

# SEAT BELT USE IN NORTH DAKOTA



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Thank you to North Dakota Tourism and Gerald Blank for the use  
of the North Dakota picture on the cover.

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# EXECUTIVE SUMMARY

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North Dakota's seat belt use study provides statistically reliable data from which generalizations, comparative analyses, and recommendations can be developed based on a field survey of driver and right front-seat passenger seat belt use. This National Occupant Protection Use Survey (NOPUS) is based on national standards for survey design and field observation protocol. It provides the North Dakota Department of Transportation (NDDOT) with a systematic evaluation of seat belt use rates within the state. The National Highway Traffic Safety Administration (NHTSA) funds NOPUS through the NDDOT's Safety Division.

During the week of June 4-10, 2018, trained observers visited each site in their assigned counties to collect seat belt use for drivers and right front seat passengers in vehicles with a gross vehicle weight up to 10,000 lbs. Data was collected for 19,383 drivers and 5,007 right front-seat passengers for a total of 24,390 vehicle occupants. The observations were conducted at 320 sites across 16 counties. Based on the sampling methodology weighting procedures, the final estimate for the statewide seat belt use was 82.5%.

A summary of major findings from the 2018 survey regarding seat belt use in North Dakota follows:

- **County.** Weighted rates of seat belt use by county showed Barnes with the highest use at 94.8%, and Burke County with the lowest use at 55.3%. McKenzie and Benson Counties were also observed to have low use of less than 70% in 2018. Applying 3-year averages for trend comparison showed several counties with improvement in rates in the 2016-2018 time frame over the previous 2013-2015 average. Trends were not available in five counties that were new to the survey in 2017. The change in the county composition was due to the NHTSA-mandated reselection process that is required in 5-year intervals.
- **Vehicle Occupant.** Driver seat belt use was 80.3% while passenger use was 83.3% statewide. At the county level, Barnes reflected the highest rate of both driver and passenger use, 94.0% and 97.5%, respectively. One additional county, Mountrail, was observed to have high driver belt use, 91.0%. Benson, Burke, and Ward Counties demonstrated driver use of less than 70%. In addition to Barnes County, passenger use was above 90% in Cass, Richland, Stutsman, and Williams counties. Passenger use was lowest in McKenzie County at 55.8%.
- **Region.** Overall rates of seat belt use were higher in the east region, 85.0% compared to 77.0% in the west region. This regional disparity is noted throughout the 2014–2018 time frame. Rates in the east ranged from a low of 82.2% in 2017 to a high of 85.7% in 2016, while rates in the west were lower, ranging from a low of 76.3% in 2014 to a high of 79.0% in 2015. Regional disparity was also evident in occupant position. Drivers and passengers in the east registered use of 84.0% and 88.6%, respectively, compared to their counterparts in the west, 76.8% for drivers and 77.7% for passengers.

- **Vehicle Type.** The results of the 2018 statewide survey indicated occupants of cars, SUVs and, vans demonstrated relatively high restraint use, 82.0%, 87.5%, and 85.8%, respectively. Truck occupants, on the other hand, were belted at a lower rate, 74.6%. The sample size of this demographic (40.4%) combined with the lower use continues to negatively influence the overall North Dakota rate. Male occupants in trucks were belted at 72.8% in 2018 compared to 83.2% for females.
- **Gender.** In 2018, female occupants continued to show higher rates of seat belt use overall than male occupants, 87.3% compared to 76.9%. When considering rates at the county level, females registered use above 80% in 13 of 16 counties. Male rates reached that same level in fewer than half the surveyed counties. The gender rates by counties varied from 4 to 26 percentage points. Higher rates hold for females whether they are drivers or passengers with one exception, Williams County, where restraint use of male passengers exceeded female passengers.
- **Gender and Vehicle Type.** Females had higher rates of seat belt use than males in every vehicle type. The highest rate for males was found in SUVs, 85.2%, and the lowest in trucks, 72.8%. By comparison, female rates ranged from a high of 92.2% in vans to a low of 83.2% in trucks.
- **Road Type.** Secondary roads held the largest share of occupants in the sample (48.7%), followed by primary roads (41.8%). Local roads had the smallest share (9.5%) mainly due to their selection only in counties designated as metropolitan statistical areas (MSA) per NHTSA protocol. Seat belt use in 2018 was highest on primary roads (88.8%), followed by local roads (79.7%), and secondary roads (74.5%). A comparison of results defined by MSA versus non-MSA county designation showed variations between road types as well. MSA-classified counties show higher rates of use by vehicle occupants, 91.4% on primary roads, 86.8% on secondary roads, and 79.3% on local roads. However, the majority of the sample is from non-MSA counties, with rates of 88.2% on primary roads and 75.1% on secondary roads. Regional differences in shares and use rates by road type were also noticed.

