

NEBRASKA TEEN MOTOR VEHICLE SAFETY SURVEILLANCE REPORT, 2016-2020

DECEMBER 2022

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NEBRASKA

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DEPT. OF HEALTH AND HUMAN SERVICES

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Introduction

Burden

Despite great reduction in teen-driver related crashes in Nebraska since the implementation of the Graduated Driver Licensing System and related driving restrictions in 1998 and updates in 2008, motor vehicle crashes continue to be the number one killer of Nebraska teens, ages 15 to 19. Teen drivers ages 19 and younger represent only 5% of the driving population in the state yet account for 21% of all crashes; in 2020 alone, they accounted for 6,218 crashes. According to the Centers for Disease Control and Prevention (CDC) WISQARS database, from 2016-2020, unintentional injuries were the leading cause of death for teens ages 15-19 in Nebraska. Of those, 76% (n=102) were motor vehicle/traffic related. Suicide (n=87) was the second leading cause of death, followed by homicide (n=27).

Purpose

The primary purpose of this report is to examine traffic-related injury distribution, burden and major risk factors in Nebraska with a particular focus on teen drivers. This report provides information on current prevention work and evidence-based recommendations and solutions for future teen traffic-related injury prevention efforts for local and state entities to carry out.

Importance

Accurately identifying high-risk behaviors and risk factors for teen traffic injuries is critical for establishing effective prevention programs and policies. This report provides communities with data on teen traffic-related injuries and fatalities and information on prevention programs to reduce them. This report's findings and recommendations can be generalizable to other states and contribute to the current knowledge base on teen traffic-related injury. Moreover, this report serves the CDC Injury Center's mission to raise awareness about teen driving and associated risks and to provide information to policy makers, safety organizations, communities, and families about the importance of policies, education, and programming around teen motor vehicle safety.

Methods

Data Sources

For this report, the following data sources were used:

- Nebraska Department of Transportation (NDOT) annual miles traveled and crash data.
 - Crash data includes a motor vehicle crash when it involves at least one death or injury or at least \$1,500 in property damage. The data includes information about the person involved and details of the crash including time and location.
- United States Census Bureau population data
- Crash Outcomes Data Evaluation System (CODES)
 - The CODES dataset consists of linked statewide crash, hospital discharge, emergency medical system and death certificate data. For this report, the CODES dataset is utilized for evaluating the outcomes of the reportable crashes.
- Vital Records dataset.
 - Death certificate data is from the Nebraska Department of Health and Human Services Vital Records and contains demographics and cause of death.
- Hospital discharge data
 - Received from the Nebraska Hospital Association and contains records for individuals who had a hospital or Emergency Room (ER) visit.

This surveillance report emphasizes the analysis of teens between the ages of 15 to 19 years involved in motor vehicle crashes from 2016 to 2020. Age of occupants is determined by law enforcement at the scene of a crash and recorded as such in the NDOT crash data. On average, 76.6% of motor vehicle-related death certificates, 65.4% of motor vehicle crash injuries from the emergency medical system and 37.5% of motor vehicle crash injuries recorded in the hospital discharge dataset are probabilistically linked to the crash dataset.

Variables

Statewide Motor Vehicle Crash Dataset

The variables extracted from the statewide motor vehicle crash dataset were improper driving behaviors, restraint use, race, injury severity, road surfaces, vehicle type, age group, type of crash, location of the crash, urban vs. rural, place of occurrence, seasons and intersection. (See Appendix 1 for variable definitions)

Crash Outcomes Data Evaluation System

The variables extracted from the CODES dataset were hospitalization, outpatient and emergency room visits, direct inpatient cost and direct outpatient cost.

Other Data Sources

The population numbers at the state and age group levels were extracted from the United States Census Bureau population data. The annual vehicle miles traveled at the state and county levels were extracted from the Nebraska Department of Transportation. (See Appendix 1 for variable definitions)

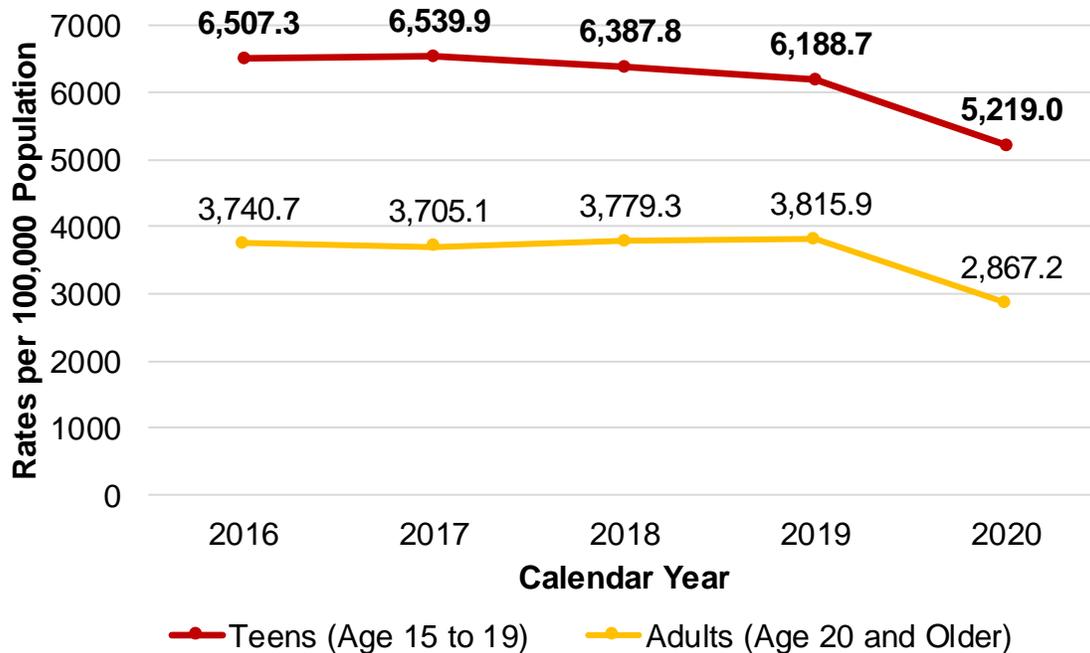
Analysis

The statistical software used for this surveillance report's analysis and data management was SAS software (version 9.4; SAS institute, Inc. Cary, NC, USA). Data management included addressing missing variables and re-categorizing the variables based on law enforcement's description of the crash (see definitions section). Variables that had missing values were excluded in the data analysis of the surveillance report. Descriptive statistics were used within the surveillance report and were displayed within graphs and tables. The descriptive statistics are summarized as frequency, percentage, rates, or average at the state, county, and subgroup levels. Rates were calculated from the annual census population and millions of miles traveled at the state level, county level, and by age group. Annual inpatient and outpatient medical charge averages were derived from the occupants within the hospital discharge data and linked to the crash data.

Data Findings

The main categories of findings in this report includes descriptive statistics, risk behaviors and crash outcomes. Descriptive statistics includes frequencies of teen involved crashes, crash types and demographic groups. Risk factors include improper driving behaviors, crash locations, time and season. Crash outcome includes injury and fatality statistics, hospital and emergency department visits and cost, top 10 counties with overall crashes and improper teen driving behaviors.

Figure 1. Occupants Involved in Motor Vehicle Crashes by Teens and Adults in Nebraska, 2016-2020



Data source: Nebraska Department of Transportation Crash Data, 2016-2020.

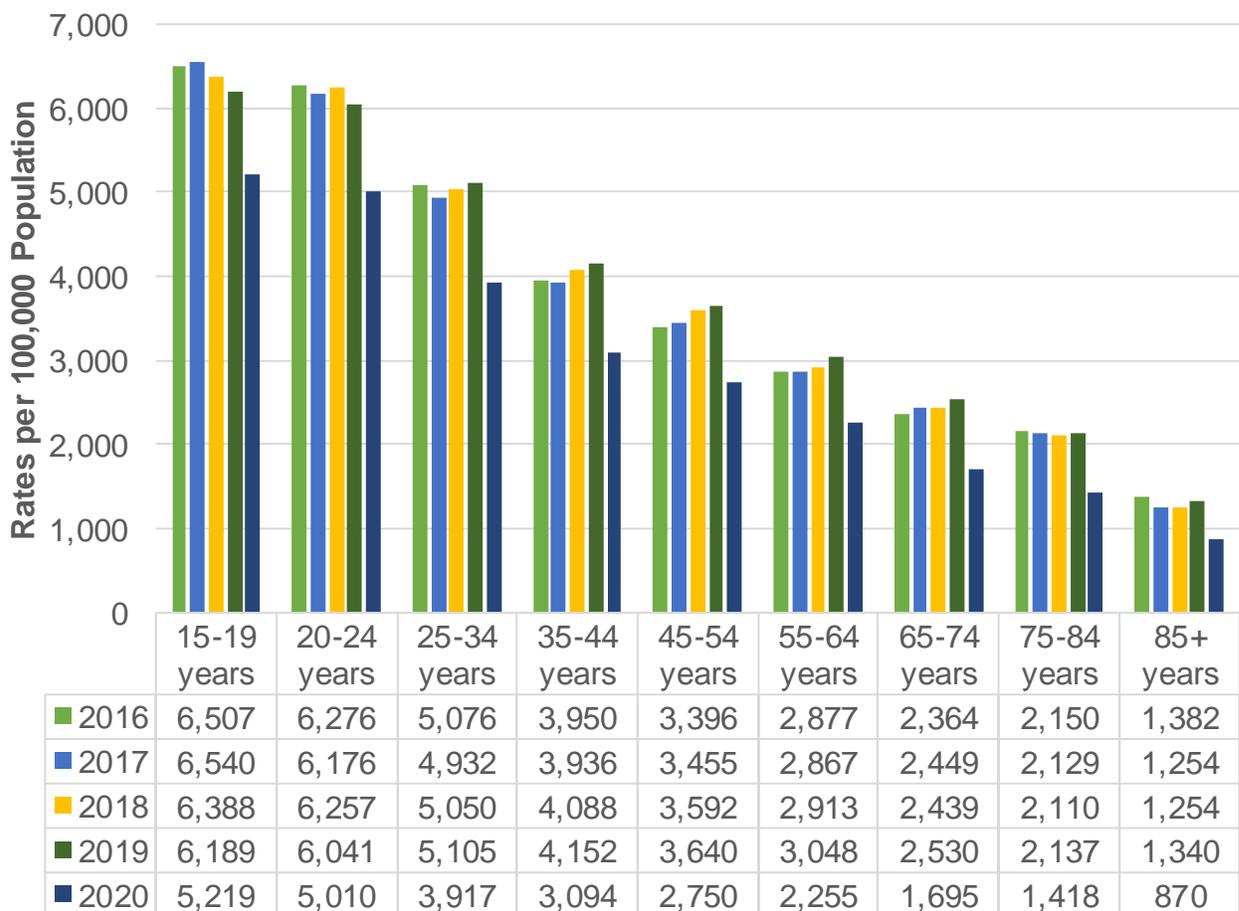
Notes: Population denominators were determined by Nebraska population data from U.S. Bureau Census 2016-2020.

Figure 1 displays the annual rates of occupants in motor vehicle crashes by age groups. The rate of motor vehicle crashes for teens is nearly twice as high for each year compared to adults aged 20 and older. The rate of crashes for teens increased from 6,507 per 100,000 population/people (n=8,409) to 6,539 per 100,000 population/people (n=8,513) from 2016 to 2017. The rate then decreased each year from 2017 to 2020.

The total number of crashes for the five-year period was 40,466 or an average of 8,093 crashes per year.

The rate of crashes for teens in 2020 is 5,219 per 100,000 population. The large overall decrease in 2020 could be attributed to the 2020 COVID-19 pandemic causing restrictions statewide, thus causing less exposure to the roads. This can be seen in the total 100 million miles traveled statewide, which decreased by 10% from 2019 to 2020.

Figure 2. Occupants Involved in Motor Vehicle Crashes by Age Groups in Nebraska, 2016-2020

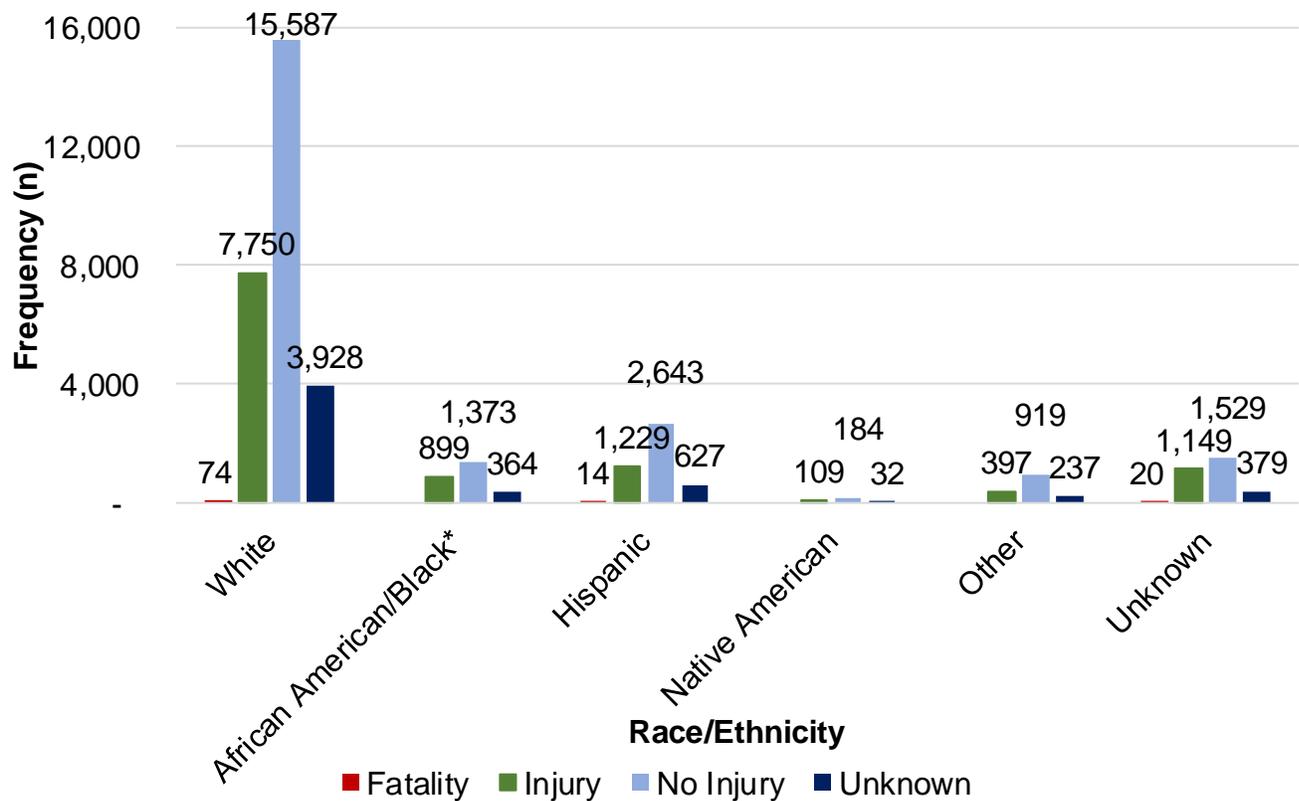


Data source: Nebraska Department of Transportation Crash Data, 2016-2020.

