



NORTH DAKOTA Youth Occupant Protection Survey: 2016 Pilot Design and Implementation

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For complete survey detail and results, please refer to:

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Disclaimer

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EXECUTIVE SUMMARY

Traffic crashes are a leading cause of death for North Dakota youth. Previous research shows that risk for fatal and serious injury increases by 50% to 70% when occupants fail to use safety restraint systems. In addition, youth in front seat positions are substantially more likely to suffer serious injury outcomes.

In this pilot year of the study, occupant restraint use in traffic crashes was considered in assessing the need to increase youth occupant protection rates. The crash data shows that 2.3% of youth in crashes were not in a safety restraint. Crash events show there was an increase in the use of child/booster seats among the 0-3 year olds. Trends for the 4-9 year olds were also positive with a shift from lap and shoulder belts to booster seats. Restraint use was stable for 10-14 age systems. Use of back seats for youth occupants also showed a positive trend for all age groups.

An observational field study was conducted to measure youth occupant restraint use in the state. Overall, 1,669 vehicles with occupants under the age of 15 were observed in the survey. Observations were conducted at 97 sites across 11 counties. Among the youth occupants, there were 554 children under age 4; 957 children between 4 and 9 years; and 642 in the 10-to-14 age group.

The youth occupant protection use rate was 95.7% in 2016. The youngest group was more often restrained at 99.2%; 4-9 year olds use at 95.1%; and 10-14 year olds at 92.6%. By vehicle type, the highest rate was among youth in SUVs at 97.4% with use in cars and vans slightly lower at 96.8% and 95.6%, respectively. Restraint in pickup trucks was lowest, with over 1 in each 10 youth unrestrained. Driver use was positively associated with youth passenger restraint. Both driver and youth use were restrained in 81.6% of cases.

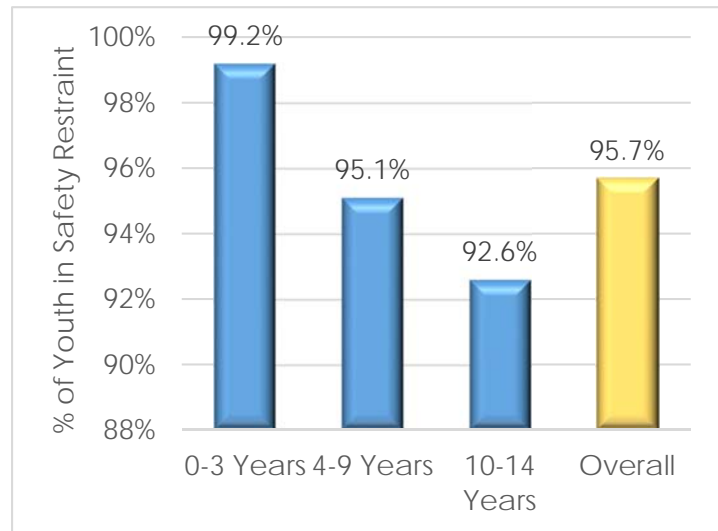
The estimated state use rate creates a benchmark for safety stakeholders working to instill positive traffic safety behaviors as common practice. The observation method was selected for this performance metric to minimize bias in extrapolating sample field data to the population in terms of observed practices. Ongoing evaluation provides critical feedback for programs and policy designed to increase youth occupant safety.

RESULTS

Overall, the statewide youth occupant protection use rate for North Dakota was **95.7%** based on probability weighting for observations collected in a youth occupant protection field survey. Youth occupant protection programs and policies are often age-based since recommendations for safety restraint systems change as children mature. The youngest group was more often restrained

Age Group

Overall, restraint use was negatively correlated with age. A significant difference was found in comparing the share of youth unrestrained among the age groups (Table 1). Larger shares of unrestrained youth were found in the older groups. The youngest occupant group was estimated to be



unrestrained in less than one percent of cases. About 5% of the 4-9 year olds were unrestrained. The rate increased to 7.5% among youth in the 10-14 year olds.

Table 1 | Restraint Type, by Age Group

| | 0-3 Years | 4-9 Years | 10-14 Years |
|--------------|-----------|-----------|-------------|
| | Percent | Percent | Percent |
| Car Seat | 92.6 | 7.4 | 1.1 |
| Booster | 6.2 | 37.5 | 1.0 |
| Seatbelt | 0.4 | 50.2 | 90.4 |
| Unrestrained | 0.8 | 4.9 | 7.5 |

Vehicle Type

Among vehicle types, the highest restraint rate was among youth in sport utility vehicles (SUV) at 97.4%. Use rates for youth in cars and vans were estimated to be slightly lower at 96.8% and 95.6%, respectively. Restraint use for youth in pickup trucks was significantly lower compared to use in cars and SUVs, respectively.

