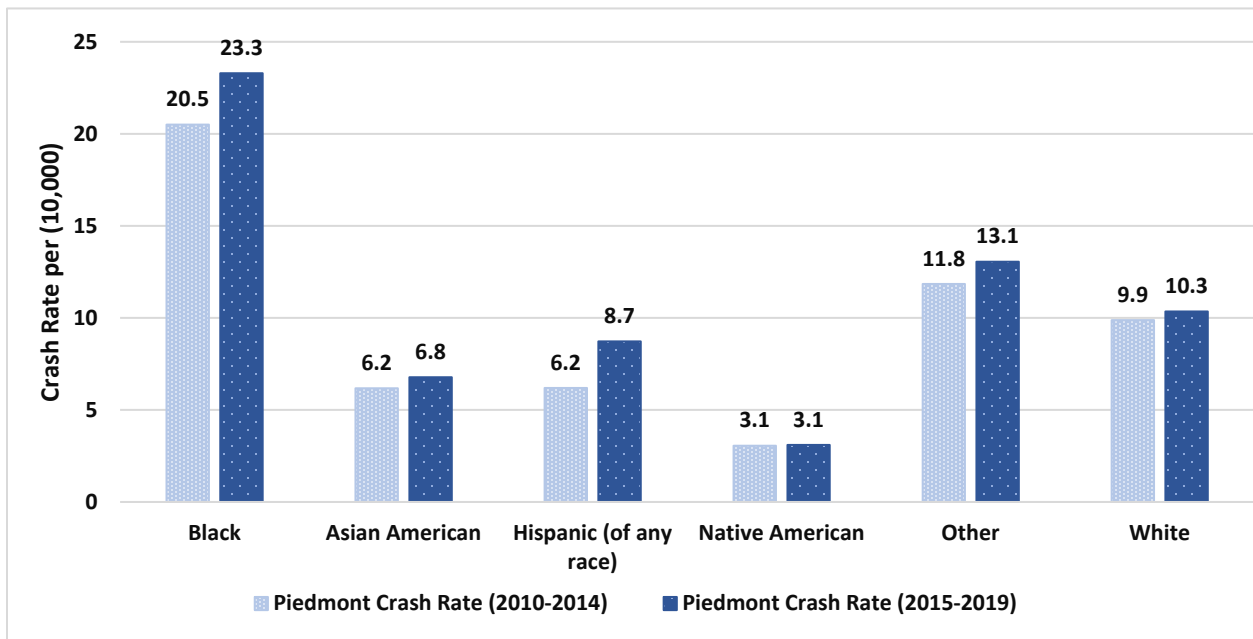


Figure 15 Crash rate by race of driver for 2010-2014 and 2015-2019, Piedmont region