Figure 2 displays the annual rates of occupants involved in motor vehicle crashes by age groups per 100,000 population in Nebraska from 2016-2020. For each calendar year, teen drivers and passengers had the highest rates of crashes followed closely by 20- to 24-year-olds. Each consecutive age group had lower crash rates than the

previous age group. Teens crashed at the highest rate in 2017; rates have declined since. However, each year the crash rate is still higher for teens than every other age group.

Figure 3. Injury Severity by Race/Ethnicity Groups among Teen Drivers and Passengers in Nebraska, 2016-2020



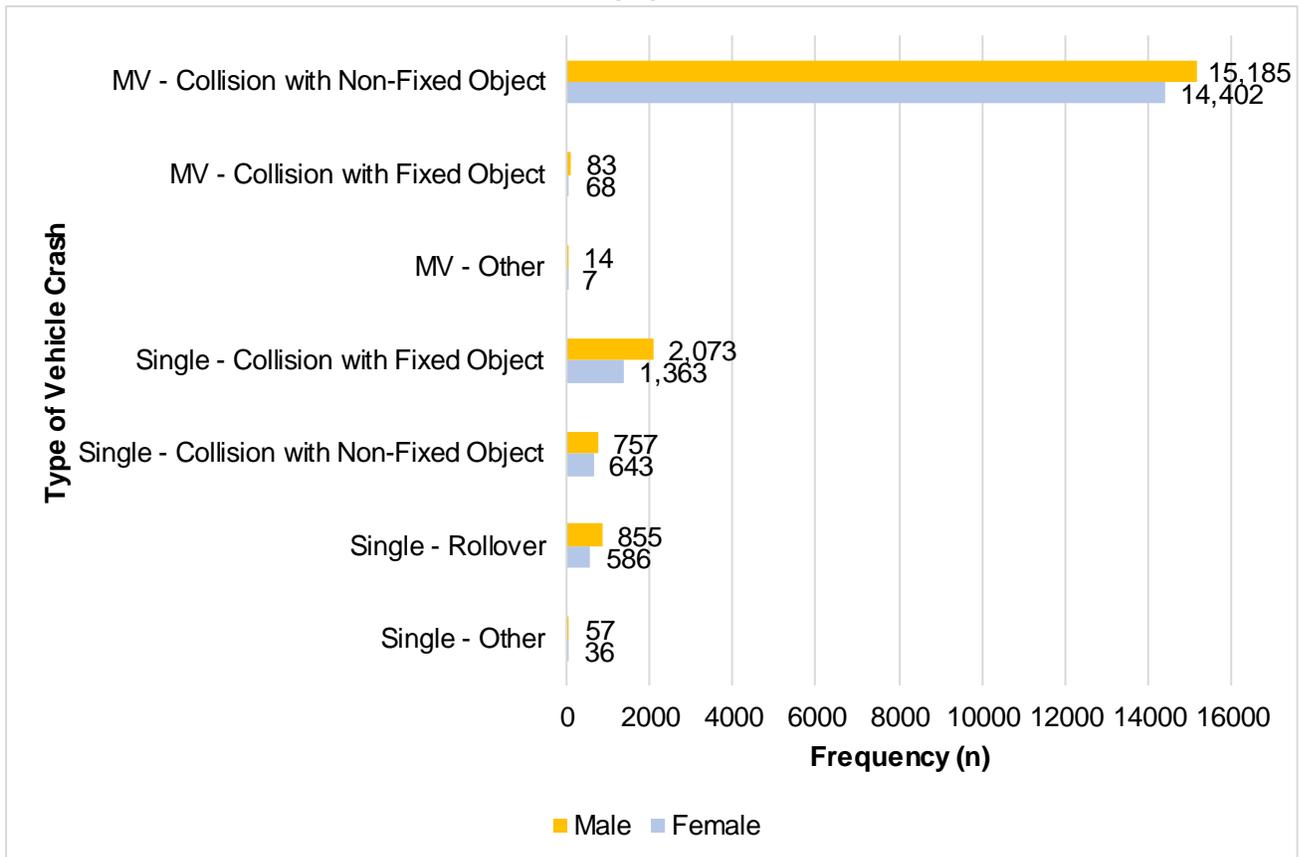
Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Notes: *Fatality number of African American/Black is less than five and thus suppressed. Other races include Asian, Hawaiian, Pacific islanders, and others. Unknown race/ethnicity includes occupants racial or ethnic information not identified or recorded by the law enforcement. Unknown injury includes non-visible injury and not recorded injury.

Figure 3 displays crash injury severity by race/ethnic groups among teen drivers and passengers in Nebraska from 2016 to 2020. The majority of fatal and injury cases were White. The fatality and injury percentages among Whites were also higher than those among the other race/ethnicity groups. A total of 3,077 (7.8%) teen occupants were recorded as unknown race/ethnicity by law enforcement at the crash scene. Lack of

detailed information on identifying specific racial groups, especially minorities, hinder specific outreach and programming. Reporting of detailed racial and ethnic information is important in understanding disparities and burden that may exist.

Figure 4. Vehicle Crash Events with Teen Drivers Involved by Sex in Nebraska, 2016-2020



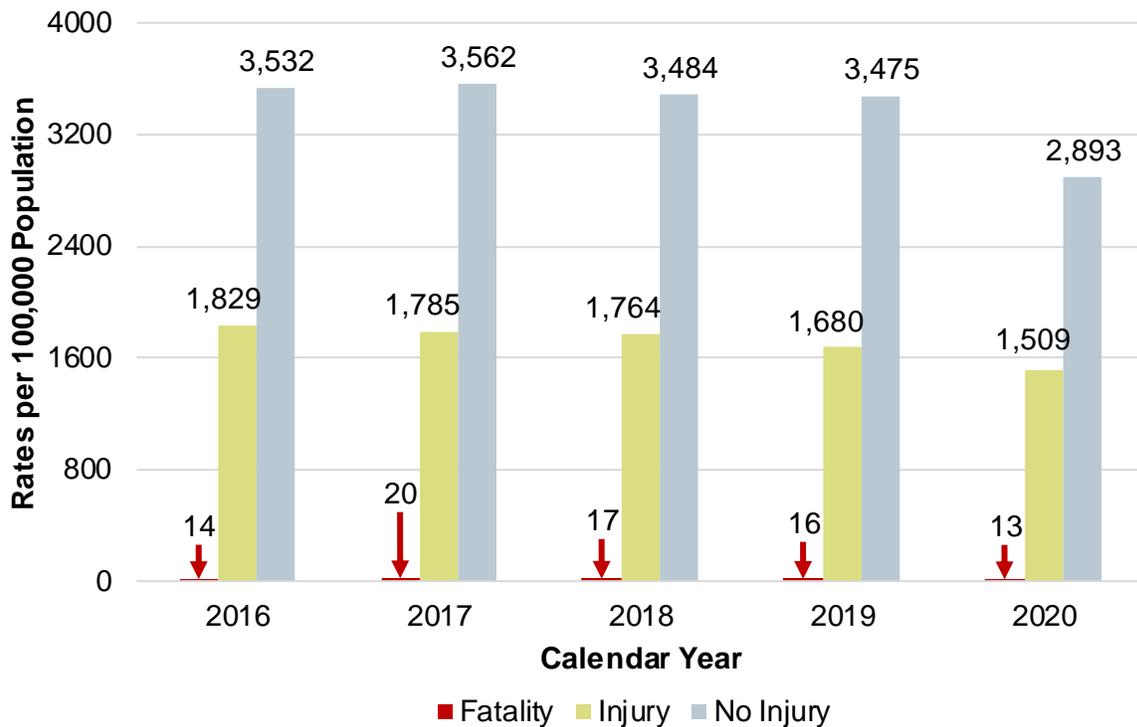
Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Notes: *MV=multi-vehicle.

Figure 4 displays frequency of the types of vehicle crashes involving teen drivers by sex in Nebraska from 2016-2020. Males have a higher frequency of total crashes and for each crash type. Multi-vehicle collisions with non-fixed objects occurred the most for both sexes. This crash type was reported 15,185 times for males and 14,402 times for females. The second highest frequency for both sexes is single vehicle – collision with a fixed object which occurred 2,073 times for males and 1,383 times for females. Single vehicle rollovers occurred 855 times for males and 586 times for females. Single vehicle

collision with non-fixed objects occurred 757 times for males and 643 times for females. Multi-vehicle collisions with fixed objects occurred 83 times for males and 68 times for females.

Figure 5. Motor Vehicle Crash Related Injury by Severity among Teen Drivers and Passengers (Age 15 to 19) in Nebraska, 2016-2020

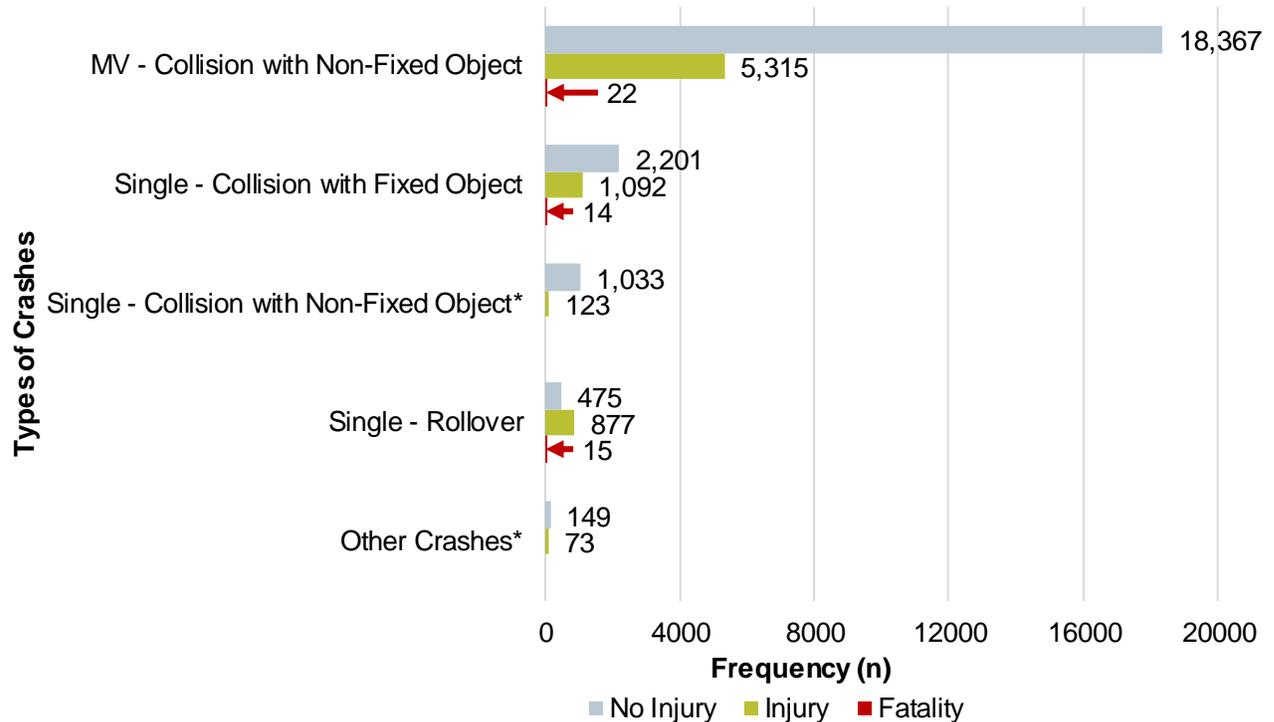


Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Figure 5 shows injury severity among teen drivers and passengers per 100,000 population related to motor vehicle crashes from 2016 to 2020. The rate of fatalities from 2016 to 2017 increased slightly from 13.9 (n=18) to 20.0 (n=26). From 2017 to 2020, the rate of fatalities decreased each year to 12.8 per 100,000 population in 2020. The rate of injuries slightly decreased each year from 2016 to 2019 with a significant decrease in 2020 (n=2,003). Over the five-year period, a total of 104 teens died. According to Nebraska Department of Transportation records, there was a 10% decrease in vehicle miles traveled in 2020. This decrease in miles traveled can be associated with the COVID-19 pandemic which in turn led to lower death and injury

rates in 2020. A comparison of 2021 and 2022 injury and death data will need to be made to see the trends after the 2020 pandemic and increase in miles traveled.