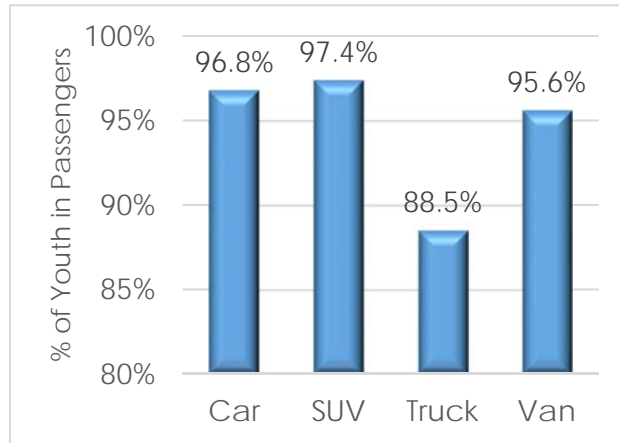


Figure 2. Youth Occupant Restraint Rates, by Vehicle Type

The lowest use rate among the age/vehicle combinations was for the 4-9 year occupants in pickups. An estimated 13.8% of these occupants were unrestrained. Each youth age group was unrestrained in pickup trucks at a greater rate than any other vehicle for each age group. The highest use rates were: 0-3 year group in SUVs at 100.0%; 4-9 year group in vans at 96.8%; and 10-14 year group in SUVs at 94.9%. The combined age and vehicle effects show some areas of opportunity for more narrowly focused education and enforcement efforts.

Table 2. Youth Occupant Restraint Rate, by Age Group and Vehicle

| Vehicle Type | Age Group | n= | Estimated Use Rate |
|--------------|-------------|-----|--------------------|
| Car | 0-3 Years | 188 | 99.3 |
| | 4-9 Years | 229 | 96.1 |
| | 10-14 Years | 174 | 94.5 |
| SUV | 0-3 Years | 216 | 100.0 |
| | 4-9 Years | 326 | 96.7 |
| | 10-14 Years | 185 | 94.9 |
| Truck | 0-3 Years | 56 | 94.4 |
| | 4-9 Years | 152 | 86.2 |
| | 10-14 Years | 138 | 87.6 |
| Van | 0-3 Years | 84 | 99.4 |
| | 4-9 Years | 120 | 96.8 |
| | 10-14 Years | 78 | 90.5 |

Seat Position

Weighted results show seat-positioning was predominantly in back seats at 82.2%. Overall, the difference between estimated restraint rates for youth occupants in the front of 92.2% and back seats of 97.8% was not statistically significant. However, the rate did vary significantly when the age group was controlled. Restraint use by youth positioned in the front seat was statistically lower than in back seat positions for each of the age groups.

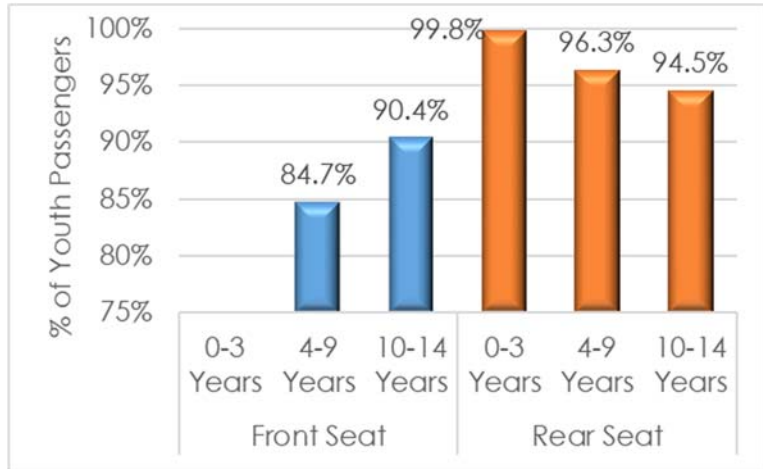


Figure 3. Estimated Youth Occupant Protection Use Rates, by Seat Position

Driver Seat Belt Use

Driver and youth passenger safety restraint decisions were correlated. This was consistent with earlier research. In observations where both driver and first young passenger use were recorded, 81.6% were both reported to be using occupant protection systems. Neither driver nor youth was belted in 7.7% of the observations. (Figure 4).