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# INTRODUCTION

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The Upper Great Plains Transportation Institute (UGPTI), a research, education, and outreach center at North Dakota State University (NDSU) located in Fargo, ND, was contracted by the North Dakota Department of Transportation (NDDOT) to conduct a field survey of seat belt use in 2018. The study replicates the sampling methodology previously approved by the NHTSA and the NDDOT for the 2012 survey. That methodology was a redesign of an earlier method to yield a more statistically robust estimate of seat belt use on all roadways in North Dakota. In 2017, survey researchers implemented a NHTSA-mandated review of state crash-related fatalities that resulted in modifications to county inclusion and selection, and a complete reselection of observation sites. This reselection is certified for five years. Requirements for conducting statewide seat belt surveys are published in the Federal Register, Vol. 76 No. 63, April 1, 2011, Rules and Regulations, pp. 18042 – 18059.

The objective of this study was to estimate the statewide rate of seat belt use of drivers and right front-seat passengers in the state of North Dakota.

Additional analyses estimated seat belt use rates in the following categories:

- Occupant position (driver, passenger)
- Gender (male, female)
- Type of vehicle (car, van, sport utility vehicle, truck)
- Region of state (east, west)
- Roadway type (primary, secondary, local)
- Population density/economic activity (MSA, non-MSA)

A description of the tasks involved in conducting the statewide seat belt survey is provided in this report. It includes general information about the methods and protocols. Survey sample design methods were employed to ensure that the results were representative of the behavior statewide. One exception to this was that local roads were only sampled in MSA counties per NHTSA protocol.

# SEAT BELT SURVEY RESULTS

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## Statewide Results

### Sample Size by Year

**Table 1: Survey Sample By Occupant Position, 2018**

Occupants Observed	2014	% of Sample	2015	% of Sample	2016	% of Sample	2017	% of Sample	2018	% of Sample
Drivers	22,203	80.1%	22,263	80.1%	21,023	78.4%	19,784	80.4%	19,383	79.5%
Passengers	5,515	19.9%	5,519	19.9%	5,802	21.6%	4,822	19.6%	5,007	20.5%
Total	27,718	100.0%	27,782	100.0%	26,825	100.0%	24,606	100.0%	24,390	100.0%

Table 1 shows the size of annual seat belt surveys from 2014 to 2018 by occupant position. Total occupants in 2018 numbered 24,390, consisting of 19,383 drivers representing 79.5% of the sample, and 5,007 passengers for a 20.5% share. These figures include only vehicle occupants where protection status could be determined.

Total sample size can vary from year-to-year depending on site locations and traffic flow. The 2018 overall sample size is similar to 2017. The reduction seen from earlier iterations of the survey may be attributed to the 5-year reselection of sites mandated by NHTSA in 2017. Occupant shares are comparative, as well, to previous surveys. It is not uncommon to have several individual sites capture only a limited number of vehicles. However, these sites are still important to the aggregate measurement of statewide and county seat belt use, and, therefore, are captured each year.