Figure 6. Crash Event and Injury Severity with Teen Occupants Involved in Nebraska, 2016-2020



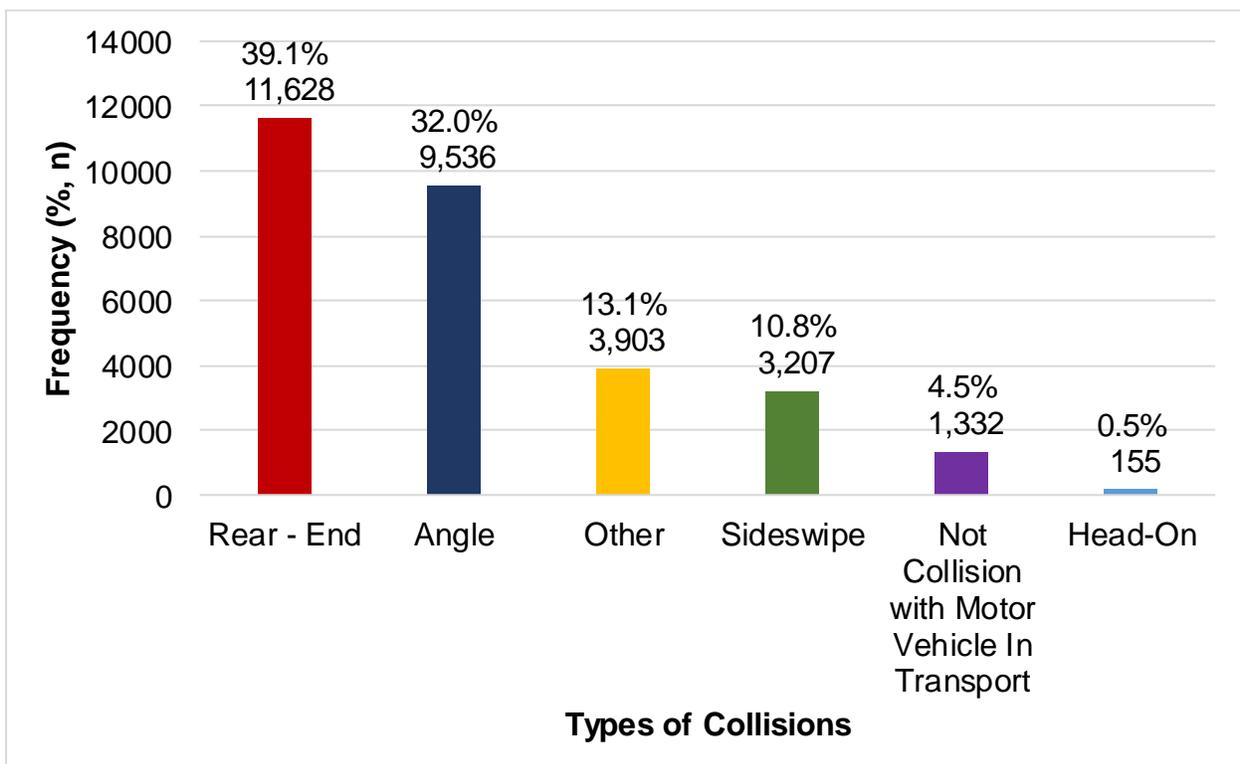
Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Notes: *MV=multi-vehicle. Other crashes included multi-vehicle collision with fixed objects, multi-vehicle rollovers, and other no collision crashes. Numbers less than five were suppressed.

Figure 6 displays the prevalence and distribution of injury severity by crash types for first harmful event among teen drivers from 2016-2020. Single-vehicle crash means any crash involving only one motor vehicle but does not involve the vehicle colliding with another moving vehicle. It includes rollovers and collisions with moving and stationary objects on or along the road. Multi-vehicle crashes refer to crashes involving at least but not limited to two motor vehicles.

Multi-vehicle collisions with non-fixed objects caused the highest prevalence of all injury types. Among these, no-injury crashes occurred 18,367 times, injury crashes occurred 5,315 times, and fatal crashes occurred 22 times. Most multi-vehicle collisions with non-fixed objects were motor vehicle-motor vehicle crash, leading to 17,239 no injury cases, 5,182 injury cases, and 22 fatalities. Single vehicle collisions with fixed objects had the second highest prevalence of all injury types; no-injury crashes occurred 2,201 times, injury crashes occurred 1,092 times, and fatal crashes occurred 14 times. Single vehicle rollover non-injury crashes occurred 475 times, injury crashes occurred 877 times, and fatality crashes occurred 15 times. Single-vehicle collisions with non-fixed objects non-injury crashes occurred 1,033 times, injury crashes occurred 123 times, and a fatality crash occurred one time.

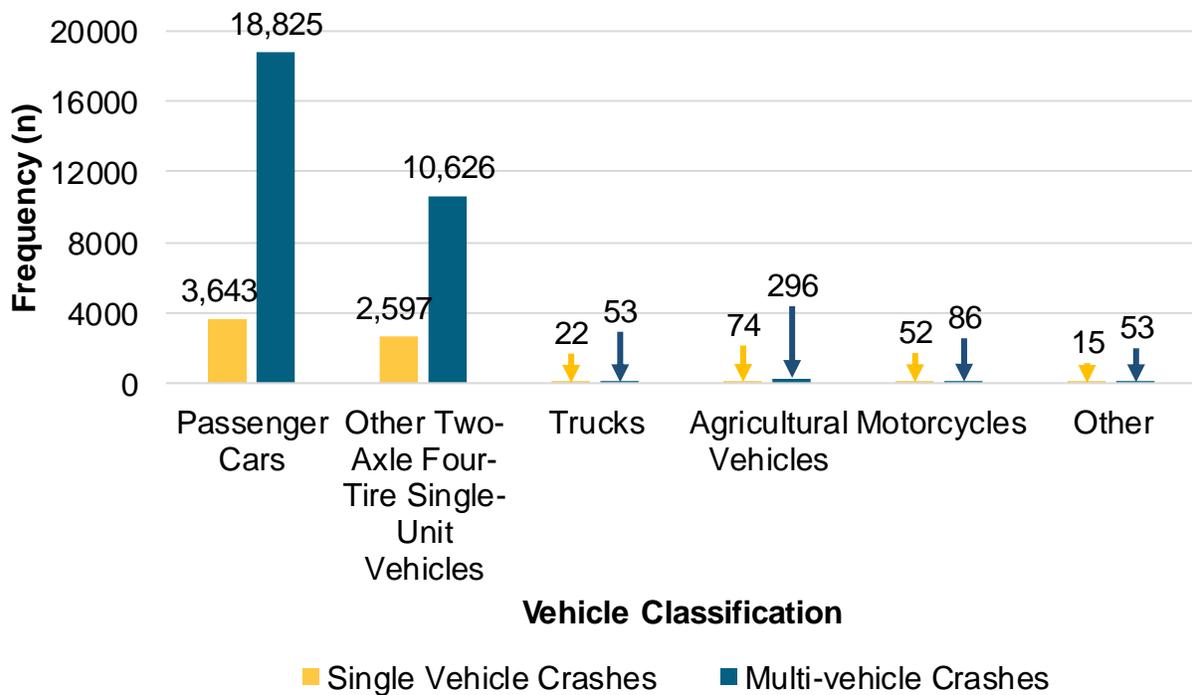
Figure 7. Type of Multi-Vehicle Collisions with Teen Drivers Involving in Nebraska, 2016-2020



Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020. Other includes left turn leaving, backing, and unknown.

Figure 7 displays the type of crashes involving teen drivers in multiple-vehicle crashes in Nebraska from 2016-2020. A total of 11,628 teen drivers were involved in a multi-vehicle crash that was a rear-end crash. The second highest prevalence was angle crashes involving 9,536 teen drivers. Other crash types including sideswipe, backing, head-on, and not with a motor vehicle in transport each had less than 15% of teen drivers involved. Among those, head-on collisions had the lowest prevalence at 155 occurrences and 0.5% of the total.

Figure 8. Types of Crashes by Vehicle Type among Teen Drivers in Nebraska, 2016-2020

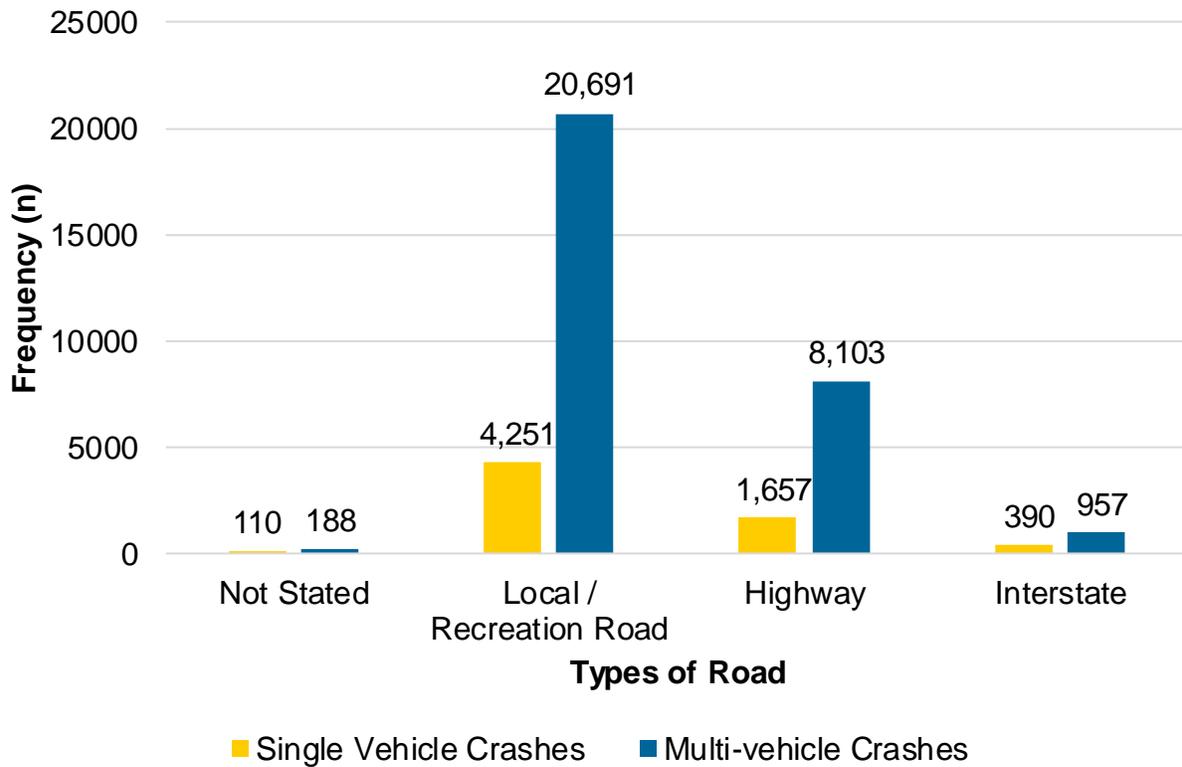


Notes: Vehicle classification follows Federal Highway Administration’s Rules. Passenger cars include coupes and sedans; Other two-axle four-tire single unit vehicles include vans, pickup trucks, and utility vehicles; Agricultural Vehicle includes ATV and farming equipment; Other includes motorhomes, limousines, and unknown vehicles.

Data source: Nebraska Department of Transportation Crash Data, 2016-2020.

Figure 8 shows the types of crashes by vehicle type among teen drivers in Nebraska from 2016 to 2020. Passenger cars (including both coupes and sedans) were involved in the most for both single and multi-vehicle crashes. Other two-axle four-tire single unit vehicles, such as vans and pickup trucks, were the second most in both crash categories.

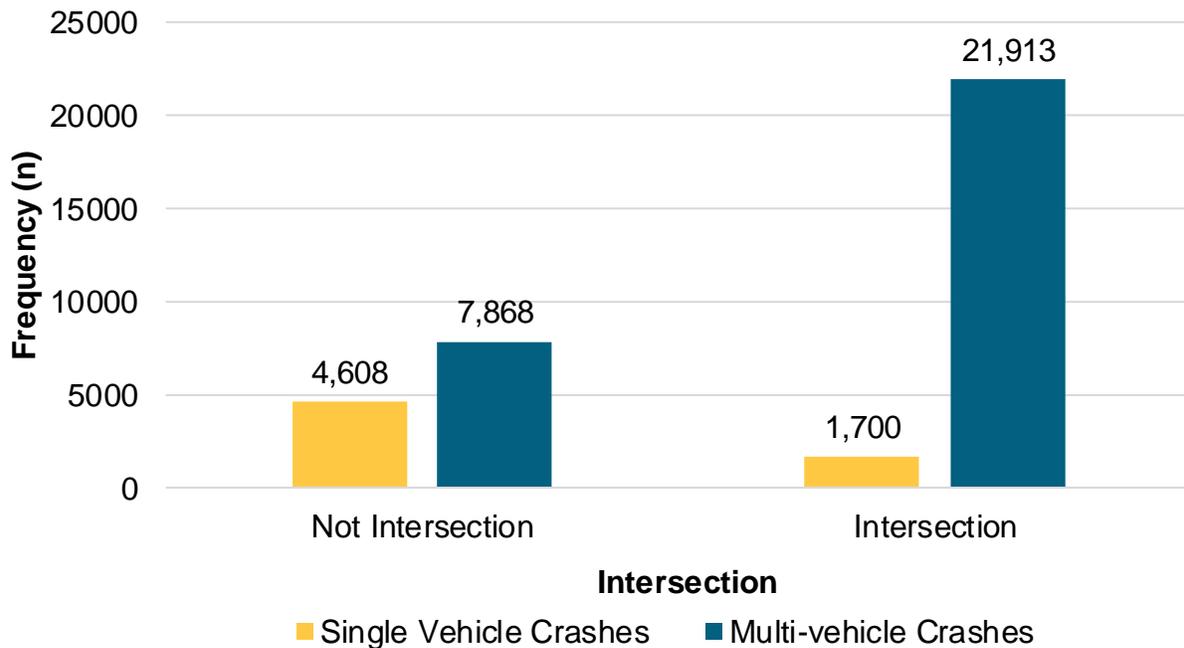
Figure 9. Crashes by Type of Roadway with Teen Drivers Involved in Nebraska, 2016-2020



Data source: Nebraska Department of Transportation Crash Data, 2016-2020.

Figure 9 displays the type of crashes by place of occurrence with teen drivers involved in Nebraska from 2016 to 2020. Crashes occurred most on local or recreation roads and accounted for 56.9% of all crashes (n=24,937). Highway crashes had the second highest frequency occurring 24.9% of the time for a total of 11,107 crashes. Crashes at an interstate have the lowest frequency occurring 4% of the time for a total of 298.