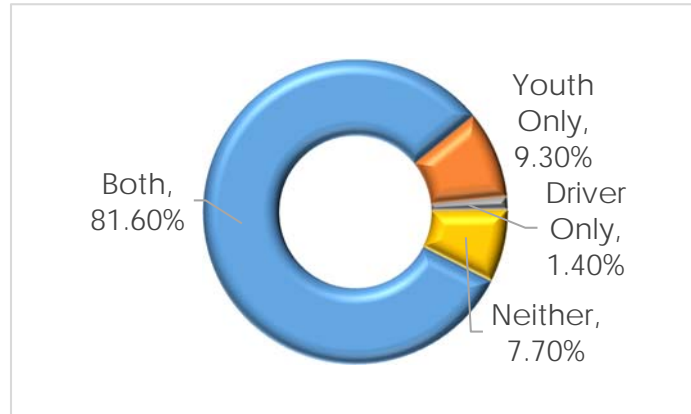


Figure 4. Restraint Status, Driver and Youth Occupant

Analysis identified factors associated with youth restraint use. When drivers were using safety restraint, it was 35 times more likely a young occupant would also be restrained. The youngest occupants, those under age four, were nearly four times more likely to be in safety restraints compared to their 5-14 year cohorts. In addition, youth were 3.5 times more likely to be in a safety restraint when seated in the back seat positions. Vehicle type was not a significant predictor.

DISCUSSION

A wide array of programs is directed at youth, parents and caregivers to encourage proper safety restraint systems for youth. The goal here was to measure statewide youth restraint use. During the 5-month observation survey in 2016, 2,164 observations were collected statewide. Statewide youth safety restraint use was estimated at 95.7%. Driver seat belt use was a strong predictor for YOP use. Drivers wearing seat belts were 35 times more likely to have youth occupants in safety restraints. The age of youth and vehicle type were significant factors in youth restraint use. Findings from the multivariate modeling may be especially valuable in identifying the greater potential for influence in positive decisions for YOP use.

The survey design allows for generalization about youth restraint use by age group and region that will be valuable to public safety in program management and resource allocations. In addition, supplemental analysis provides knowledge that may be valuable in refining efforts to influence specific youth or parent cohorts. The protocol and training have been established to replicate the survey effort in a sustained plan to produce metrics needed for monitoring progress and making effective program management decisions.

BACKGROUND

Traffic crashes remain a leading cause of death for North Dakota's youngest population. Between 2011 and 2015, 297 youth were passengers in serious injury crashes on North Dakota roads (NDDOT 2016). Serious crashes include events where any vehicle occupant suffers a fatal or disabling injury. The benefit of occupant protection in youth traffic safety is evident (Figure 5). In serious crash events, 17% of youth in safety restraint systems were seriously injured compared to 50% of unrestrained youth.

Unprotected youth have substantially increased risk for serious injury in crashes compared to their restrained cohorts.

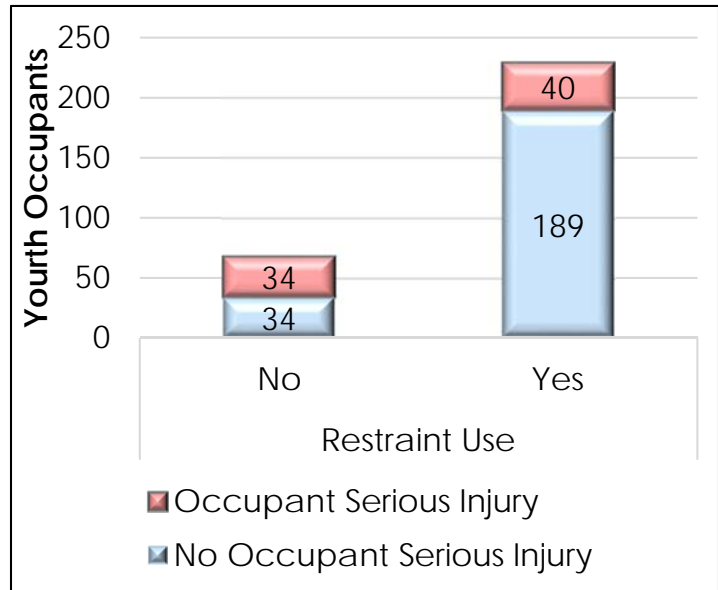



Figure 5. Occupant Protection and Injury Outcomes, Passengers Ages 0 to 14



ND Child Passenger Safety Law


North Dakota law requires that occupants under age 17 use proper occupant protection. Seat belt use for youth 8¹ to 17 years is required under North Dakota law. Children 7 years and younger are required to be restrained in infant seats, child seats or booster seats based on guidelines set for national safety standards (Figure 6). The oldest youth in the occupant range may be drivers or passengers. The 2012 transition from a minimum licensing age of 14 to 15 means that the driver is responsible to have all occupants under age 15 appropriately restrained. In addition, children under age 13 are recommended to ride in the back seat to reduce injury likelihood.




North Dakota's Child Passenger Safety Law

- Children younger than 7 are required to ride in a child restraint (car seat or booster seat). The restraint must be used correctly – following the manufacturer's instructions.
- A seat belt may be substituted for children younger than 7 who weigh more than 80 pounds and are more than 57 (4'9") inches tall.
- A lap belt may be used by children who weigh more than 40 pounds who ride in vehicles with lap-only seat belts or if all lap and shoulder belts are used by other occupants. (This is because booster seats require both a lap and shoulder belt for correct use.)
- Children ages 7 through 17 must be properly secured in a seat belt or child restraint (car seat or booster seat).
- The law applies to all seating positions – front seat and back.
- The driver is responsible for ensuring that all occupants younger than 18 are buckled up in the appropriate restraint.
- The penalty for violation is \$25 and one point against the license of the driver.