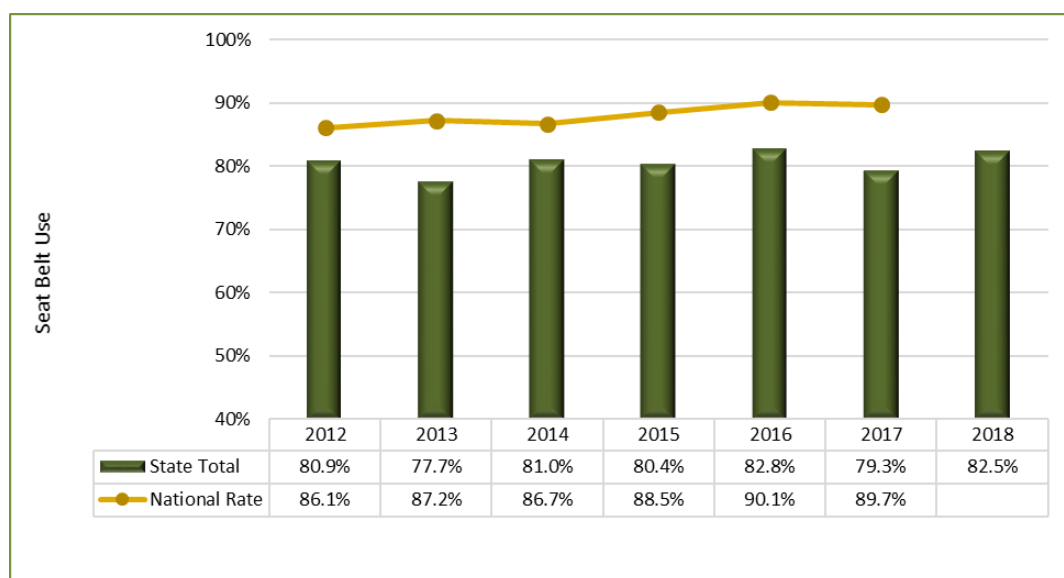
The driver-to-passenger ratio can influence overall use rates. This year the ratio was 3.9 drivers for every occupant, meaning drivers represent 79.5% of the sample. Table 2 shows only minor variation in this ratio since 2014. Driver share of the sample deviated 2 percentage points or less over the time period shown.

**Table 2: Ratio of Drivers to Passengers, 2014-2018**

Ratio	2014	2015	2016	2017	2018
Drivers:Passengers	4.0:1	4.0:1	3.6:1	4.1:1	3.9:1
Drivers as % of Sample	80.1%	80.1%	78.4%	80.4%	79.5%

Overall unweighted results of the 2018 statewide survey indicated 80.9% of vehicle occupants were observed wearing seat belts on North Dakota roads. Because the survey employs a two-stage stratified random sampling scheme, a more appropriate estimate of seat belt use is found by weighting the unadjusted rate. Using those formulas, the overall weighted rate of seat belt use in North Dakota was

82.5% for 2018. Figure 1 shows annual seat belt use since implementation of the amended methodology in 2012. In addition, the graph includes national use as reported by NHTSA with the most recent data showing a rate of 89.7% in 2017. Nationally, NOPUS survey data confirms that vehicle occupants in states with primary enforcement of seat belt laws demonstrate higher restraint use than states with secondary laws. Accordingly, North Dakota aligns more closely with NHTSA's 2017 published rate of 85.7% for states without primary seat belt laws.<sup>1</sup>