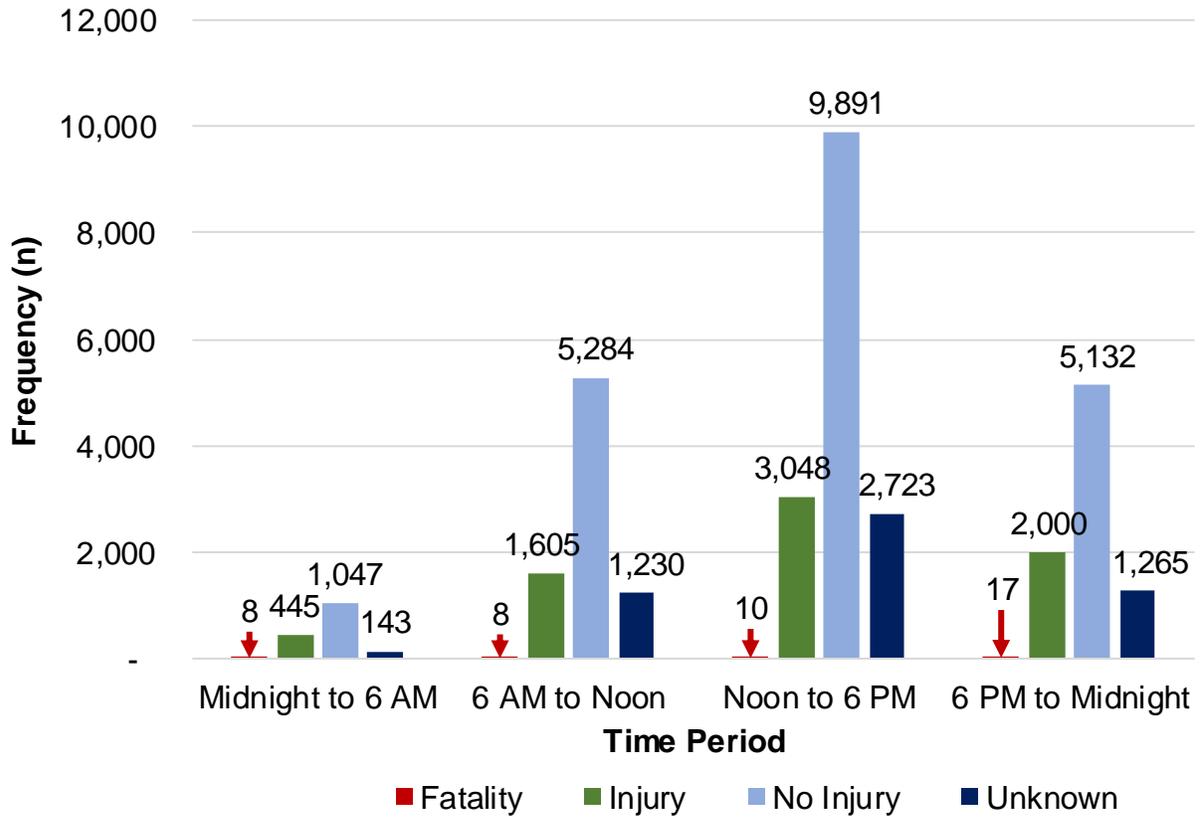
Figure 10. Type of Crashes by Intersection with Teen Drivers Involved in Nebraska, 2016-2020



Data source: Nebraska Department of Transportation Crash Data, 2016-2020.

Figure 10 displays the type of crashes by intersection involving teen drivers in Nebraska from 2016 to 2020. Crashes at intersections occurred much more frequently than at other locations. The leading cause of crashes at intersections was failure to yield right of way (n=4,379, 19% of intersection crashes). Other main causes of crashes at intersections included disregarding traffic signs, signals, or road markings (n=1,441), following too closely (n=2,573), and inattention (n=2,012). Multiple vehicle crashes occurred the most which accounted for 60.7% of all crashes (n=21,913). Multiple-vehicle crashes at a not-intersection area was the second highest frequency occurring 21.8% of the time and 7,868 times in total. Single vehicle crashes at an intersection have the lowest frequency occurring 4.7% of the time and 1,700 times in total.

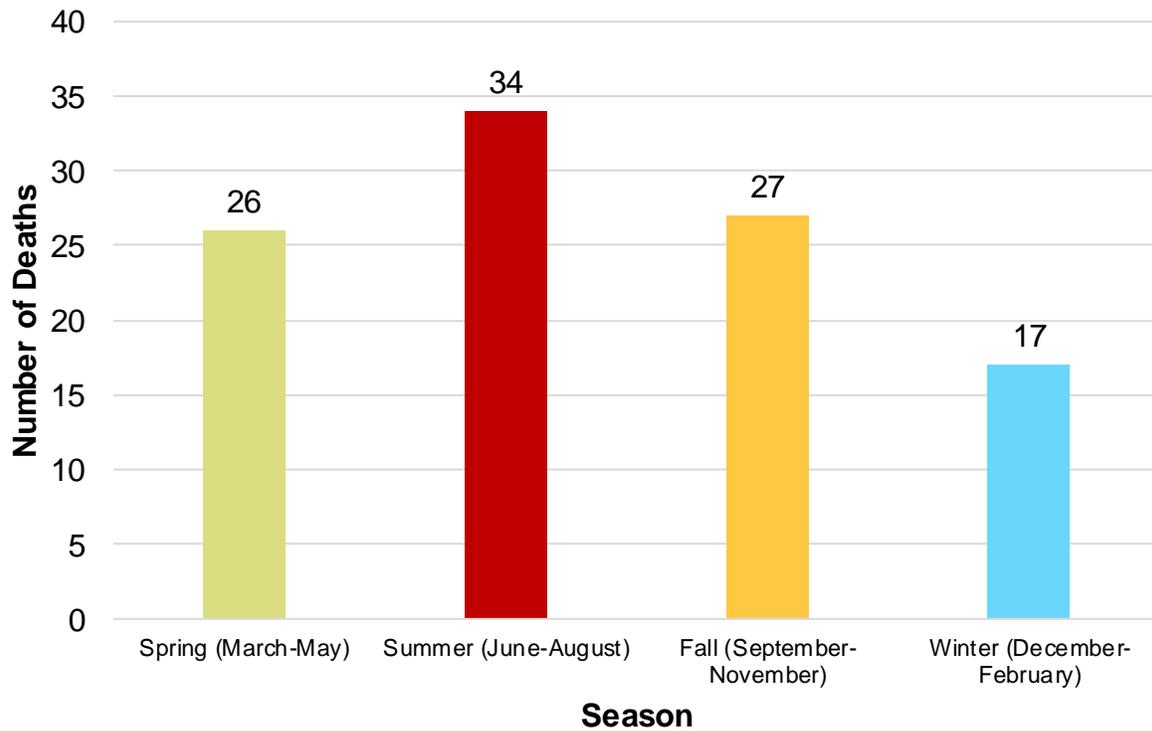
Figure 11. Crashes by Time Period with Injury Severity among Teen Drivers in Nebraska, 2016-2020



Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Teen-driver involved crashes can occur at any time during a day. Based on **Figure 11**, crash frequency follows the daily activity cycle which increases from early morning hours and reached peak in the late afternoon. Between 2016 and 2020, the highest three-hour time period of teen driver crashes was from 3 PM to 6 PM. However, fatal crashes were more prevalent in the evening with 17 teen drivers dying between 6 PM and midnight.

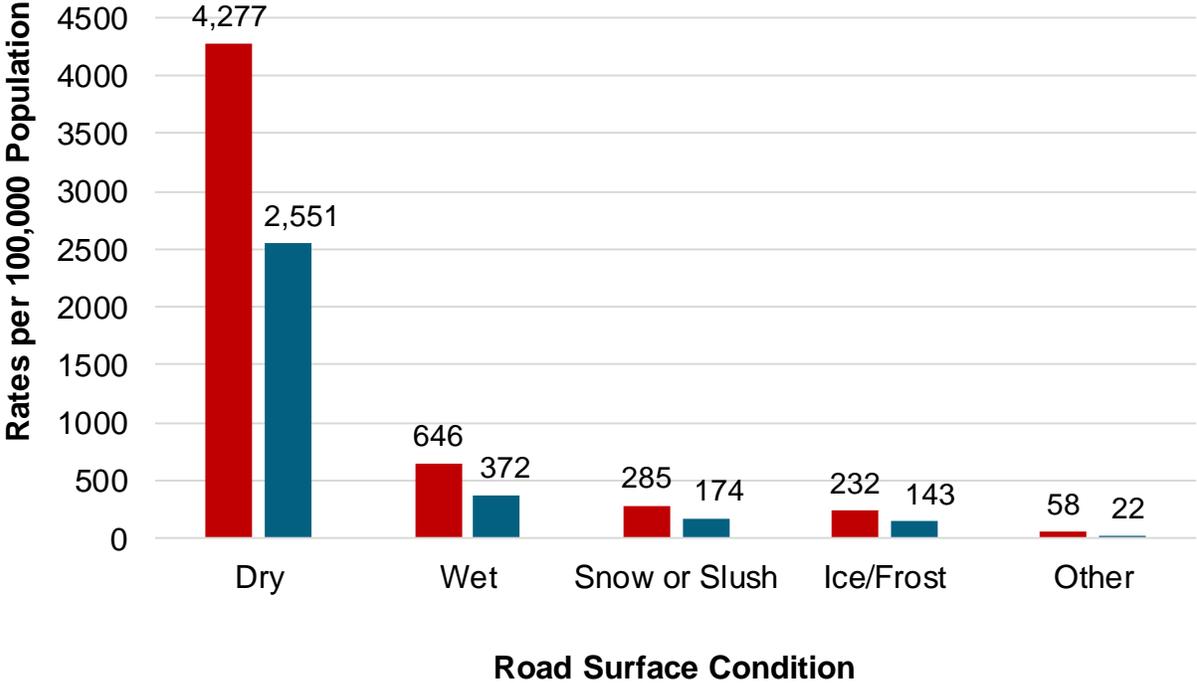
Figure 12. Teen Driver and Passenger Deaths by Season in Nebraska, 2016-2020



Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Figure 12 displays the distribution of teen driver and passenger deaths by season in Nebraska from 2016-2020. The most deaths occurred in the summer (June-August) with 34 cases. The second most deaths occur in the fall (September-November) with 27 deaths followed closely by spring (March-May) with 26 deaths. The fewest teen deaths occurred in the winter (December-February) with 17 cases.

Figure 13. Crashes by Road Surface Conditions among Teen Drivers (Aged 15-19) and Middle-Aged Adult Drivers (Aged 35-54) in Nebraska, 2016-2020

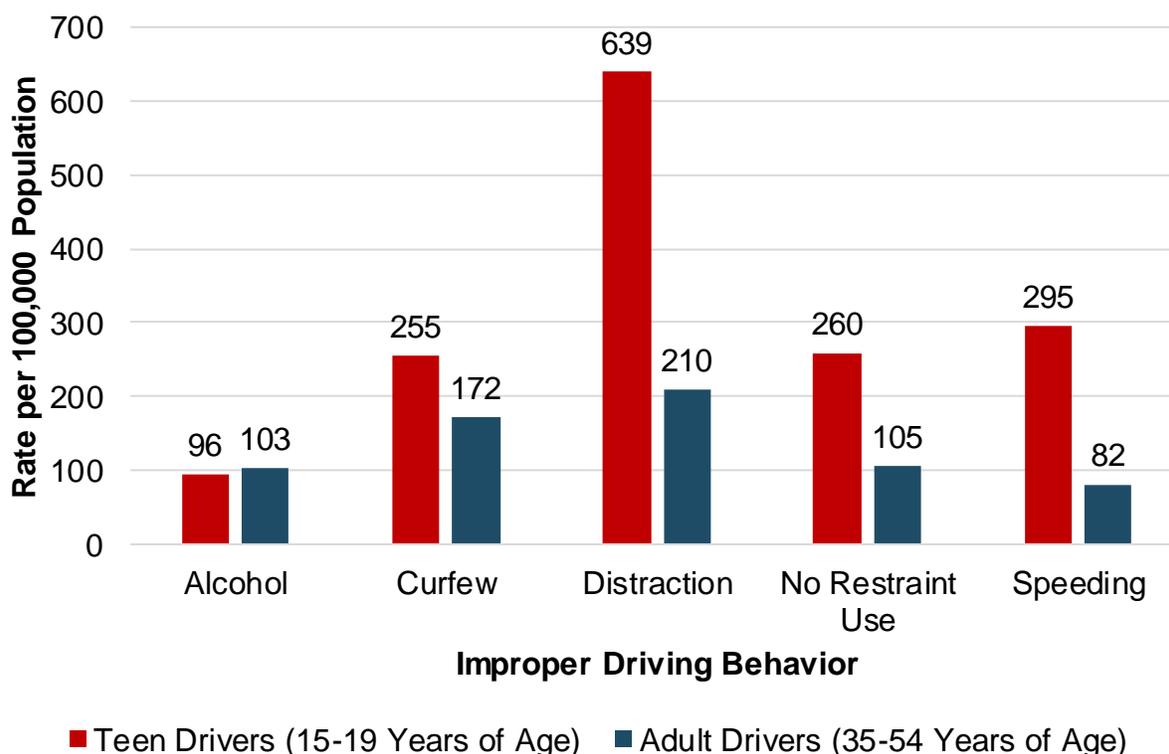


■ Teen Drivers (15-19 Years of Age) ■ Adult Drivers (35-54 Years of Age)

Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Figure 13 shows the rates per 100,000 population of crashes by road surface conditions comparing teen drivers (age 15 to 19) and middle-aged adult drivers (age 35-54) in Nebraska from 2016 to 2020. Teen drivers had higher rates of crashes compared to middle aged adults on any road surface conditions. Specifically, among those known road surface conditions, teen drivers had 1.74 times higher rates of crashes on a wet road compared to adults. The second highest rate difference was on dry roads with teen drivers having a 1.67 times higher rate than middle-aged adults. Similar rates were found on snow/slush and ice/frost road surfaces.