To help you select the right child restraint for your child, refer to best practice guidelines on back.

 **NORTH DAKOTA**
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Child Passenger Safety Program
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Figure 6. Public Resource for Child Passenger Safety Practices

¹Transition to the seat belt from booster seat under age 7 was permitted if the child is at least 80 pounds and minimum of 57 inches tall at the time of the 2016 survey. This age was increased to 8 years during the 2017 legislative session.

Crash Trends

Between 2005 and 2015, there was an increase in the use of child/booster seats among the 0-3 year olds (Figure 7). In 2005, only 52% of children between 0-3 years who were involved in crashes were in child or booster seats compared to 83% in 2015. The share unrestrained is concerning because the share was up in 2013, 2014 and 2015 compared to rates between 2007 and 2012.

Trends for the 4-9 year olds are also positive, reflecting a transition to a higher use of child or booster seat equipment (Figure 8). The shares have been fairly stable since a gradual shift between 2005 and 2009. The share unrestrained ranged from 2% to 5% since 2007.

The 10-14 age group was predominately reported to be using lap and/or shoulder safety restraint systems during crash events between 2005 and 2015 (Figure 9). The share unrestrained in these police-reported crash events ranged from a low of 5% to highs of 8% in 2010 and 2013, respectively.

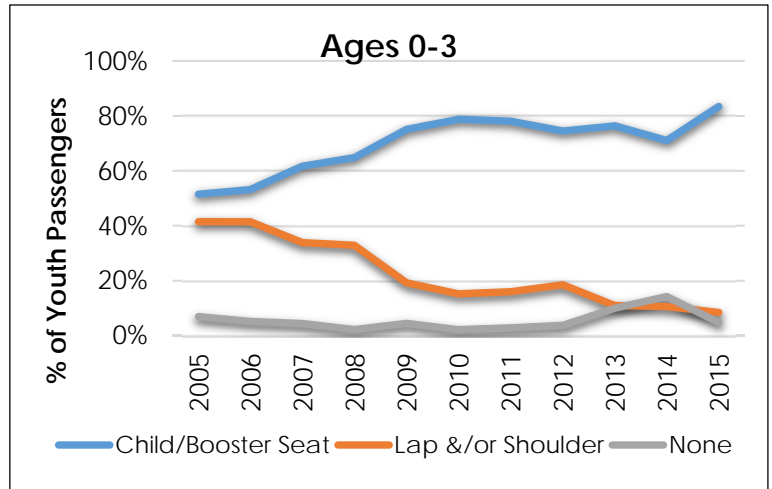


Figure 7. Safety Restraint in Crashes, Ages 0-3

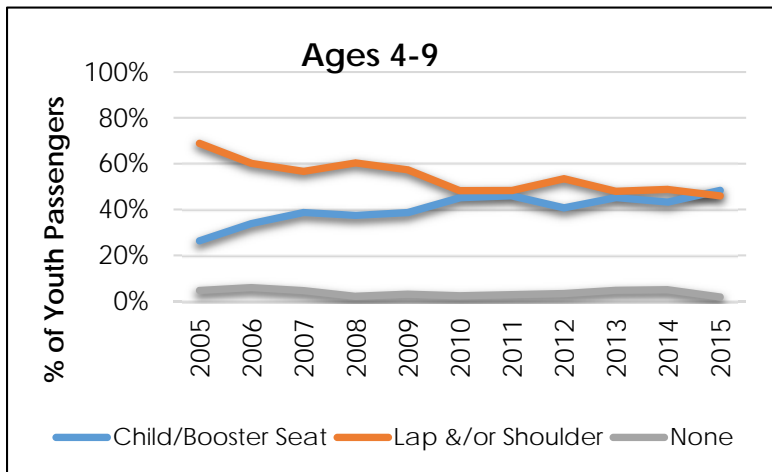


Figure 8. Safety Restraint in Crashes, Ages 4-9