**Figure 1: Statewide Seat Belt Use, Weighted**

\*2017 rate marks NHTSA-mandated resampling of counties and sites

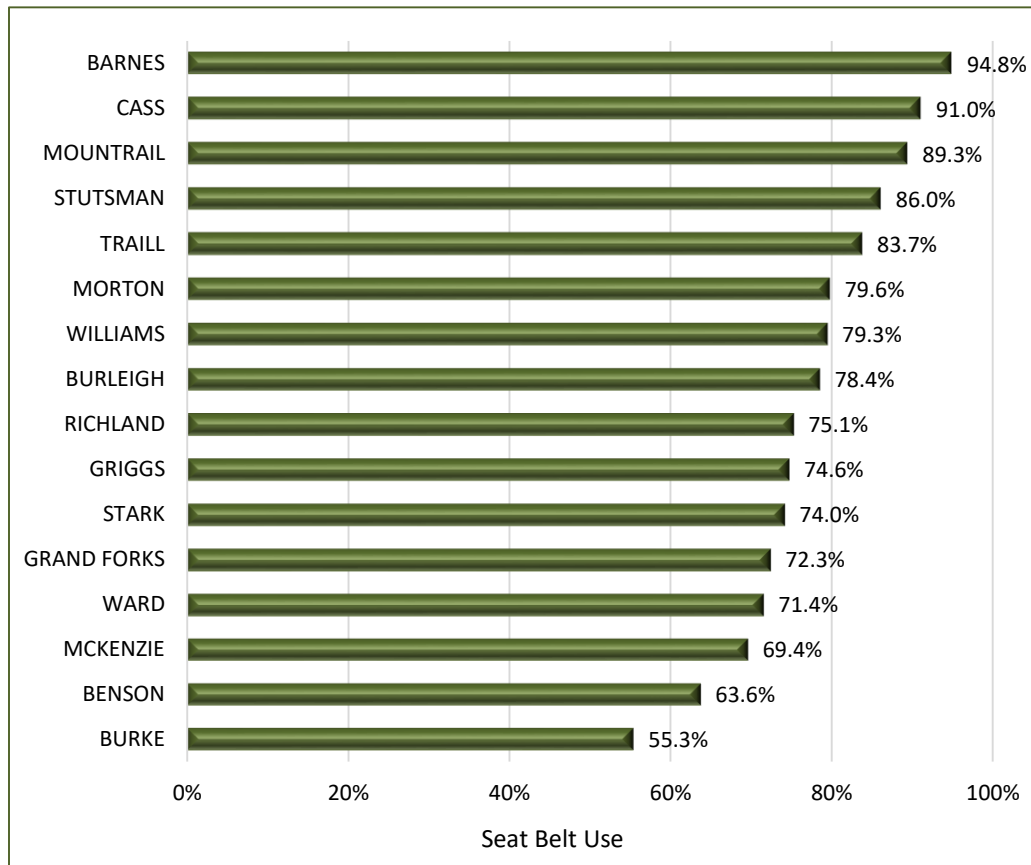
## County Results

The 2018 weighted seat belt rates by county are shown in Figure 2. Restraint use ranged from a high of 94.8% in Barnes County to a low of 55.3% in Burke County. Higher seat belt use is generally noticed in counties that follow interstate corridors, and this was supported again in the 2018 data. There is a greater concentration of counties with higher rates where interstates form a share of the road system. There may also be a regional influence depressing rates in Burke County which is located in western North Dakota with relatively high truck<sup>2</sup> traffic shares and no interstate roadways. Additional detail on these issues is provided later in sections of the report addressing region, vehicle type, and roadway variation in seat belt use rates.

<sup>1</sup> National Highway Traffic Safety Administration. Traffic Safety Facts Research Note. April 2018 (revised). <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812465>

<sup>2</sup> Truck definition is trucks with a gross vehicle weight of less than 10,000 lbs. including pickups, wrecker tow vehicles, flatbed 3-or-4 ton trucks, and utility service trucks; excludes semi or large box trucks, and large emergency vehicles.

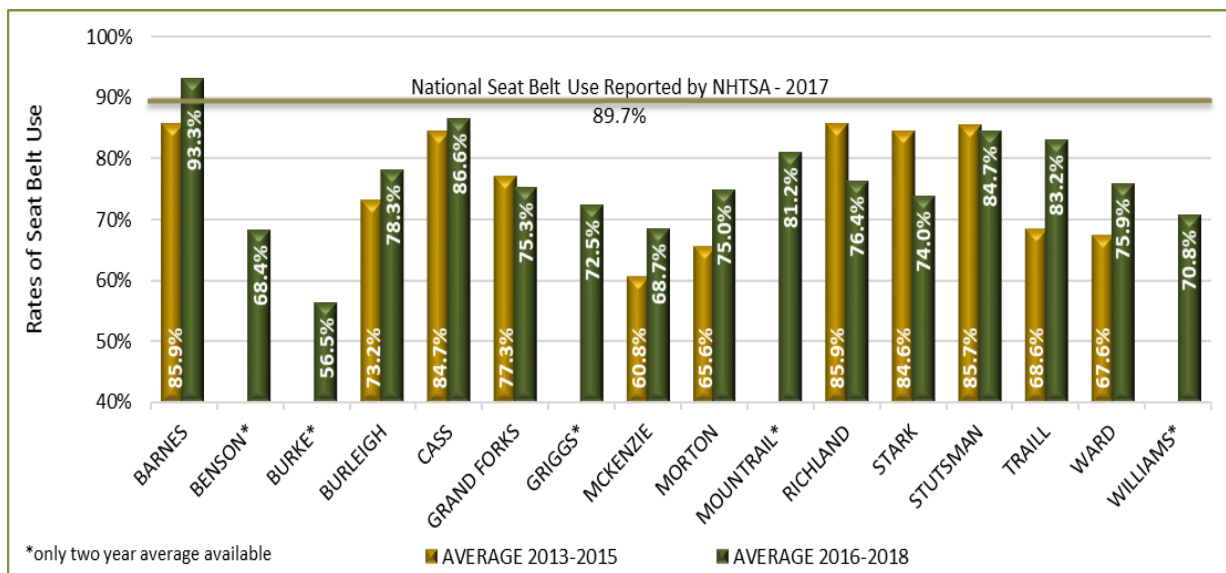
Rates vary from year-to-year at the county level. The changes can represent sampling differences and are not likely to be statistically significant, especially for counties where there are fewer total observations. However, even the rates for counties with more observations may exhibit noticeable change from one year to the next.