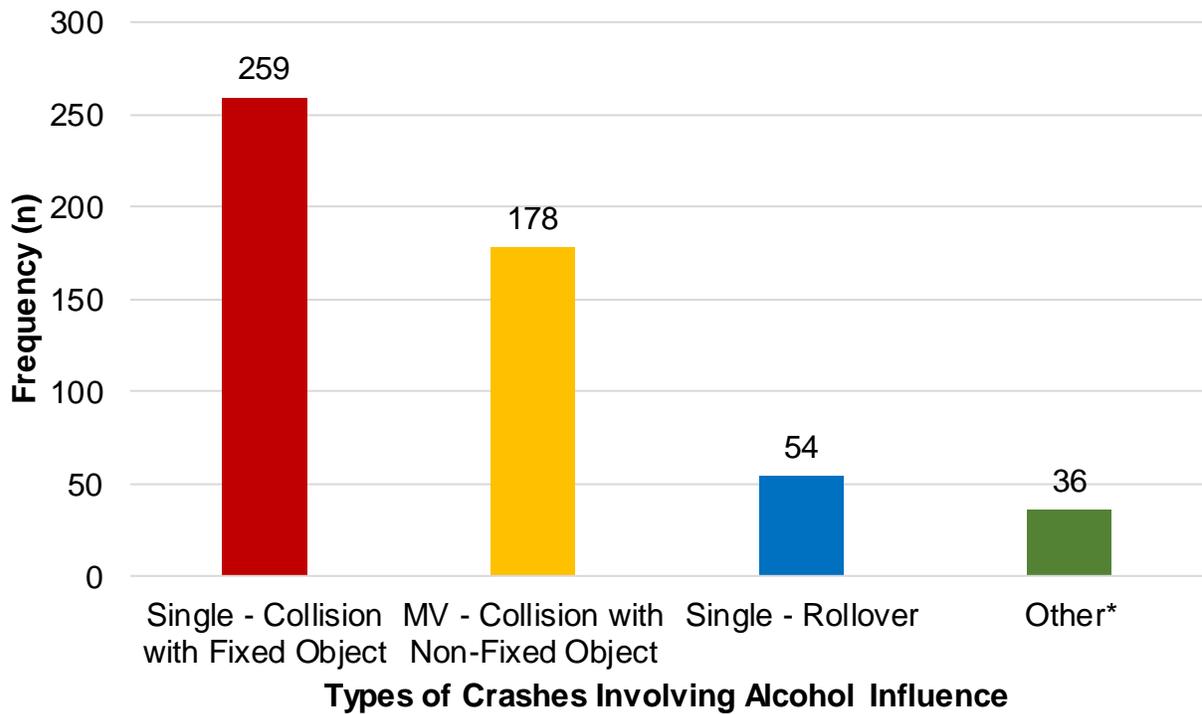
Figure 14. Crash Rates by Improper Driving Behaviors among Teen Drivers (Age 15-19) and Middle-Aged Adult Drivers (Age 35-54) in Nebraska, 2016-2020



Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Figure 14 compares the rates per 100,000 population of crashes by improper driving behaviors between teen drivers (age 15 to 19) and middle-aged adult drivers (age 35-54) in Nebraska from 2016 to 2020. Teen drivers had higher rates for the majority of improper driving behaviors (except driving under the influence of alcohol) compared to middle aged adults. Specifically, teen drivers are about three times more distracted while driving which resulted in a crash than middle-aged adult drivers. Teen driver crash rates when speeding was 3.6 times higher than the middle-aged adults. Statistics also showed teen drivers were found 2.5 times more often not using a restraint, compared to middle-aged adults. In Nebraska, the legal drinking age is 21 and there is a zero-tolerance law while driving. Although these laws are in place, teens had a crash rate of 95.8 in crashes involving alcohol use.

Figure 15. Crashes Related to Alcohol Influence among Teen Drivers and Passengers in Nebraska, 2016-2020

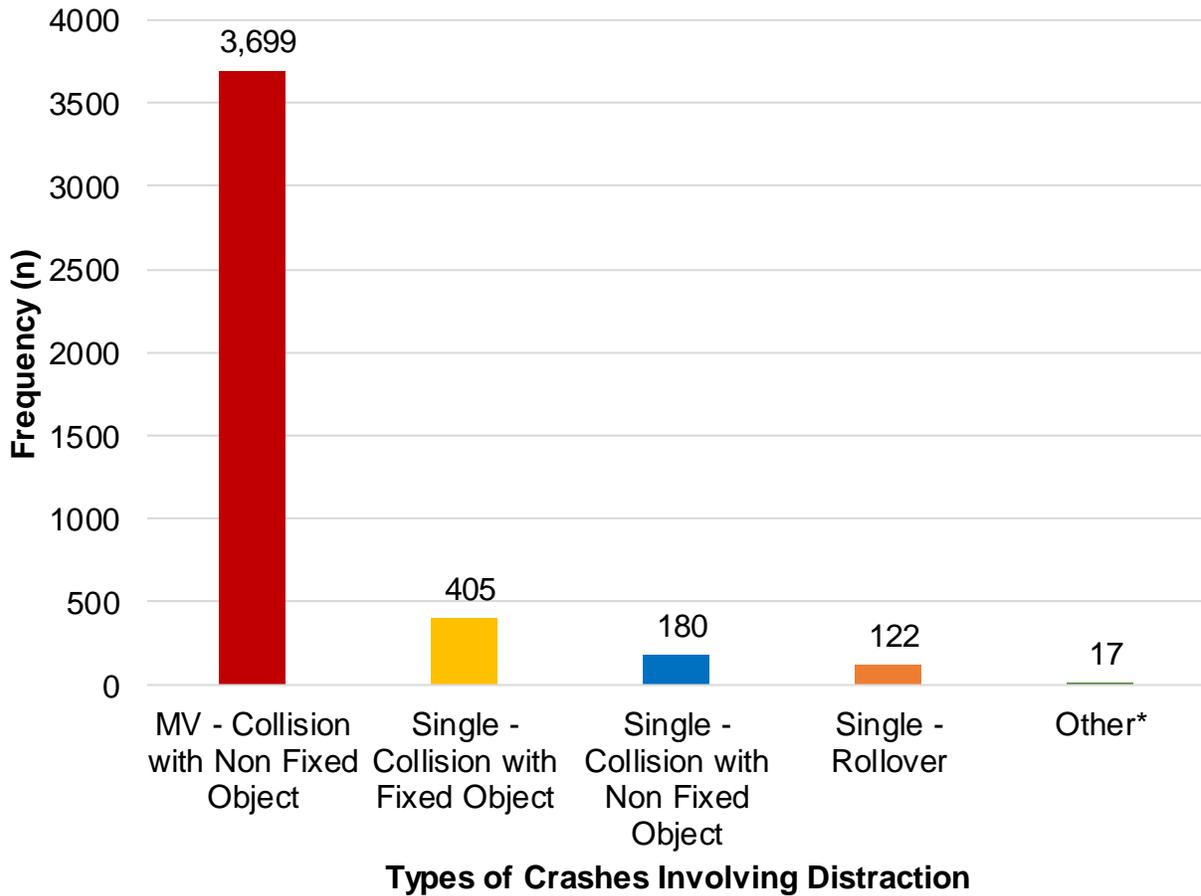


Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Notes: *Other crashes included multi-vehicle collision with fixed objects, multi-vehicle rollovers, single vehicle collision with non-fixed object, and other no collision crashes.

Figure 15 displays the frequency of crash types related to teens when at least one of the drivers or passengers was under the influence of alcohol in Nebraska from 2016-2020. The highest crash type is single-vehicle collisions with fixed objects which occurred 259 times. The next highest is multi-vehicle collisions with non-fixed objects which occurred 178 times. There were also 54 single vehicle rollovers in this five-year period. The remaining 36 crashes in the other category include single vehicle crashes-collision with non-fixed objects, multiple vehicle crashes-collision with fixed objects, and other crashes with non-collision.

Figure 16. Crashes Related to Distractions among Teen Drivers and Passengers in Nebraska, 2016-2020

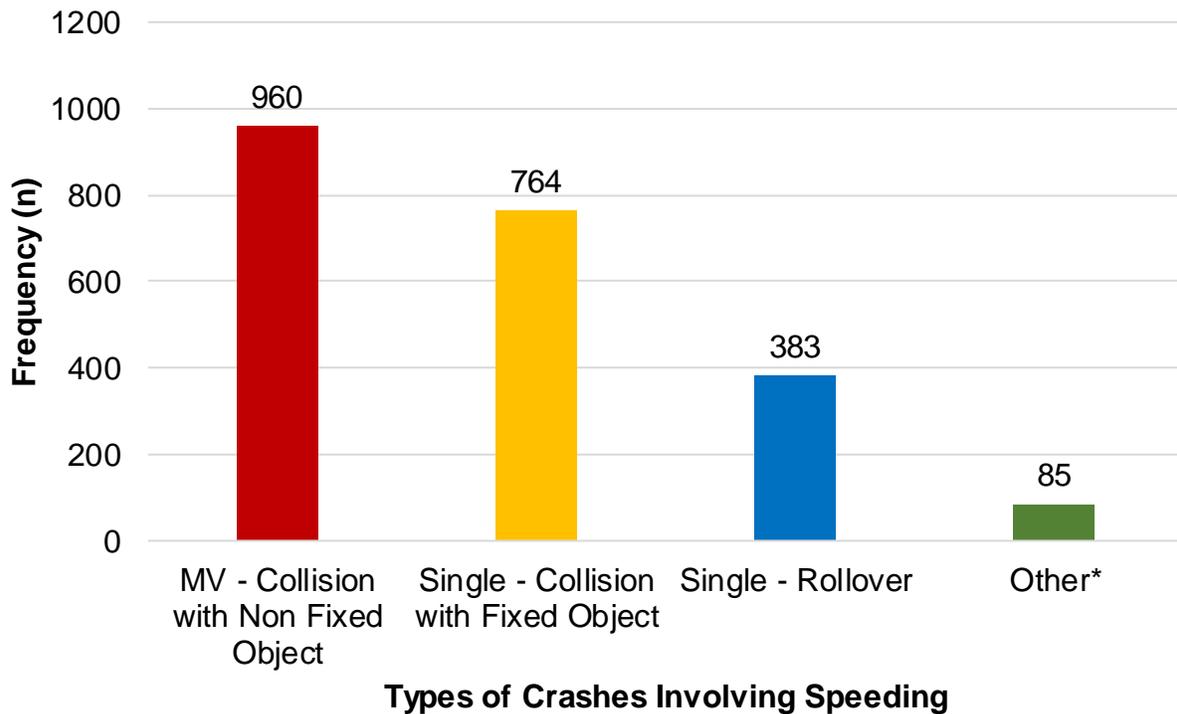


Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Notes: *Other crashes include multi-vehicle collision with fixed objects, multi-vehicle rollovers, and other no collision crashes.

Figure 16 displays the frequency of crash types related to teens when driving distracted (inattention, mobile phone, passenger, or other type) was a factor. The most frequent crash type is multi-vehicle collisions with non-fixed objects which occurred 3,699 times. The next highest is single-vehicle collisions with fixed objects which occurred 405 times. Single vehicle collisions with non-fixed objects occurred 180 times followed by single vehicle rollovers with 122 occurrences. The remaining 17 crashes in the other category include single vehicle crashes-collision with non-fixed objects, multiple vehicle crashes-collision with fixed objects, and other crashes with non-collision.

Figure 17. Crashes Related to Speeding among Teen Drivers and Passengers in Nebraska, 2016-2020



Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Notes: *Other crashes include multi-vehicle collision with fixed objects, multi-vehicle rollovers, single vehicle collision with non-fixed object, and other no collision crashes.

Figure 17 displays the frequency of crash types related to teens when speeding (too fast for certain conditions, exceeding authorized speed limit) in Nebraska from 2016-2020. The most frequent crash type is multi-vehicle collisions with non-fixed objects which occurred 960 times. The next highest is single-vehicle collisions with fixed objects which occurred 764 times. Single vehicle rollovers occurred in 383 instances. Other crashes occurred the least with 85 instances; this category includes multi-vehicle crash collisions with fixed objects, single-vehicle crash collisions with non-fixed object and other non-collision crashes.

Figure 18. Restraint Use by Year among Teen Drivers Involved in Crashes in Nebraska, 2016-2020

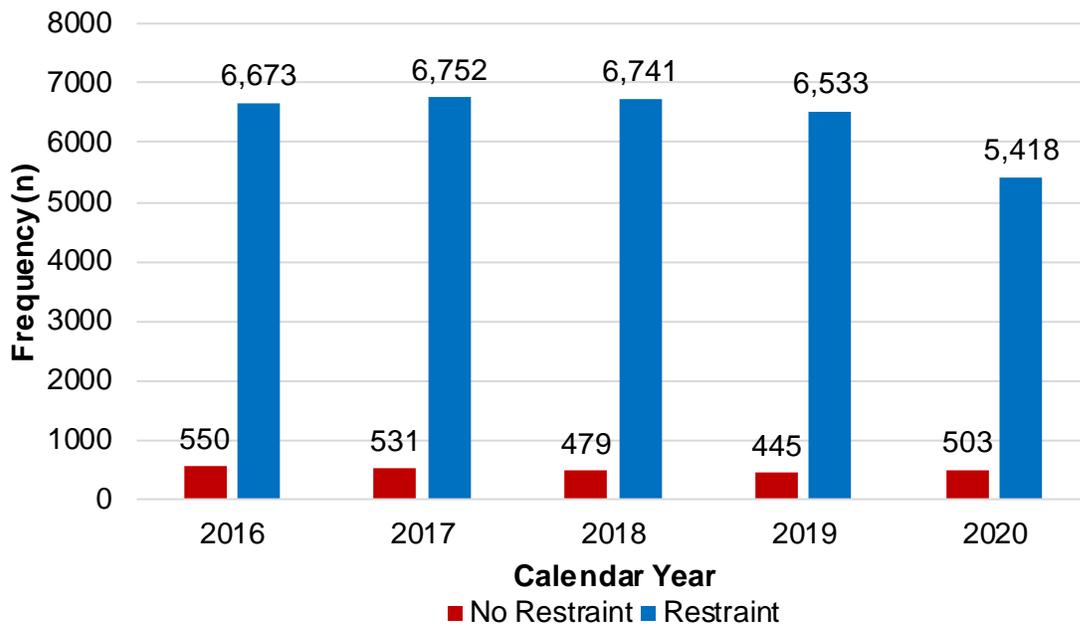
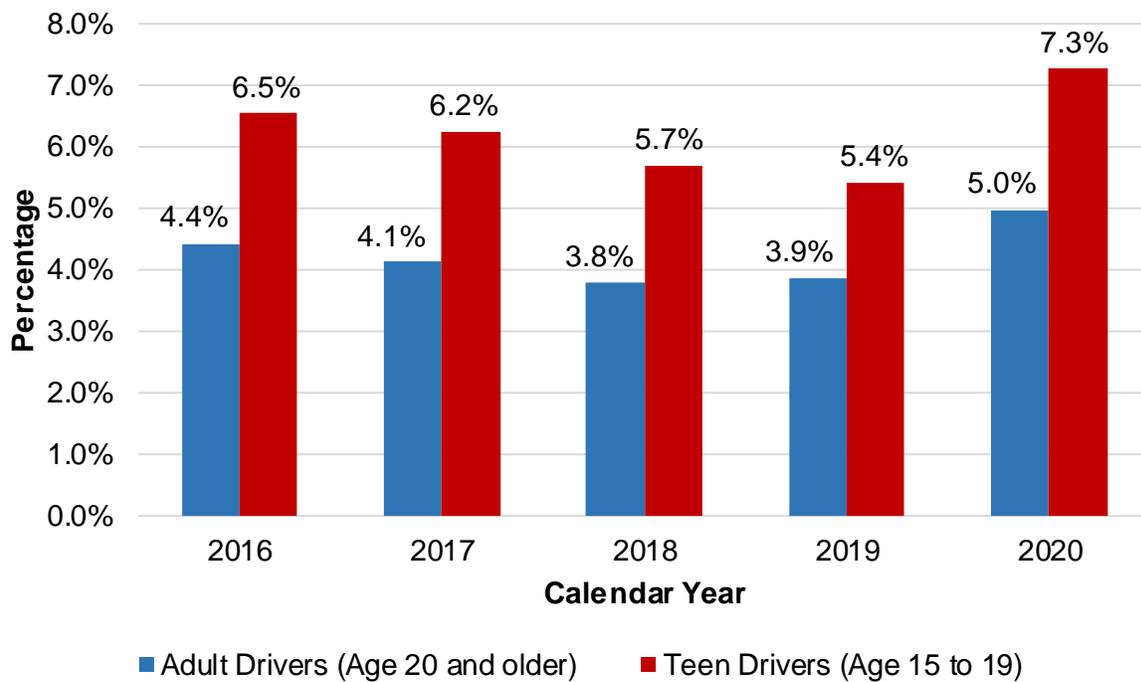


