Bicycle-Involved Crashes in Michigan: 2014-2018

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Contents

1.0 Executive Summary

This report provides an analysis of police-reported motor vehicle crashes involving bicycles on public roadways in Michigan from 2014 through 2018. Key findings include:

- From 2014-2018, the peak number of bicycle-involved crashes occurred in 2016 with 1,959, and the low occurred in 2018 with 1,546, a decrease of 21.1% from 2016 to 2018.
- The lowest number of fatal bicycle-involved crashes took place in 2014 and 2017 with 21 each; 2018 was slightly higher at 23.
- A total of 79.6% of bicycle-involved crashes involved injury or fatality, compared to 17.5% for motor-vehicle-only crashes.
- Bicycle-involved crashes have strong seasonality with much higher numbers in the warmer months.
- All weekdays had higher counts of bicycle-involved crashes than did Saturday or Sunday.
- Bicycle-involved crashes occur most often on clear days, during daylight, and generally in the afternoon.
- Most bicycle-involved crashes took place at intersections, but most fatal bicycle-involved crashes were not intersection related.
- In bicycle-involved crashes involving alcohol but not drugs, 76.5% of the bicyclists and 24.3% of the motor-vehicle drivers were reported to have been drinking.
- About 20.9% of bicyclists in crashes were reported to have been wearing helmets. The lowest helmet use rates were among 15-20-year-olds.

2.0 Introduction

This report analyzes police-reported motor vehicle crashes involving bicycles on public roadways in Michigan from 2014 through 2018. Michigan traffic crashes are defined as taking place on public roadways in Michigan, involving at least one motor vehicle in transport, and resulting in death, injury, or property damage of $1,000 or more. Bicycle-involved crashes are characterized in terms of severity, temporal patterns, and roadway and environmental variables. Impairment is examined at the level of the crash as well as according to whether alcohol was used by bicyclists or motor vehicle drivers in these crashes.

3.0 Crash Trends and Injury Severity

3.1 Crash Count Trends

Table 1 shows the counts of motor vehicle crashes involving bicycles in Michigan over the past five years, both for all police-reported crashes and for those involving a fatality. Figure 1 shows the five-year trend for bicycle-involved crashes. After peaking in 2016 with 1,959 crashes, the number of bicycle-involved crashes decreased 12.6% to 1,712 in 2017, and another 9.7% down to 1,546 in 2018.

Table 1. Bicycle-Involved Crashes, 2014-2018

	Year	All Crashes	Fatal Crashes
Bicycle-Involved Crashes	2014	1,749	21
	2015	1,869	34
	2016	1,959	33
	2017	1,712	21
	2018	1,546	23
	Total	8,835	132