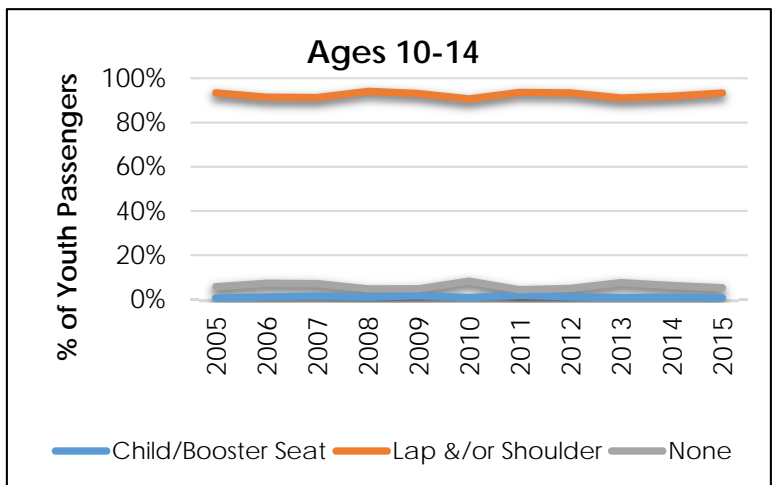


Figure 9. Safety Restraint in Crashes, Ages 10-14

The seat position for the youth occupants has shown positive trends for all age groups (Figure 10). The most pronounced shift is among the youngest occupants. Only 62% of the 0-4 age occupants were reported to be positioned in the back seat for crash events reported in 2005. This percentage peaked at 95% in 2015. The share positioned in back seats was similar for the 4-9 age group in 2015 at 93% – also a peak in the youth occupant safety metrics. The oldest youth group shows the least change with regard to seat position. The share of 10-14 youth passenger occupants seated in the back positions ranged between 45% and 50% between 2005 and 2015. On average, it showed some positive trend with the average seated in the back between 2005 and 2007 at 46% compared to 50% between 2013 and 2015. Distinguishing the back seat tendency in crash records provides insight with regard to tying common practices to ongoing education and policy efforts.

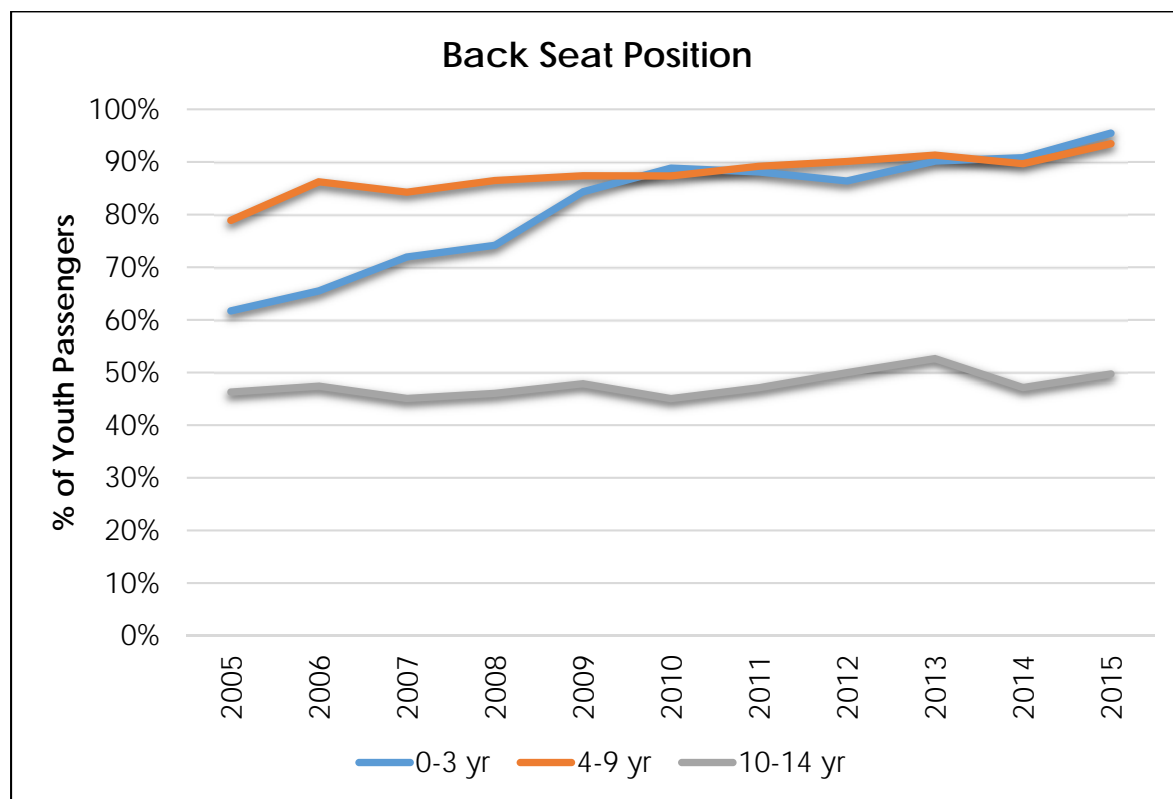


Figure 10. Youth Passenger Seat Position in Crash Events (No Pickups or Large Trucks), by Age Group

Another metric that may be useful in understanding risk in youth occupant restraint is the road environment. The road types are rural interstate, urban, and other rural roads. The relative risk ratios, with regard to the serious injury outcomes, suggest the other rural road driving environment had the highest risk for youth occupants. The rural road rate of serious injury was 1.6 times greater than on rural interstates and 21.7 times greater than on urban roads.