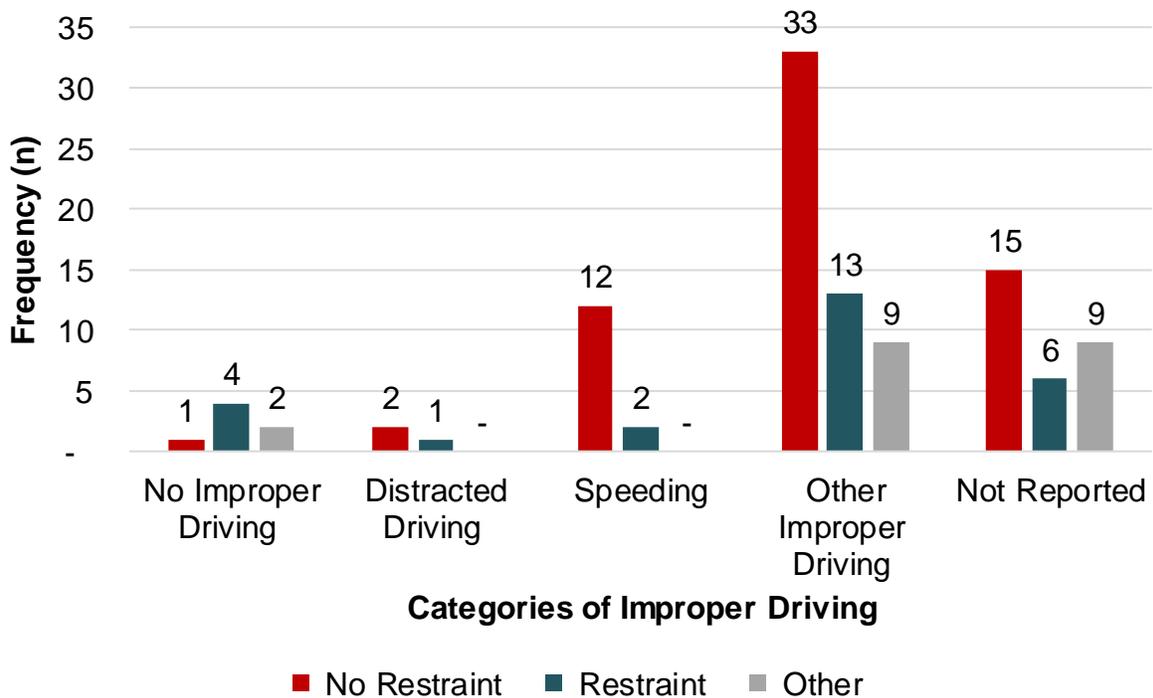
Figure 19. Percentage of Non-Restraint Use by Teen Drivers Compared to Adult Drivers Involved in Crashes in Nebraska, 2016-2020



Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Figures 18 displays the status of restraint use among teen drivers in Nebraska from 2016-2020 when in a crash. In **Figure 19**, the percentage of seat belt use between teen and adult drivers was compared. For every year examined, teen drivers used restraints less frequently than adult drivers when involved in a crash. From 2016 to 2019, the percent of teen drivers who did not use a restraint when involved in a crash declined, then increased in 2020 reaching its highest percentage of 7.3%. Considering miles traveled by teens and adults resulted in fewer crashes in 2020 due to COVID, non-restraint use was at its highest for both. This follows the overall trend in increased improper driving nationally which includes speeding, aggressive driving and distractions.

Figure 20. Causes of Fatality among Teen Drivers and Passengers in Nebraska 2016-2020

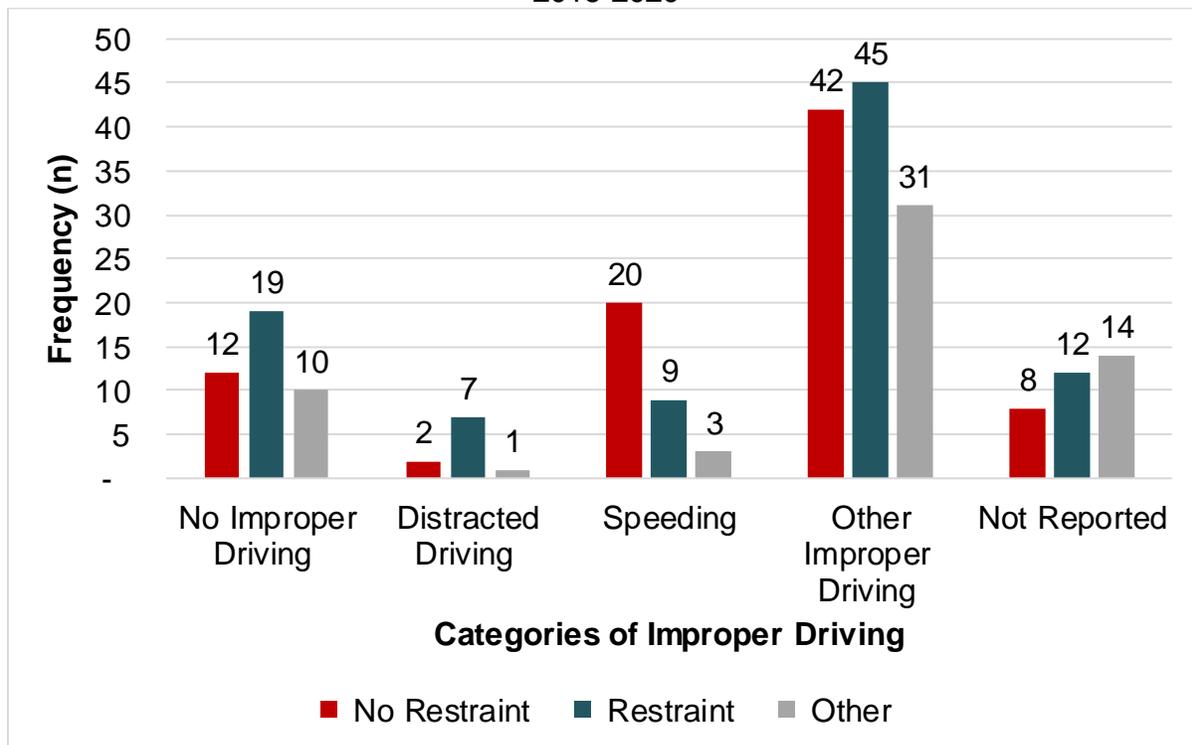


Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Figure 20 displays the frequency of teen driver and passenger deaths in Nebraska from 2016 to 2020 by improper driving categories with their restraint use status included. Most fatalities were caused by improper driving behaviors (72 cases, 66%). More importantly, among fatal crashes with improper driving behavior indicated, 61% of

vehicle occupants (47 cases) were unrestrained which contributed to a significantly higher number of deaths. Other improper driving had the highest fatality and includes teen drivers who failed to yield right of way; disregarded traffic signs, signals, or road markings; made an improper turn; drove on the wrong side of road; followed other vehicles too closely; or failed to keep in lane (n=24) between 2016 and 2020.

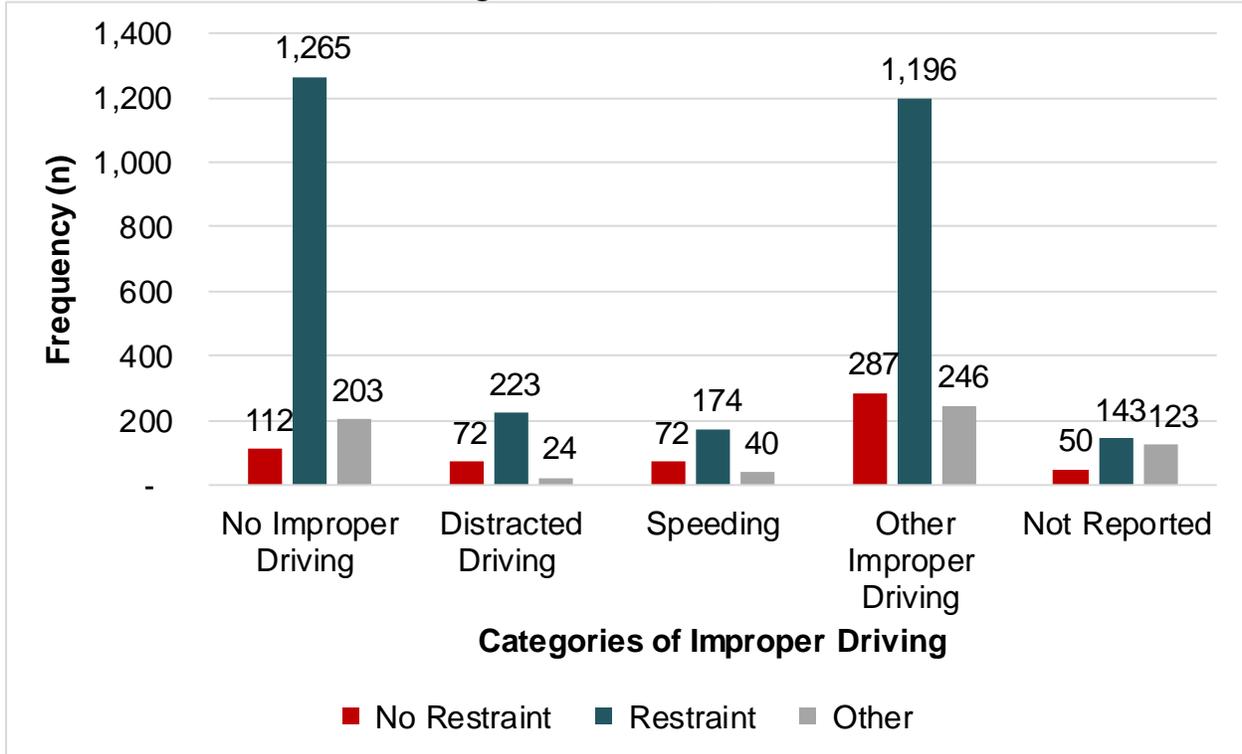
Figure 21. Causes of Hospitalization among Teen Drivers and Passengers in Nebraska 2016-2020



Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

Similar to the findings from Figure 20, **Figure 21** shows that most teen occupant hospitalizations were led by improper driving behaviors (160 cases, 68%). Among the cases where improper driving behavior was involved, 36% of the vehicle occupants were not using a seat belt when the crash occurred.

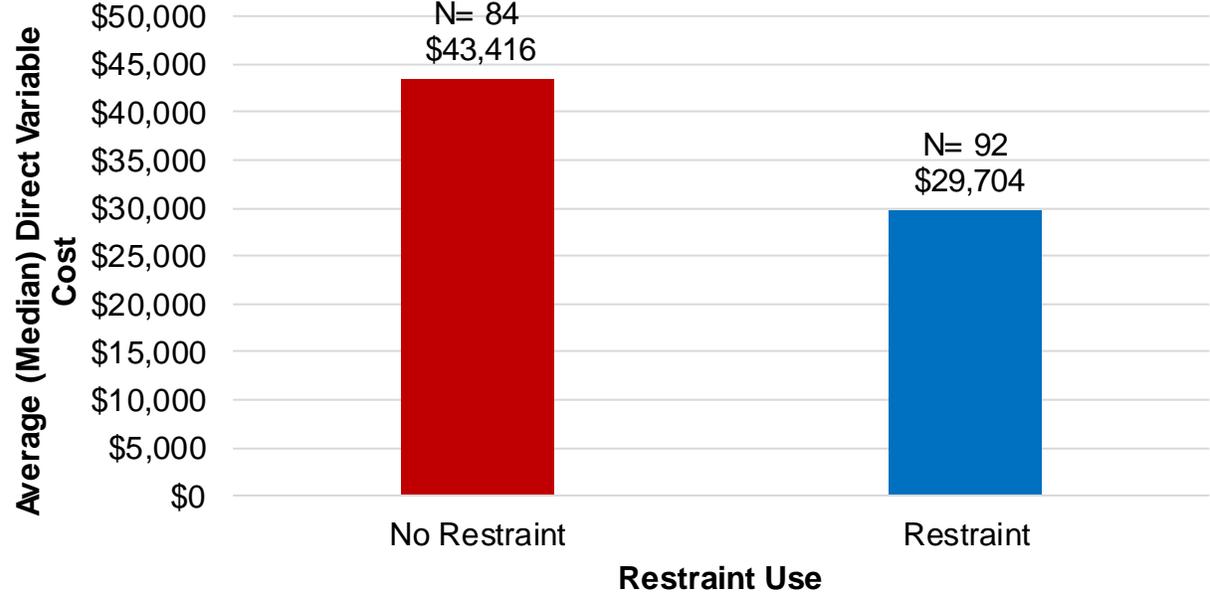
Figure 22. Causes of Outpatient and Emergency Room Visits among Teen Drivers and Passengers in Nebraska, 2016-2020



Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020.