**Figure 2: Seat Belt Use by County, 2018, Weighted**

To smooth the annual variability, 3-year averages are graphed in Figure 3 to provide a representation of county rates. This analysis does not offer averages on five counties that were first-year additions to the survey in 2017 because of the reselection process. Rather, occupant use collected during the 2017 and 2018 surveys only is averaged for Benson, Burke, Griggs, Mountrail and Williams counties.

The 3-year averages used for trend comparison show variations in seat belt use in several counties. In the most recent 3-year time frame, Barnes County leads in belt use at 93.3%. Cass, Mountrail, Stutsman, and Traill counties register rates above 80%. It is noted that Burke County's low use of 56.5% reflects two years of data and readers are reminded of the fluctuations that occur from year-to-year.

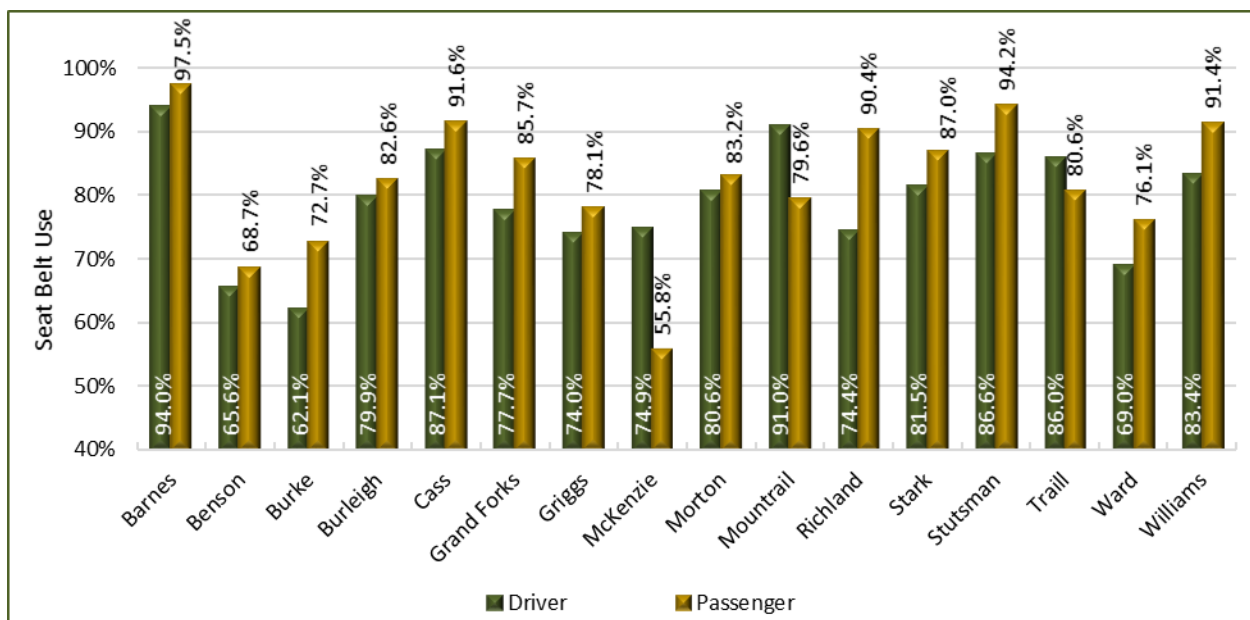


**Figure 3: Seat Belt Use by County, 3-Year Averages, Weighted**

The preceding statewide data is based on the weighted county sampling frame. However, the following sections of this report describe strata frequencies that are unadjusted due to survey design.