The youth occupant restraint use is lowest in all years for crashes on other

rural roads. Youth restraint rate for these roads ranged from a low of 75% to 90%. In comparison, youth occupant restraint on the rural interstate and urban roads ranged between 94% and 100%. In addition to youth occupant restraint use, traffic speed and emergency medical response proximity influence risk.

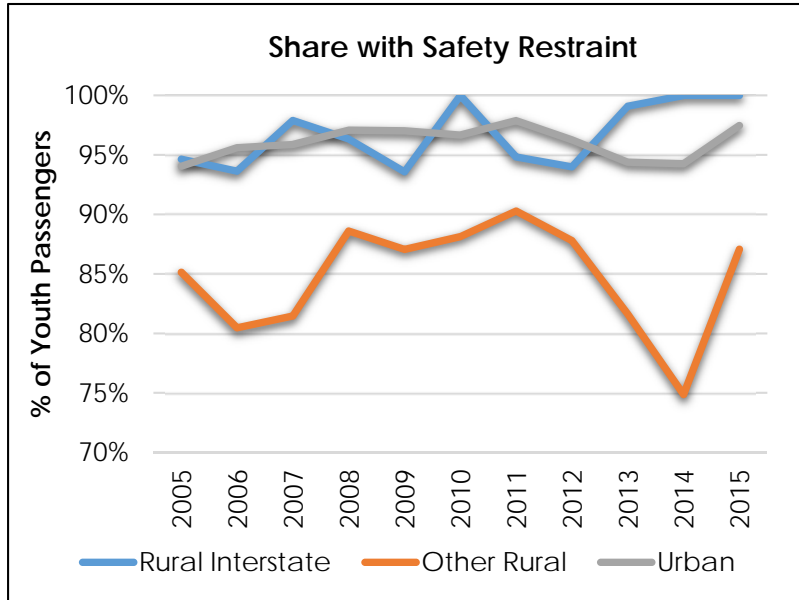


Figure 11. Youth Safety Restraint, by Road Type

Another aspect considered in queries for youth safety restraint use in crash events was geographic region. The regions show similar youth safety restraint usage rates reported in the regions through about 2012. A substantial drop is noticed in the west for 2013 and 2014 with partial recovery in 2015.

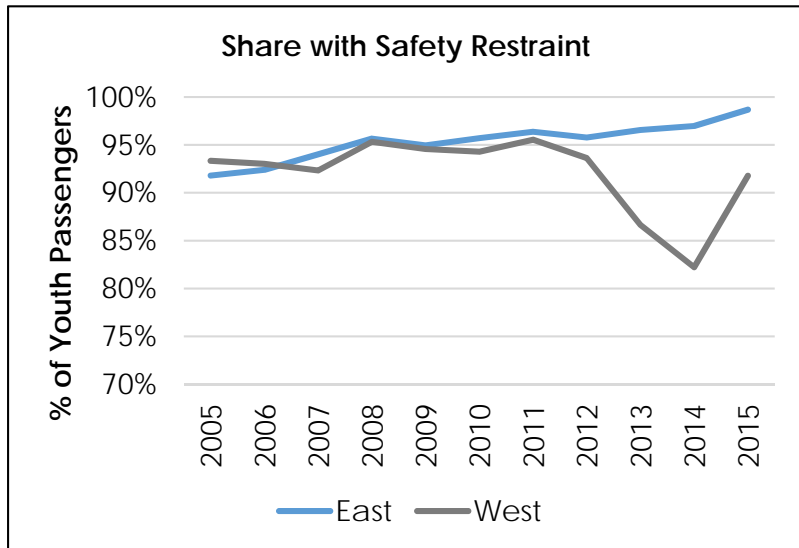


Figure 12. Youth Safety Restraint, by Region

METHOD AND DATA

Based on the 85% representation of the youth population in 19 counties, 12 of these counties were selected to be comprised of six in the west and the east regions (Figure 13). The ND Emergency Medical Services Association (NDEMSEA) was able to collect observations in eight counties and the UGPTI collected observations in the remaining four counties. The NDEMSEA and UGPTI was a new collaboration developed during the pilot phase.