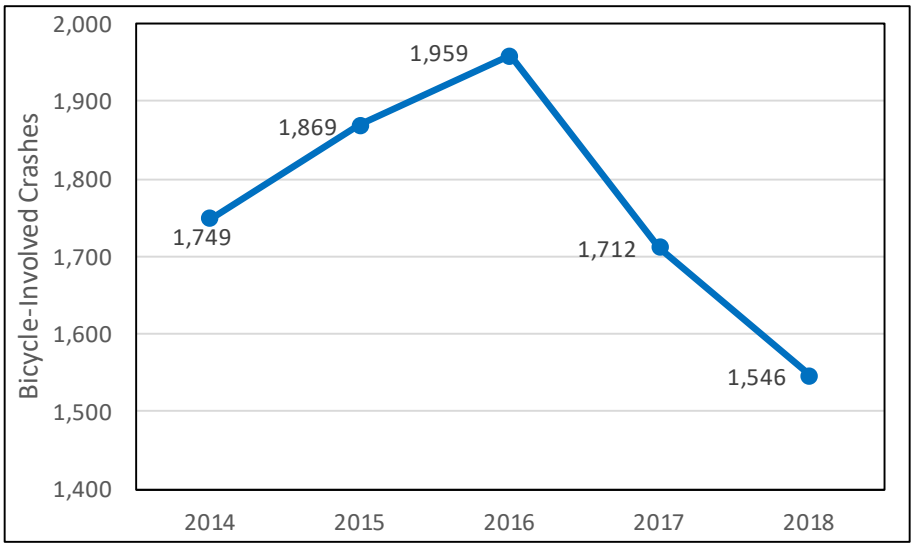

Figure 1 – Bicycle-Involved Crashes by Year

3.2 Crash Severity

Table 2 compares crash severities for crashes involving bicycles and crashes involving only motor vehicles. About 1.5% of bicycle-involved crashes were fatal and 8.1% involved suspected serious injuries. Only 20.4% of bicycle-involved crashes were without injury, compared with 82.5% of crashes involving only motor vehicles. These differences in police-reported crashes highlight the vulnerability of bicyclists compared with motor vehicle occupants.

Table 2. Crash Severity Distributions for Bicycle-Involved and Motor-Vehicle-Only Crashes, 2014-2018

Crash Severity	Bicycle	Motor Vehicle
Fatal	1.5%	0.2%
Suspected Serious Injury	8.1%	1.3%
Suspected Minor Injury	33.7%	4.5%
Possible Injury	36.4%	11.5%
Property Damage Only (PDO)	20.4%	82.5%
Total	100.0%	100.0%

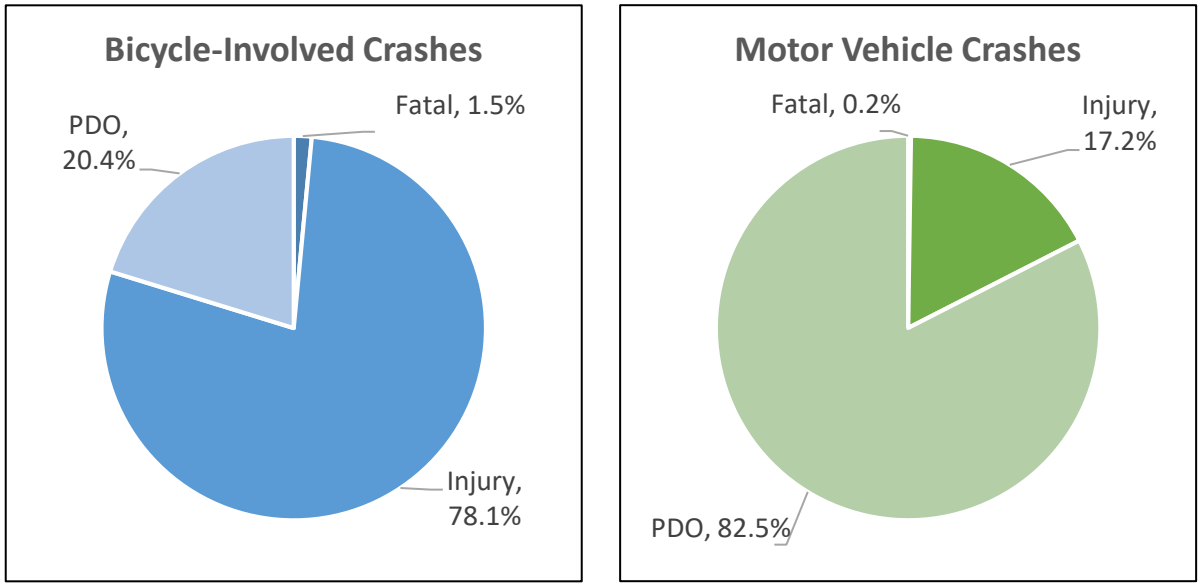

Figure 2 – Crash Severity Comparison for Bicycle-Involved and Motor-Vehicle-Only Crashes

Figure 2 provides a striking visual comparison of the crash severity distributions between bicycle-involved crashes and motor-vehicle-only crashes. Both crash types are categorized according to the worst injury in the crash—fatal, injury, or PDO (property damage only). The figure illustrates the much greater likelihood of death or injury in bicycle-involved crashes compared with crashes involving only motor vehicles.