## Results for Vehicle Occupants by Position

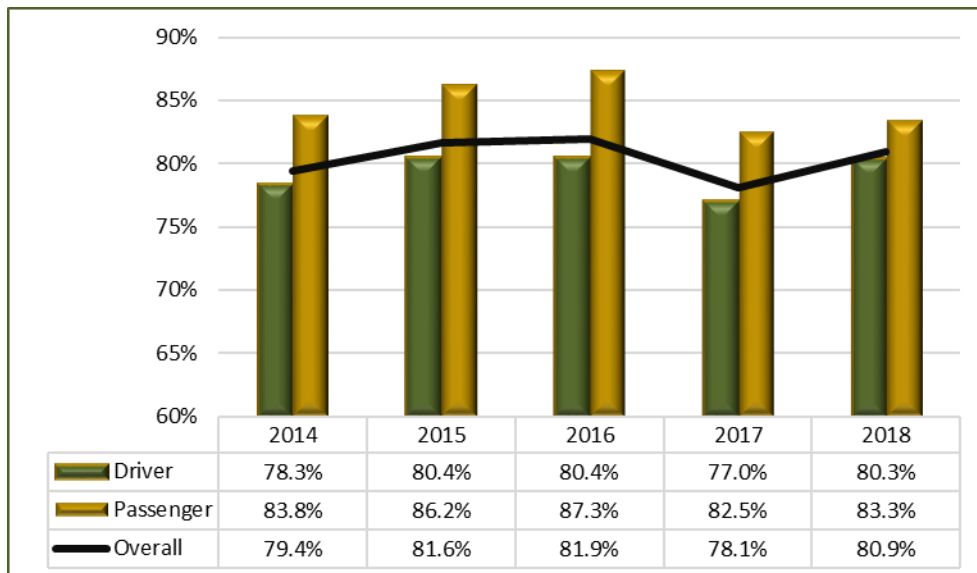
Figure 4 illustrates seat belt use by occupant position in 2018. When examined at the county level, driver use ranged from a low in Burke County of 62.1% to a high in Barnes County of 94.0%. The spread



**Figure 4: Percent Belted by Occupant Position and County, Unweighted, 2018**

in passenger use was 55.8% to 97.5% in McKenzie and Barnes counties, respectively. Annual surveys confirm that, as a rule, passengers buckle up at higher rates than drivers. The 2018 survey showed just three counties, McKenzie and Mountrail, and Traill, with lower restraint use among passengers than drivers.

Considering the state as a whole, the unweighted estimates of seat belt use in 2018 were 80.3% for drivers, 83.3% for passengers, with an overall estimate of the seat belt use rate of 80.9% for drivers and passengers combined (Figure 5). These rates compare to 77.0%, 82.5%, and 78.1%, respectively in 2017.



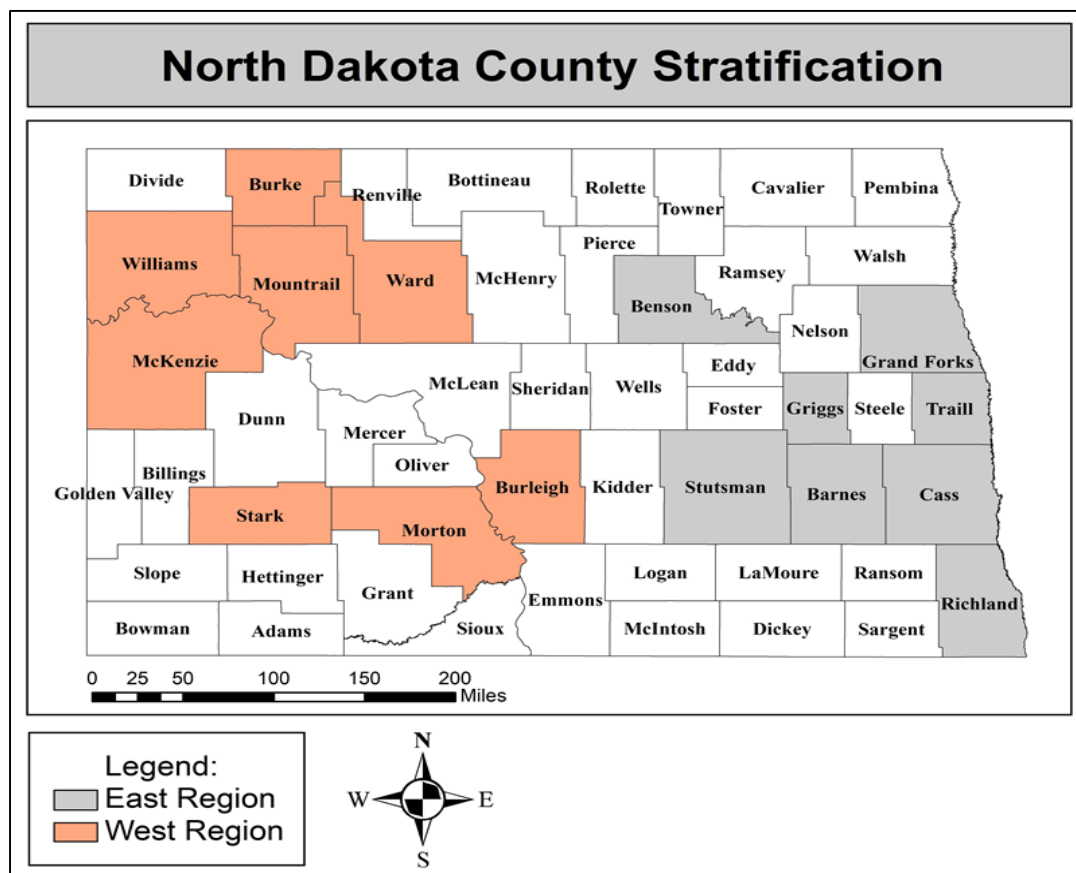
**Figure 5: Percent Belted by Position, Annual, Unweighted**