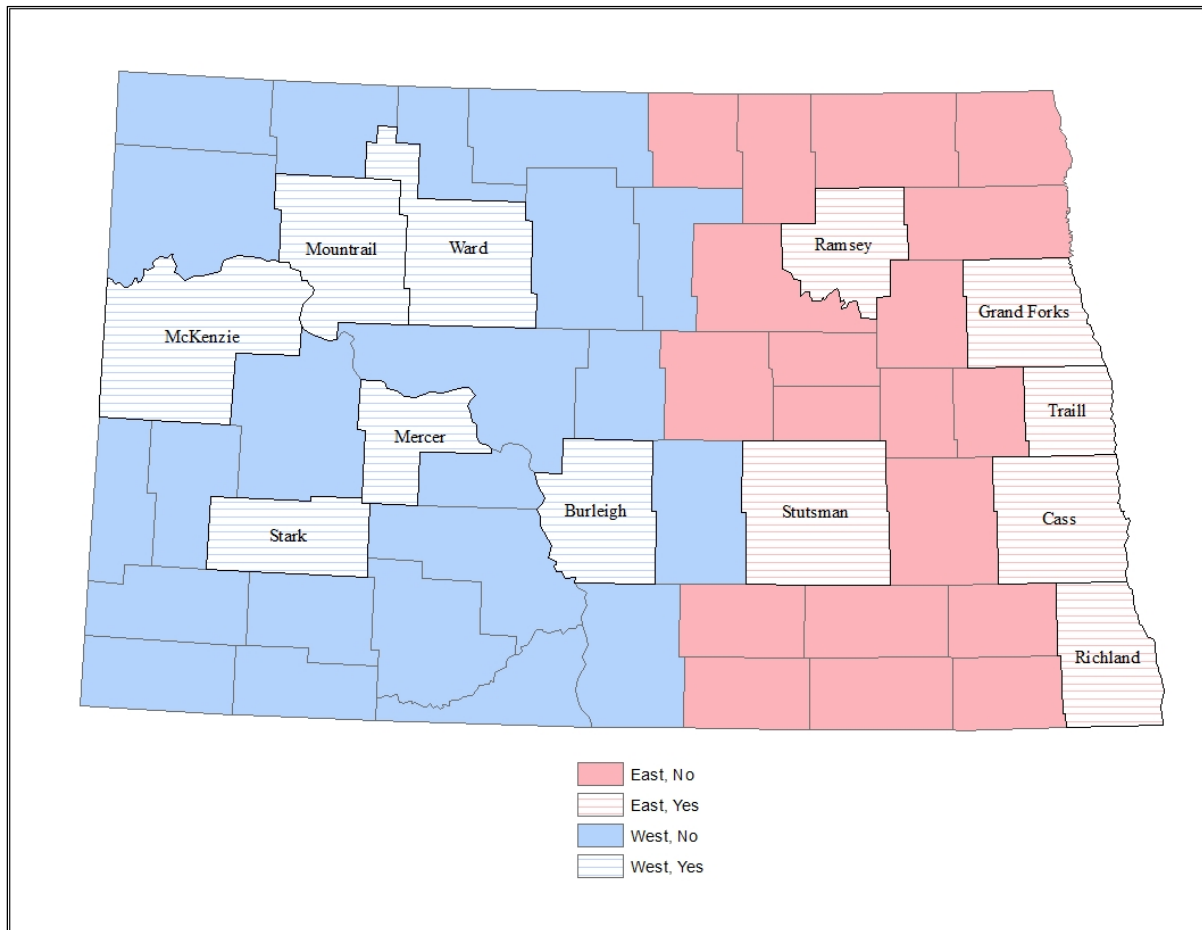


Figure 13. Youth Occupant Survey Counties, by Region

At least eight sites were visited for observations in each county. One county did have only five sites, but due to the county's rural nature, additional sites were not added to avoid duplication. Because of the nature of the survey, sites were chosen based on the time and location characteristics of venues where children were likely to be present with vehicles stopped or moving slowly.

Observations were collected between May 1 and September 30. They could be conducted between 7 a.m. and 7 p.m. on all days of the week. The duration of site visits was a minimum of one-half hour to a maximum of one hour. Observers recorded the site location, date, and observation start time to initiate each site visit. Vehicles included in the survey were consistent with NHTSA's Uniform Criteria for State Observational Surveys to include vehicles up to 10,000 pounds. The observers collected child age group, child restraint type, front/back seat position, vehicle class, and driver seat belt use. The child age groups were 0-3, 4-9, and 10-14 years. When completing a site, the observer recorded the observation end time.

Overall, 1,669 vehicles with occupants under the age of 15 were observed in the survey. Observations were conducted at 97 sites in 11 counties (Table 3). A total of 2,164 youth vehicle occupants were recorded by observers. The observations included 11 motorcycles that were outside the scope of this study. Youth restraint could not be determined in 201 cases. Among the youth, there were 554 children under age 4; 957 children between 4 and 9 years; and 642 in the 10-to-14 age group. The overall and strata-based restraint rates were weighted by county youth population.