4.0 Temporal Variables

4.1 Month of Year

Figure 3 shows the number of bicycle-involved crashes across different months of the year. About 79% of bicycle-involved crashes occurred from May through October, with a peak in August. The fewest bicycle-involved crashes occurred in January and February, with a combined 3.6% of the total. The bicycle-involved crash pattern appears to align with the cycling season in Michigan, which generally spans from April through October.

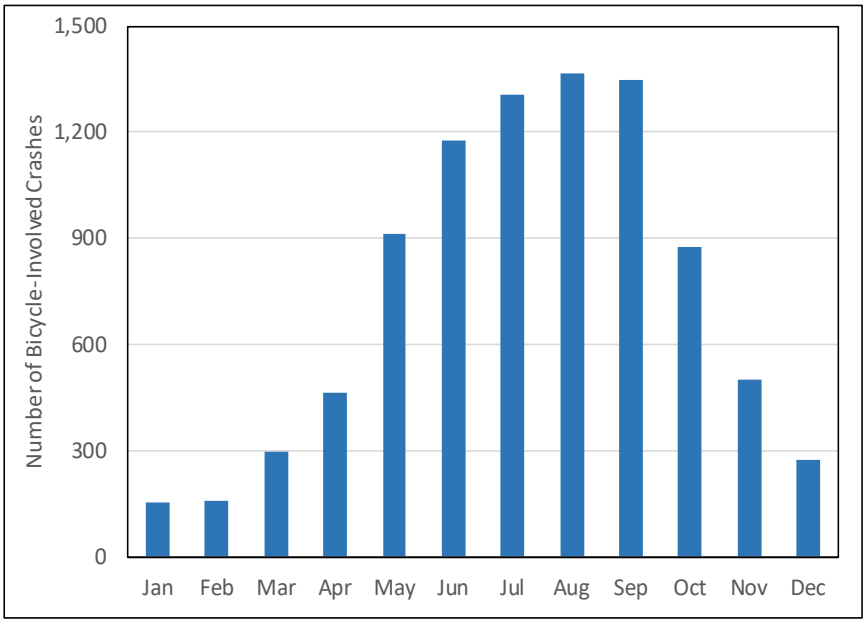

Figure 3 – Bicycle-Involved Crashes by Month, 2014-2018

4.2 Day of Week

Figure 4 shows the number of bicycle-involved crashes on each day of the week. Counts were higher on the weekdays compared to weekends, which may reflect travel by bicycle to work and school. The percent of bicycle crashes on each weekday ranged from 15.2% to 17.0%, compared with 9.4% on Sunday and 11.0% on Saturday.

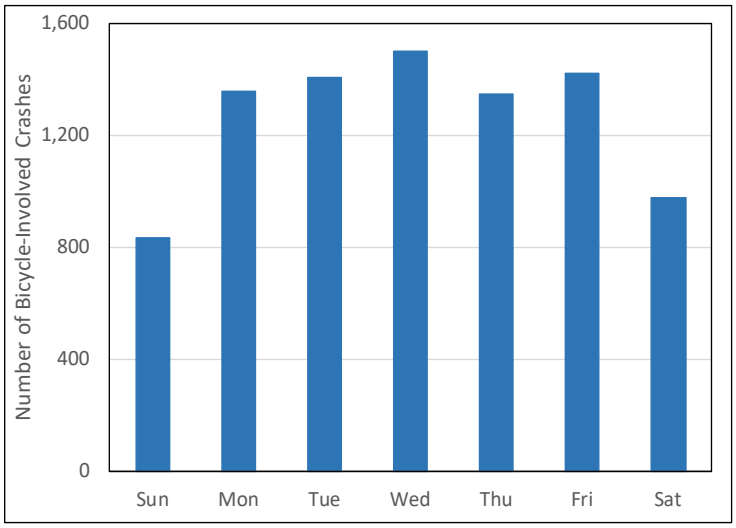

Figure 4 – Bicycle-Involved Crashes by Day of Week, 2014-2018

4.3 Time of Day

Figure 5 shows the number of bicycle-involved crashes across the hours of the day. We see that the number of bicycle-involved crashes steadily rose from the 9:00 a.m. hour through the 5:00 p.m. hour, when 9.8% of bicycle-involved crashes occurred. The number then declined each hour, reaching the low point during the 3:00 a.m. hour, when just 19 bicycle-involved crashes (0.2%) occurred over the five-year period.