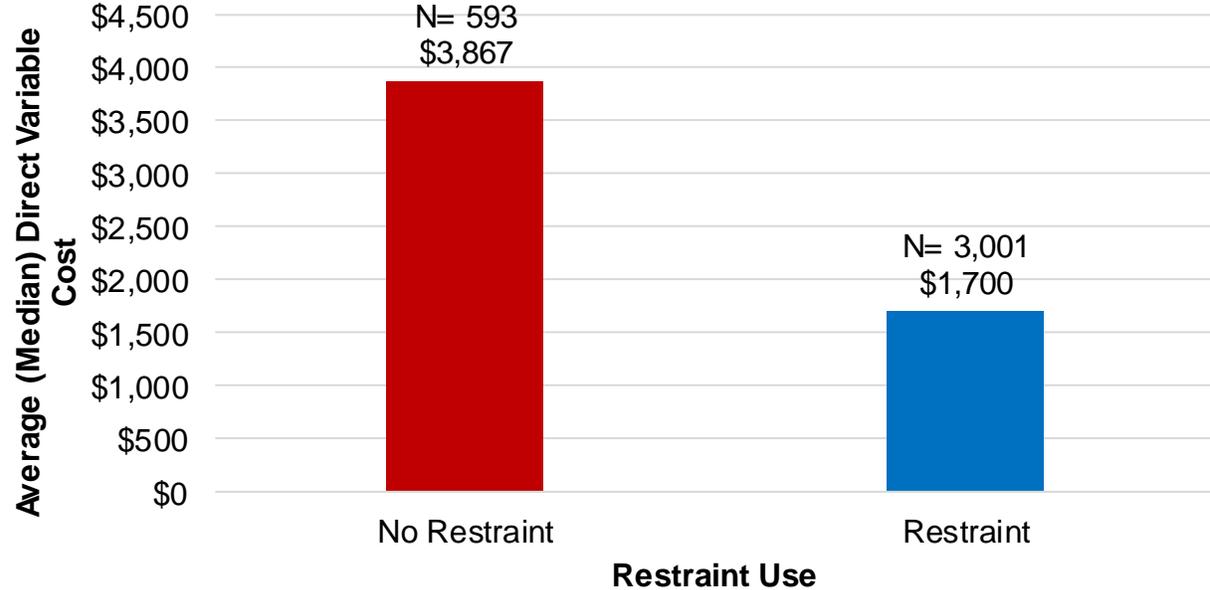
Figure 22 displays the frequency of teen driver and passenger emergency department visits after a crash in Nebraska from 2016 to 2020. Comparing fatality and hospitalization data to emergency department (ED) visits, the percentage of teen occupant ED visits due to improper driving behaviors was 55% (2,334 cases). However, crashes with improper driving behaviors still contributed to the majority of ED visits. A significantly higher number of teen occupants needing an ED visit after a crash were using a restraint compared to those not using a restraint in Figures 20 and 21. This finding suggests that proper restraint use prevents teen occupants from more serious injury or death when a crash happens.

Figure 23. Average (Median) Inpatient Direct Variable Cost by Restraint Use Among Teen Drivers and Passengers in Nebraska, 2016-2020



Data source: Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020; Nebraska Hospital Discharge Data, 2016-2020.

Figure 24. Average (Median) Outpatient Direct Variable Cost by Restraint Use Among Teen Drivers and Passengers in Nebraska, 2016-2020

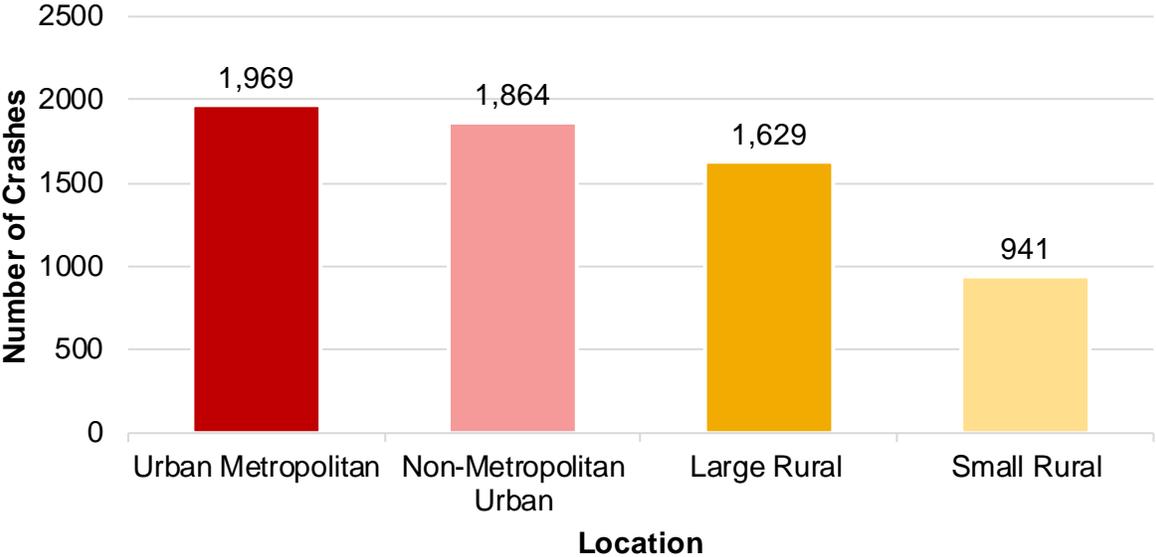


Data source: Nebraska Crash Outcomes Data Evaluation System (CODES), 2016-2020; Nebraska Hospital Discharge Data, 2016-2020.

Figures 23 and 24 show that non-restraint use by teen drivers and passengers involved in a crash led to higher medical costs. In general, although there were more restrained occupants admitted to the hospital or emergency department after a crash, teen occupants not using a seat belt had at least 1.5 times higher medical costs compared to occupants using a restraint. Among the eighty-four teen occupants not using a seat belt who had an inpatient visit, the median/mean direct variable cost was \$43,415 and \$91,677, respectively. The sum/total direct variable cost for these teen occupants is \$7,700,915 with an average length of stay of 5.78 days. A total of ninety-two teenage drivers who used a restraint had a median/mean direct variable cost of \$29,703 and \$58,239, respectively. The sum/total of direct variable cost for these teen drivers was \$5,358,033 with an average length of stay of 4.46 days.

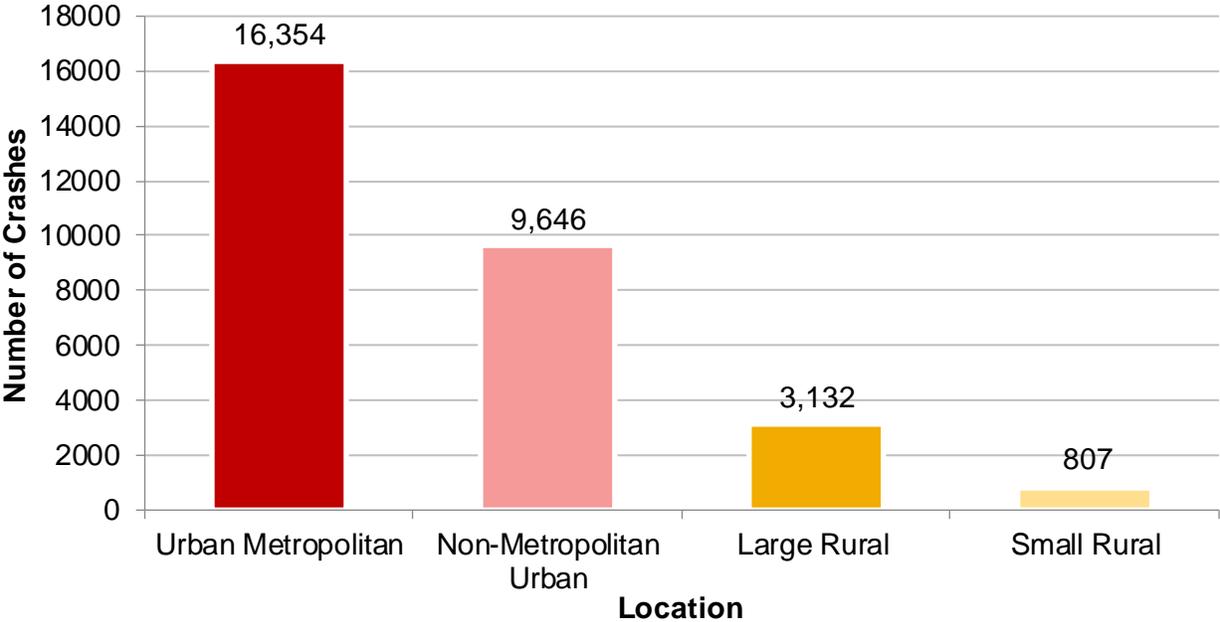
A total of 593 no restraint teen drivers had an outpatient visit. The median and mean direct variable cost is \$3,867 and \$6,199, respectively. The sum of direct variable cost for these 593 teen drivers is \$3,676,298. A total of 3,001 teen drivers who used a restraint had an outpatient visit. The median and mean direct variable cost were \$1,700 and \$362, respectively. The sum of direct variable cost for these 3,001 teenage drivers is \$10,877,700.

Figure 25. Single Vehicle Crashes Involving Teen Drivers by Location, Nebraska, 2016-2020



Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska-U.S. Census Bureau data, 2020.

Figure 26. Multiple Vehicle Crashes Involving Teen Drivers by Location, Nebraska, 2016-2020



Data source: Nebraska Department of Transportation Crash Data, 2016-2020; Nebraska-U.S. Census Bureau data, 2020.

Figures 25 and 26 displays the Census urban/rural regions and frequency of vehicle crashes involving teen drivers in Nebraska from 2016-2020. Metropolitan counties had higher total numbers for both single and multiple vehicle crashes compared to rural counties. **Figure 25** specifically displays single vehicle crashes by locations in Nebraska. Urban metropolitan has the highest frequency of single vehicle crashes occurring 30.8% of the time and 1,969 times in total. Non-metropolitan urban has the second highest frequency occurring 29.1% of the time and 1,864 times in total. Large rural has the third highest frequency occurring 25.4% of the time and 1,629 times. Small rural has the lowest frequency occurring 14.7% of the time and 941 times.

Figure 26 displays the location and frequency of multiple vehicle crashes involving teen drivers in Nebraska from 2016-2020. Multiple vehicle crashes occurred the most in urban metropolitan areas; they accounted for 54.6% of all multiple vehicle crashes and occurred 16,354 times. Non-metropolitan urban has the second highest frequency at 32.2% and occurring 9,646 times. Large rural areas have the third highest frequency at 10.5% and occurring 3,132 times. Small rural areas have the lowest frequency at 2.7% and occurring 807 times.

Although urban areas had more teen driver involved crashes than rural areas in Nebraska between 2016 and 2020, the single vehicle crashes rates per 100,000 population for rural areas were higher than urban areas. The crash rate per 100,000 population for single vehicle crashes in rural areas is 389 vs. 294 in urban areas. However, the multi-vehicle crashes rates per 100,000 population is higher in the urban area (1,787) compared to rural (597).

Table 1. Top Ten Nebraska Counties of Teen Driver and Passenger-Involved Crash Rates by Vehicle Miles Traveled, 2016-2020

Overall Crash				Improper Driving Related Crash				Speeding Related Crash				Distraction Related Crash			
County	Miles	Freq	Rate	County	Miles	Freq	Rate	County	Miles	Freq	Rate	County	Miles	Freq	Rate
Scotts Bluff	1,503.2	846	56.3	Box Butte	493.7	84	17.0	Box Butte	493.7	30	6.1	Platte	1,682.6	157	9.3
Adams	1,231.5	677	55.0	Scotts Bluff	1,503.2	225	15.0	Adams	1,231.5	56	4.5	Scotts Bluff	1,503.2	137	9.1
Platte	1,682.6	880	52.3	Platte	1,682.6	243	14.4	Madison	1,530.5	68	4.4	Box Butte	493.7	44	8.9
Madison	1,530.5	763	49.9	Saline	599.5	85	14.2	Scotts Bluff	1,503.2	66	4.4	Saline	599.5	49	8.2
Lancaster	12,612.4	6,196	49.1	Adams	1,231.5	168	13.6	Platte	1,682.6	68	4.0	Adams	1,231.5	98	8.0
Saline	599.5	287	47.9	Madison	1,530.5	178	11.6	Colfax	644.7	24	3.7	Dodge	1,834.2	138	7.5
Douglas	22,621.1	10,786	47.7	Dodge	1,834.2	213	11.6	Dawes	483.8	17	3.5	Phelps	568.9	42	7.4
Sarpy	6,922.9	3,137	45.3	Hall	3,449.5	388	11.2	Saline	599.5	21	3.5	Red Willow	557.5	41	7.4
Hall	3,449.5	1,562	45.3	Brown	213.9	24	11.2	Saunders	1,258.1	42	3.3	Lincoln	3,220.6	234	7.3
Box Butte	493.7	209	42.3	Phelps	568.9	61	10.7	Dodge	1,834.2	60	3.3	Hall	3,449.5	237	6.9
Statewide	101,475.3	35,859	35.3	Statewide	101,475.3	6,904	7.5	Statewide	101,475.3	1,917	1.9	Statewide	101,475.3	4,071	4.0

Data source: Nebraska Department of Transportation County Level Vehicle Miles Travel, 2016-2020.

Table 1 presents crash rates by counties vehicle miles traveled in four different categories (overall crash, improper driving, speeding and distraction). Listed are the top 10 counties crash rates compared to the overall state rate. Scotts

Bluff, Box Butte and Platte counties rank in the top 10 in at least three categories of either overall crash, improper driving, speeding and distraction. In overall crashes, Scotts Bluff County had a 1.6 higher rate compared to the state rate. Box Butte County had the highest rates in improper driving and speed related crashes compared to the other two counties and the state. Platte ranked highest in distraction related crashes.

Based on the findings in Table 1, a targeted approach can be taken to implement evidence-based strategies in communities with high rates of teen motor-vehicle related crashes, injuries and deaths. The following section outlines proven policies, programming and recommendations to effectively address the overrepresentation of teens in motor vehicle crashes.