Table 3. Site and Observation Count, by County

| County Name | Rural or Urban | Region | Sites | Youth Observations | | Share of County Population, 0-14 yr. | |
|--------------------------|----------------|----------|----------|--------------------|-----------|--------------------------------------|-----------|
| | | | Count | Count | Percent | in 1,000 | Percent |
| Cass | Urban | E | 10 | 340 | 16% | 29,635 | 22% |
| Burleigh | Urban | W | 8 | 274 | 13% | 16,411 | 12% |
| Grand Forks | Urban | E | 8 | 215 | 10% | 11,543 | 9% |
| Ward | Rural | W | 9 | 124 | 6% | 13,224 | 10% |
| <i>Stark¹</i> | Rural | <i>W</i> | <i>0</i> | <i>0</i> | <i>0%</i> | <i>5,596</i> | <i>4%</i> |
| Stutsman | Rural | E | 8 | 239 | 11% | 3,494 | 3% |
| McKenzie | Rural | W | 5 | 92 | 4% | 2,205 | 2% |
| Ramsey | Rural | E | 9 | 164 | 8% | 2,089 | 2% |
| Richland | Rural | E | 8 | 228 | 10% | 2,827 | 2% |
| Mountrail | Rural | W | 10 | 104 | 5% | 1,931 | 1% |
| Mercer | Rural | W | 12 | 248 | 11% | 1,538 | 1% |
| Traill | Rural | E | 10 | 136 | 6% | 1,470 | 1% |

¹Omitted in 2016 survey.

The youth restraint observation counts were stratified by region and rural/urban geography. All counts reflect missing information. Understanding these distributions was important in gauging the potential to study subpopulations in the sample and their potential reliability in extrapolating to a population estimate. Table 4 shows the distribution of these observations among the age group and location. The east accounted for about 57% of the observations by region. About 65% of the youth recorded in field observations were from the rural location observation sites.

Table 4. Youth Occupants Safety Restraint Observations, by Region and Geography

| | | 0-3 Years | 4-9 Years | 10-14 Years | Total |
|-----------|-------|-----------|-----------|-------------|-------|
| Region | East | 309 | 418 | 390 | 1,117 |
| | West | 235 | 409 | 185 | 829 |
| Geography | Rural | 290 | 583 | 387 | 1,260 |
| | Urban | 254 | 244 | 188 | 686 |

The unweighted observations indicate that parents are heeding recommendations to position young children in vehicle back seats. Overall, 1,630 of the 2,101 youth where seat position was recorded were reported to be in the back seat(s) of the vehicle. Additional insight was gained by also considering the type of safety restraint in cases where it was known (Table 5). The most effective back seat use was for the car seats and booster seats. Observations show 552 of the 557 youth observed in car seats were in a back seat position. The booster seats were positioned in back seats in 329 of 334 cases. The majority of the youth occupants using seat belts were in the back seat(s) at 524 of 865.

Table 5. Youth Occupants by Seat Position and Observed Safety Restraint

| | Car Seat | Booster Seat | Seat Belt | Unrestrained | Unknown | Total |
|-------|----------|--------------|-----------|--------------|---------|-------|
| Front | 5 | 6 | 341 | 85 | 34 | 471 |
| Back | 552 | 328 | 524 | 75 | 151 | 1,630 |
| Total | 557 | 334 | 865 | 160 | 185 | 2,101 |

The observations were stratified by seat position for the three youth age groups. When the age effect was considered, 519 in 527 of 0-3 year olds; 695 in 806 of 4-9 year-olds; and 255 in 570 10-14 year olds were positioned in the back seat(s). The health sector guidance on seat position was reflected in these counts with few observations of youth occupants in the front seat, especially among the youngest occupants.

Table 6. Youth Occupant Seat Position Observation Count, by Vehicle Type

| | Seat Position | Car | SUV | Truck | Van |
|-------------|---------------|-----|-----|-------|-----|
| 0-3 Years | Front | 2 | 1 | 4 | 1 |
| | Back | 182 | 209 | 51 | 77 |
| 4-9 Years | Front | 26 | 31 | 40 | 14 |
| | Back | 192 | 289 | 110 | 104 |
| 10-14 Years | Front | 100 | 92 | 83 | 40 |
| | Back | 73 | 90 | 54 | 38 |
| Total | | 575 | 712 | 342 | 274 |

Nonresponse Rate

Potential bias from nonresponse was considered for the overall sample. If the nonresponse rate is unusually high, it may bias results. Among the 2,164 youth occupants observed, the nonresponse rate was 9.3%. The bound on the nonresponse for the uniform criteria published in the Federal Register was 10% so the nonresponse rate is considered acceptable from the federal perspective, per NHTSA's Uniform Criteria. Additional data collection was not necessary.

Weighting

The adjusted statewide youth occupant restraint use rate estimates were calculated by weighting the raw rates to the number of individuals in the population that the sample observations represent. The sampling weights for the youth observations were based on a county's population of 0 to 14 year olds.