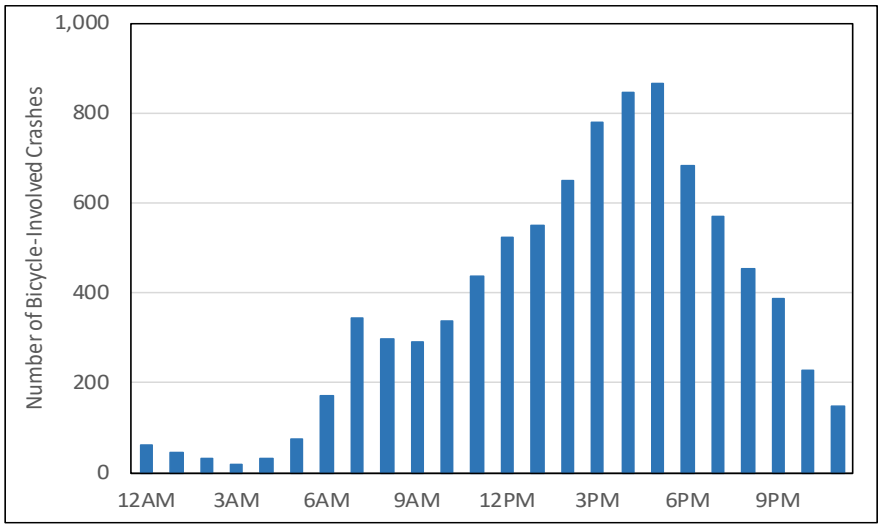

Figure 5 – Bicycle-Involved Crashes by Time of Day, 2014-2018

5.0 External/Environmental Conditions

5.1 Light Conditions

Figure 6 shows crash counts by light condition for bicycle-involved crashes. About 76.4% of bicycle-involved crashes occurred in daylight conditions, 12.3% in dark/lighted conditions, and 5.3% in

dark/unlighted conditions. This distribution is likely related to exposure, since bicyclists are more likely to be out during the daytime than at night.