Solutions to Decrease Teen-related Motor Vehicle Crashes

Current teen traffic safety initiatives in Nebraska include a variety of evidence-based practices starting with the long-standing Graduated Driver Licensing (GDL) system and driver's education. In addition, peer-to-peer education in schools, education in communities through local health departments and safety organizations, parent outreach, alcohol and impaired driving education, alcohol compliance retail checks and messaging (social media, billboards) have been deployed over the years. Below are evidence-based solutions addressing teen traffic safety that are known to make an impact. Nebraska has many of these evidence-based practices in place but improvements of current GDL driving provisions and spread of educational programming is necessary to further reduce teen-related motor vehicle crashes.

Comprehensive GDL (Graduated Driver Licensing) Laws

Every state, including Nebraska, has GDL provisions in place. These provisions have significantly reduced teen crash rates. States with the most comprehensive GDL provisions see reductions of all types of crashes for teen drivers. According to the Insurance Institute for Highway Safety (IIHS) GDL calculator, if Nebraska implemented the best practices in GDL components including primary enforcement, it is estimated that there would be a 27% reduction in collision claims and 45% fewer fatal crashes.

Best practice GDL laws include:

- Primary enforcement (seat belt, use of cell phone/electronic device)
- No drive time between 10 PM-6 AM
- Zero to one passenger until age 17
- Driver education
- Full license at age 18

Parental Involvement

According to the Children's Hospital of Philadelphia Center for Injury Research and Prevention, involved parents who set rules and monitor their teens' driving behavior in a supportive way can lower their teens' crash risk by half. Parents can be engaged by

using a parent-teen driving agreement; increasing their understanding of GDL provisions; enforcing current GDL laws; and role modeling safe driving behaviors such as wearing a seat belt and obeying traffic laws. Communication and connectedness between parent and teen can create trust and understanding leading to better compliance of teen driver laws and safer driving. The Nebraska Parent's Drive the Message Program provides educational resources to parents, schools, law enforcement, physicians and traffic safety advocates on GDL licensing, driving provisions and driving agreements.

Community and School Engagement

Peer-to-Peer Education

Peer-to-peer education is an intervention in which teens develop and deliver messages to their peers in order to create awareness, increase knowledge, and change behaviors; it can help create cultural norms around safe driving. One such program, Teens in the Driver Seat, is a school-based program that focuses solely on traffic safety and addresses the most common risks to teens:

- driving at night
- distractions (passengers, cell phone)
- speeding
- not wearing a seat belt
- impaired driving.

Since implementation in Nebraska schools across the state, sixteen of the seventeen driving behaviors surveyed have shown improvement. In addition, eight of the indicators have seen statistically significant improvements. This type of program can create school connectedness and engagement by involving all types of students in outreach efforts, creating positive peer influence, and providing connections to caring adults.

FCCLA FACTS

The FCCLA (Family, Career and Community Leaders of America) Families Acting for Community Traffic Safety (FACTS) program gives members the information and incentives they need to build an understanding of what it means to drive safely, both

today and in the future. Through their projects, members work to educate adults and peers about traffic safety and support enforcement of local rules and regulations. FCCLA members are given the tools to help families promote basic safety attitudes that can last a lifetime.

FACTS Essential Topics

- People - to understand and promote your role as a driver or passenger and keep yourself and others safe
- Vehicles - to understand vehicle safety and the role it plays in safety for you and others
- Roads - to understand and promote your role on the road as well as the safety hazards you may encounter and how to avoid or react to them

Power of Parents and Power of Youth

MADD's Power of Parents and Power of Youth programs work to reduce underage drinking and substance youth through educational programming.

Power of Parents focuses on encouraging parents or trusted adults to have the conversation about alcohol/drugs with their middle school and high school students. Research shows 74% of teens still say their parents are the biggest influence on their choice to use substances underage. The program uses both a presentation and handbook to allow parents to become educated on both the why and how of having these important conversations with their teens.

Power of Youth works to empower teens to make the choice to not drink underage or use drugs. Instead of focusing on scare tactics the program educates through facts and science. It also recognizes the unique challenges facing our teens today. Using both interactive presentations and activities, MADD encourages students to become a positive influence among their peers, leading in the choice to not use substances.

Community Policing- Safety Programs

The Nebraska State Patrol Community Policing Services is a partnership between law enforcement agencies and the communities they serve. Community Policing focuses on problem identification and solving. Troopers assigned, work closely with schools, businesses, organizations and groups to focus on fatality reduction efforts and crime prevention. With a goal to reduce the state's fatality rate to one fatality per 100 million vehicle miles driven, the Nebraska State Patrol utilizes a variety of tools including the Rollover Simulator, Seat Belt Convincer and Distracted Driving Simulator as well as an assortment of safety related programs.

Other Community Involvement

Other community involvement includes local health departments and safety organizations conducting activities in their community through messaging/billboard/social media contests, educational outreach and presentations. Many of the activities conducted across the state are supported through funding from the Nebraska Department of Transportation-Highway Safety Office.

Driver's Education

A study of more than 150,000 Nebraska teen drivers was conducted by the Nebraska Prevention Center for Alcohol and Drug Abuse at the University of Nebraska-Lincoln. The study compared teens who took driver education courses to those that logged 50 hours of supervised driving. Results showed teens that took driver education courses were less likely to be involved in crashes or to commit traffic violations during their first two years of driving compared to teens who completed 50 hours of practice driving under the supervision of a parent or other adult. Approximately 50% of Nebraska young drivers take a driver education course leaving another 50% not accessing this safety resource. Consideration into possible barriers in accessing driver's education needs to be examined such as cost, transportation and accessibility (internet, geography).

In Car Technology

According to the Insurance Institute for Highway Safety, crash avoidance features and teen-specific technologies in vehicles have the potential to prevent or mitigate up to three-quarters of fatal crashes involving teen drivers if widely used. Per mile driven, teen drivers are nearly 4 times as likely to crash as drivers age 20 and older and more likely to be involved in a fatal crash than any age group except those age 80 and above. Teen drivers are not as good at recognizing hazards and controlling the vehicle compared to more experienced drivers. Until in-vehicle technologies are widely accessible and accepted, seeing their full potential in reducing teen-related crashes is yet to be fully realized.

Virtual Driving Skill Assessment Models

The use of virtual driving assessments in state's department of motor vehicles and pediatrician offices may have practical uses in informing teens and their parents of skills needed to be a safer driver. The Children's Hospital of Philadelphia has been testing this model which assesses one-hundred driving skills through a virtual driving assessment using the Ready-Assess software. This validated assessment was found to be scalable and can detect unprepared license applicants. Knowing the driving skills still needed by a teen driver can empower families to take further action in practice and training to become a safer driver prior to receiving their license.

Zero Tolerance of Impaired Driving

The Nebraska .02 law or "zero tolerance law" is a law to prevent minors from drinking and driving. Under the law, minors (defined as anyone under age 21) are prohibited from driving with more than .02 grams of alcohol per 100 milliliters of blood or 210 liters of breath. States that have implemented these laws reduce youth drinking and driving. Other influences, when widely spread, that can reduce underage drinking and driving are no-drinking messages, zero-tolerance enforcement and alcohol vendor compliance checks. These interventions require shared work between safety organizations, law enforcement, motor vehicle departments, community, health and educational

organizations and parents. Impairment from prescription drugs and marijuana use needs to be addressed as well.

Resource

Resource and information on teen motor vehicle safety are listed in the following table.

Table 2. Teen Motor Vehicle Safety Resource Information

Program	Website
Graduated Driver Licensing informational card and parent teen driving agreement	https://dhhs.ne.gov/Pages/Motor-Vehicle-Safety.aspx
The Insurance Institute for Highway Safety Teen Driver Information	https://www.iihs.org/topics/teenagers
NE Department of Motor Vehicle-Overview of Graduated Driver Licensing	https://dmv.nebraska.gov/dl/overview-graduated-drivers-licensing
Teens in the Driver Seat	https://www.t-driver.com/
NE Family, Career and Community Leaders of America	https://www.nebraskafccla.org/about-us/
Mothers Against Drunk Driving (MADD)- Power of Parents	https://madd.org/power-of-parents/
MADD-Power of Youth	https://madd.org/power-of-youth/
Nebraska State Patrol Community Policing	https://statepatrol.nebraska.gov/divisions/field-services/community-policing-safety-programs
NE Department of Transportation Highway Safety Office	https://dot.nebraska.gov/safety/hso/
NE Driver Education Courses	https://dmv.nebraska.gov/dl/approved-driver-safety-schools
Children’s Hospital of Philadelphia- Teen Driver Source	https://www.teendriversource.org/
National Highway Traffic Safety Administration- Teen Drivers	https://www.nhtsa.gov/road-safety/teen-driving

Appendix 1. Data Dictionary

Variable values	Definitions
Injury Severity	Injury severity is based on the initial determination by law enforcement at the scene and the results of data linkage.
0=No injury	No occupant was not injured when records reported by law enforcement were considered not injured.
1=Injured	At least one driver or passenger was considered injured when records reported by law enforcement were considered to have a serious, visible, or possible injury.
2=Fatality	Fatality was defined as when an occupant was considered killed by records reported by law enforcement.
Hospitalization	An occupant was considered hospitalized when that occupant was linked to the hospital discharge data and was a record within the inpatient data.
ED Visits	An occupant was considered an emergency department visit when that occupant was linked to the hospital discharge data and was a record within the outpatient dataset.
Driving Behaviors	Driving behaviors were categorized based on the occupant's driving behavior that law enforcement reported at the crash scene.
0=no improper driving behavior	No improper driving when records reported by law enforcement were no improper driving that contributed to the crash.
1=distraction	Reported by law enforcement at the crash, included inattention, mobile phone distraction, or other types of distraction that contributed to the crash.
2=speeding	Exceeding the authorized speed limit or driving too fast for conditions that contributed to the crash, reported by law enforcement at the crash.
3=other improper driving behaviors	Other improper driving behaviors included failing to yield the right of way, disregarding traffic signs, signals, or road markings, following too closely, making an improper turn, driving on the wrong side or wrong way, failing to keep in the lane or running off the road, swerving, fatigued/asleep, operating effective equipment, or other improper action that contributed to the crash.
Road Type	Based on the location of the crash that was reported by law enforcement at the scene of the crash.
1=Local/Recreational	A recreational road, local road, or local street.
2=Highway	On a highway, included highway rest area/scale, highway ramp, or highway maintenance.
3=Interstate	On an interstate, included an interstate rest area/scale, interstate ramp, or interstate maintenance.
Type of Crash	Based on the number of vehicles involved in the crash and the first harmful event that law enforcement reported at the crash scene.
• Single Vehicle	Only one vehicle at the crash scene, reported by the law enforcement.

1=Rollover	The vehicle is overturn.
2=other non-collision crash	Included a vehicle with a fire/explosion, immersion, jackknife, cargo/equipment loss or shift, or other unknown non-collision.
3=collision with a non-fixed object	Included crash with a pedestrian, pedal cycle, railway vehicle, animal, work zone maintenance equipment, other movable objects, and unknown movable object.
4=crash with a fixed object	The first harmful event included impact attenuator/crash cushion, bridge overhead structure, bridge pier or abutment, bridge parapet end, bridge rail, guardrail face, guardrail end, median barrier, highway traffic signpost, overhead sign support, light/luminaire support, utility pole, other post, pole or support, culvert, curb, ditch, embankment, fence, mailbox, tree, other fixed objects, or unknown fixed object.
5=other	A crash event was categorized as other when the crash category cannot be determined by any previous first harmful event criteria.
• Multi-vehicle	More than one vehicle involved in the crashed, determined and reported by law enforcement.
1=Rollover	The vehicle is overturn.
2=other non-collision crash	Included a vehicle with a fire/explosion, immersion, jackknife, cargo/equipment loss or shift, or other unknown non-collision.
3=collision with a non-fixed object	a pedestrian, pedal cycle, railway vehicle, animal, motor vehicle in transport, parked motor vehicle, work zone maintenance equipment, other movable objects, and unknown movable object.
4=crash with a fixed object	The first harmful event included impact attenuator/crash cushion, bridge overhead structure, bridge pier or abutment, bridge parapet end, bridge rail, guardrail face, guardrail end, median barrier, highway traffic signpost, overhead sign support, light/luminaire support, utility pole, other post, pole or support, culvert, curb, ditch, embankment, fence, mailbox, tree, other fixed objects, or unknown fixed object.
5=other	A crash event was categorized as other when the crash category cannot be determined by any previous first harmful event criteria.
Vehicle Type	Reported by the law enforcement at the crash scene.
1= Passenger vehicle	2 door sedan, 4-door sedan, convertible, station wagon, or a hazmat passenger car.
2=Other two-axle four-tire single-unit vehicle	mini-van, full-size van, compact utility, medium / large utility, or pickup truck.
3=Truck	bus that seats 9-15 people, a bus that seats more than 15 people, a tractor & semi-trailer, a tractor with doubles, tractor with triples, a single-unit vehicle with a gross vehicle weight rating (GVWR) of 10,001 to 26,000), a single-unit vehicle with a GVWR more than 26,000, truck tractor, truck with trailer, unknown heavy truck, or a hazmat light truck.
4=Agricultural vehicle	farm equipment, three-wheel ATV, four-wheel ATV / dune buggy, or a construction/maintenance equipment vehicle.
5=Motorcycle	motorcycle, dirt bike, minibike, moped, or a motor scooter.

6=other	motor home, limousine, or an unknown body style.
Rural/Urban Area	A county's urban/rural status was determined based on the 2020 Bureau of the Census's urban and rural classification.
1=urban metropolitan	A county with a population above 50,000 people.
2=non-metropolitan urban	The population was between 10,000 and 49,999 people.
3=large rural	The population was between 2,500 and 9,999 people
4=small rural	The population was below 2,500.
Alcohol Use	Alcohol was considered a contributor to the crash when records reported by law enforcement included that alcohol was suspected, alcohol and drugs were suspected, or when blood alcohol level was above 0.10%.
Restraint Use	Determined by the law enforcement at the crash scene.
1=Yes	Included using lap & shoulder seatbelt, shoulder seatbelt only, or a lap seatbelt only.
2=No	An occupant was considered to be using no restraint when involved in a crash when records reported by law enforcement had non-used when involved in a crash.
3=Other	Included a child safety seat being used, child booster seat being used, DOT-approved helmet used, costume helmet used, or when restraint use was unknown.
Curfew	A teenage driver was considered to be in a crash past curfew when records reported by law enforcement had the time of crash from 0000 hours to 0600 hours.
Per 100,000 Population	Per 100,000 population can be referred to as per 100,000 people. Rates makes is easier to understand and compare injury and deaths in a group of people.