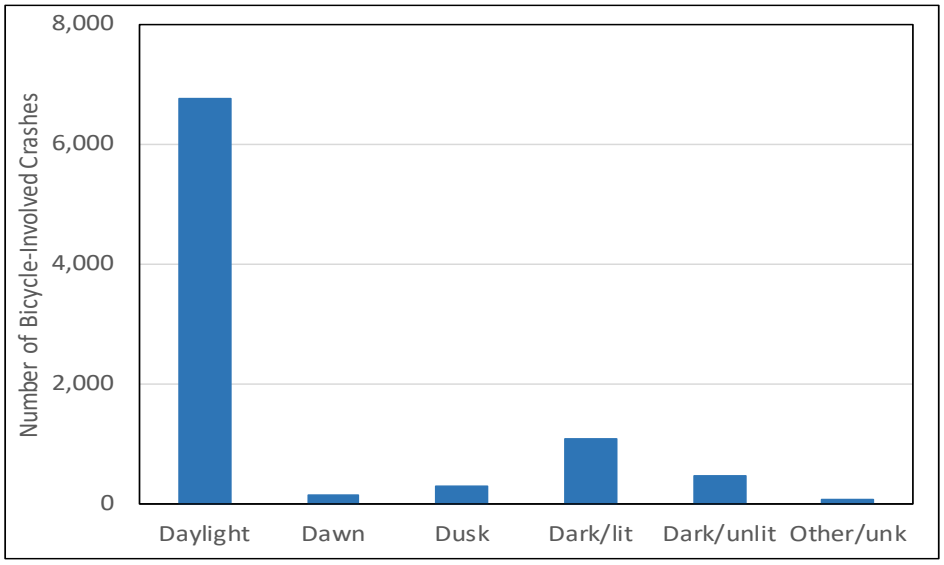

Figure 6 – Bicycle-Involved Crashes by Light Condition, 2014-2018

5.2 Weather Conditions

Figure 7 depicts weather conditions at the time of bicycle-involved crashes. Favorable weather was the norm, with 92.5% of the crashes occurring during clear or cloudy conditions and just 5.1% of the bicycle-involved crashes taking place when it was raining. Again, these weather-related crash patterns are likely related to exposure, with bicyclists less likely to be riding during bad weather.

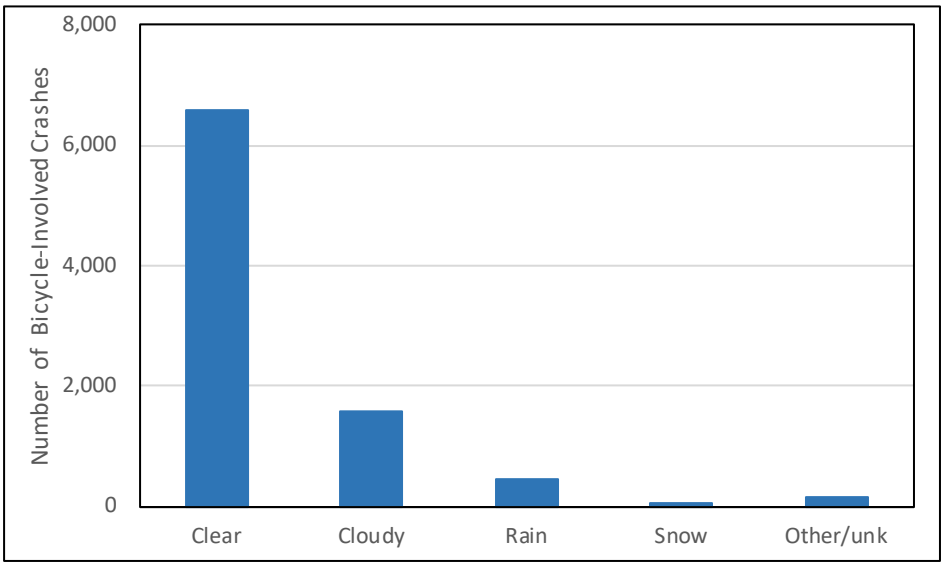

Figure 7 – Bicycle-Involved Crashes by Weather Condition, 2014-2018

6.0 Road Factors

6.1 Relation to Intersection

Table 3 indicates whether or not crashes took place at intersections for bicycle-involved crashes. About 65.7% of all bicycle-involved crashes took place at an intersection, but about 65.9% of fatal bicycle-involved crashes occurred at non-intersections.

Table 3. Bicycle-Involved Crashes by Relation to Intersection

	Relation to Intersection	All Crashes	Fatal Crashes
Bicycle-Involved Crashes	Not an intersection crash	3,026	87
	Intersection crash	5,809	45
	Total	8,835	132

6.2 Speed Limit

Figure 8 shows counts of bicycle-involved crashes according to speed limit at the crash site. The greatest number of crashes occurred in speed limit 25 zones, followed by speed limits of 35 and 45 mph. The percent of bicycle-involved crashes occurring in those three speed limit zones were 40.5%, 16.5%, and 13.0% respectively. Exposure is probably one factor in this crash breakdown, with bicyclists more likely to use roadways in the lower speed limit ranges.

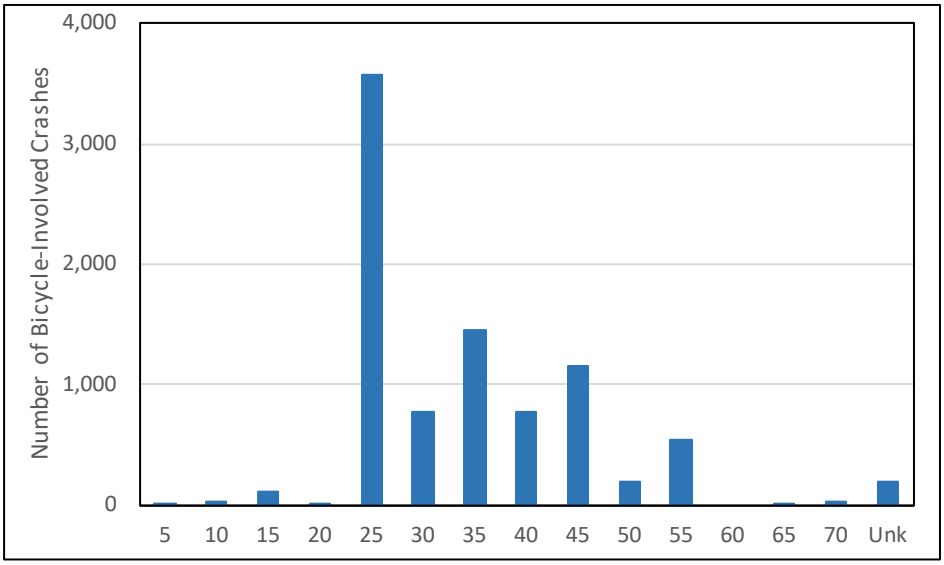

Figure 8 – Bicycle-Involved Crashes by Speed Limit at Crash Site, 2014-2018

7.0 Impairment-Related Crashes

Table 4 compares impairment distributions for bicycle-involved crashes and crashes involving only motor vehicles. Impairment status is based on what is reported by the police officer at the time of the crash. The crashes are split into those not involving alcohol or drugs, those involving alcohol only, those involving drugs only, and crashes involving both alcohol and drugs. The impairment distributions for

bicycle-involved crashes and motor-vehicle-only crashes are similar, although a slightly larger share of bicycle-involved crashes (3.5%) involved alcohol only compared with motor vehicle crashes (2.8%).

Table 4. Impairment Distributions for Bicycle-Involved and Motor Vehicle Crashes, 2014-2018

Impairment	Bicycle-Involved Crashes	Motor-Vehicle Crashes
Alcohol Only	3.5%	2.8%
Drugs Only	0.5%	0.4%
Alcohol and Drugs	0.4%	0.4%
None	95.6%	96.5%
Total	100.0%	100.0%

In the five years of data, there were 308 bicycle-involved crashes involving alcohol only. Figure 9 shows the drinking status for the bicyclists and motor vehicle drivers in those crashes (one driver with unknown alcohol use was excluded). Of the 311 bicyclists in these crashes, 238 (76.5%) were drinking. In contrast, of the 313 drivers in these crashes, only 76 (24.3%) were drinking.

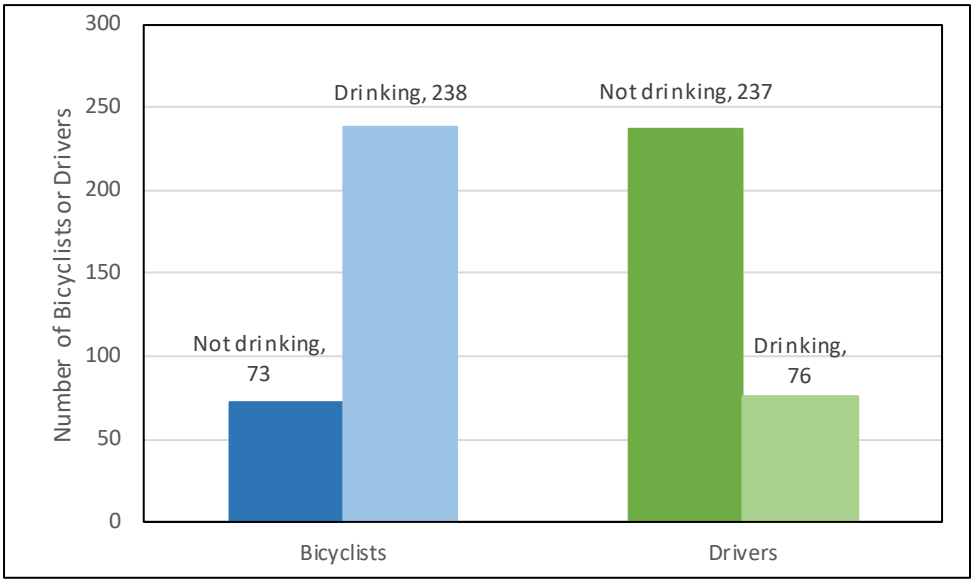

Figure 9 – Bicyclists and Drivers in Alcohol-Involved Bicycle-Involved Crashes, 2014-2018

8.0 Bicyclist Age and Helmet Use

Of the 8,929 bicyclists involved in crashes over the five-year period, age was unknown for 353 and coded as "0" for 547. In theory, zero values should mean less than one year old, but in reality most of these were likely also unknown age. Excluding both of those categories leaves us with 8,029 bicyclists and their age groups are charted in Figure 10. For these bicyclists of known age one and older, 26.4% were under age 18 and 66.2% were under age 40.

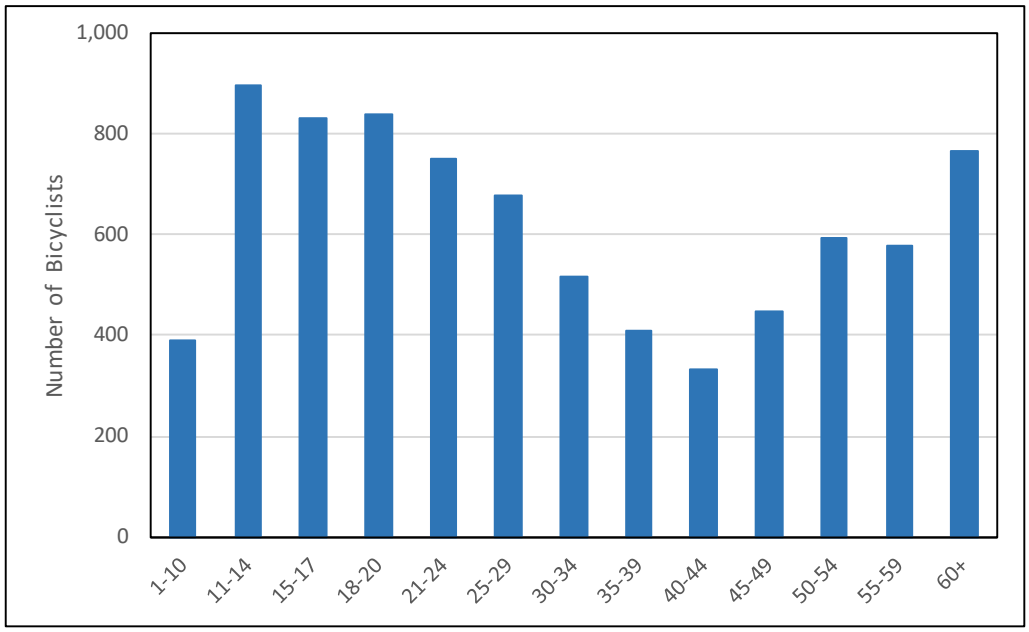

Figure 10 – Bicyclists in Crashes by Age Group, 2014-2018

Of the 8,029 bicyclists of known age one and older, helmet use was not reported for 3,002 (37.4%) bicyclists. These cases were coded as helmet use unknown, no belts available, or some other level of the Person Restraint variable. When helmet use was reported, 1,052 (20.9%) bicyclists were reported as having worn a helmet at the time of the crash and 3,975 (79.1%) were unhelmeted. Since helmet use was not recorded in a large share of cases, it is unknown how well the known helmet use distribution represents the entire population of crash-involved bicyclists.

That said, it is still interesting to compare helmet use rates among age groups. Figure 11 shows the percentage of crash-involved bicyclists in each age group who were helmeted at the time of the crash, again restricting to bicyclists with known helmet use. In general, the percentage helmeted was higher for older riders than younger riders. The 15-17 (7.9%) and 18-20 (9.2%) year-old riders had the lowest percentages of helmet use. Conversely, the age groups with the highest percentages of helmet use were the two oldest. Of the 367 bicyclists age 55-59, 116 (31.6%) were helmeted. Among bicyclists 60 and older, 183 (37.0%) of 495 were helmeted.

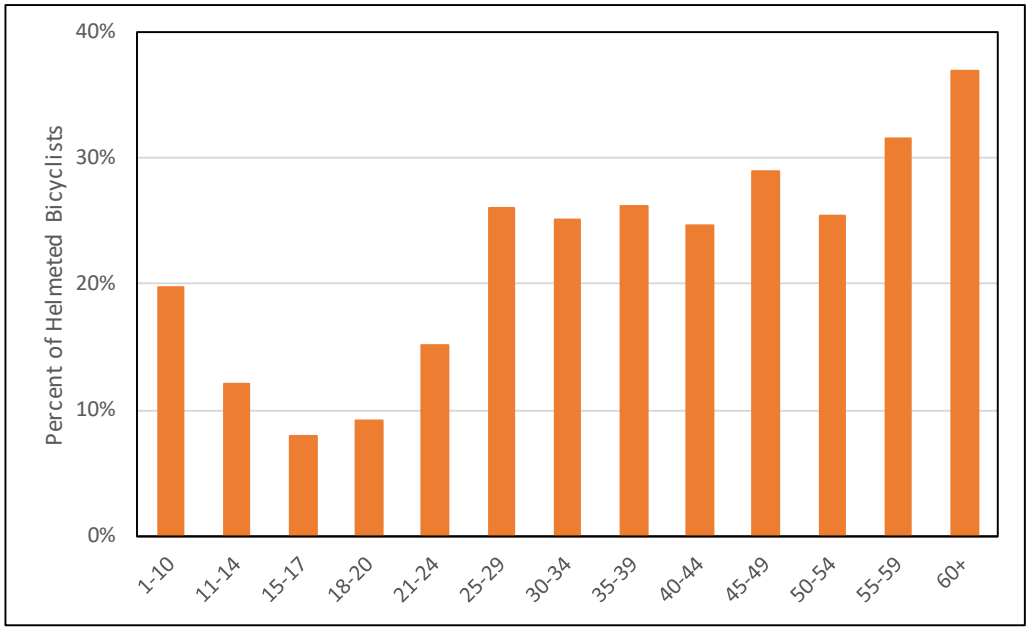

Figure 11 – Percent of Helmeted Bicyclists by Age Group, 2014-2018

9.0 Summary

From 2014 through 2018 in Michigan, an average of 1,767 motor vehicle crashes involving a bicycle took place each year. In a typical year, 26 bicycle-involved crashes involved at least one fatality. Bicyclists are vulnerable roadway users compared with motor vehicle occupants, as they lack the protection a vehicle's frame, airbags, and seat belts provide. While only 17.5% of crashes involving only motor vehicles resulted in death or injury, 79.6% of bicycle-involved crashes resulted in death or injury to at least one person.

Bicycle-involved crashes were concentrated during the warmer months, in clear weather, on the weekdays, and during daytime hours. The majority of bicycle-involved crashes took place at intersections, but the majority of fatal bicycle-involved crashes occurred at non-intersections. For bicycle-involved crashes that involved alcohol but not drugs, alcohol use was reported for the bicyclists about three times as often as for the motor vehicle drivers.