Considerable effort has been made to address seat belt use in North Dakota. Experiences from other states suggest that some impetus to cause a major shift will be necessary to achieve significant increases in seat belt use. One possibility would be enactment of a primary seat belt law which NHTSA suggests would change seat belt use rates by 10% to 15%. Other possible interventions include heightened education and enforcement across the state.

Some factors that may be useful in administering programs to increase seat belt use in North Dakota are found in the remainder of this report. Differences in seat belt use among regions of the state, gender, vehicle type, and roadway type are explored for additional insight.

## Results by North Dakota Regions

The survey sampling methodology groups the state into an east/west regional division (Figure 6). Both east and west regions contain three “certainty” counties and five additional counties selected from the remaining counties in each region.<sup>3</sup>



**Figure 6: North Dakota County Stratification**

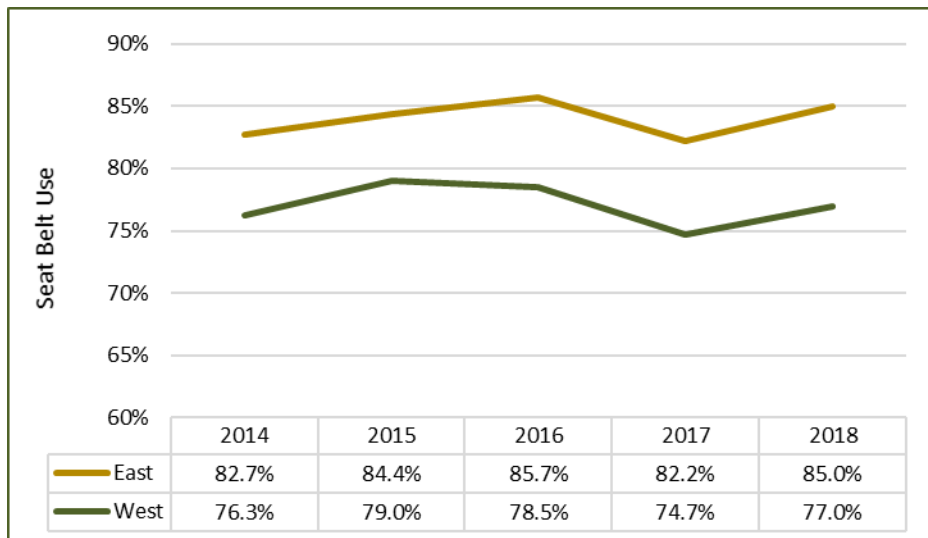
Year-to-year variations in sample size may be associated with revised sites and/or changes in travel levels and patterns. Table 3 shows a proportionate sample distribution between regions throughout the five-year period, although the 2018 records indicate a slim difference in the number of occupants. Seat belt data collected from western North Dakota totaled 12,349 occupants compared to 12,041 from the eastern half of the state. This represented 50.6% and 49.4% of the sample, respectively.

**Table 3: Sample Size By Region**

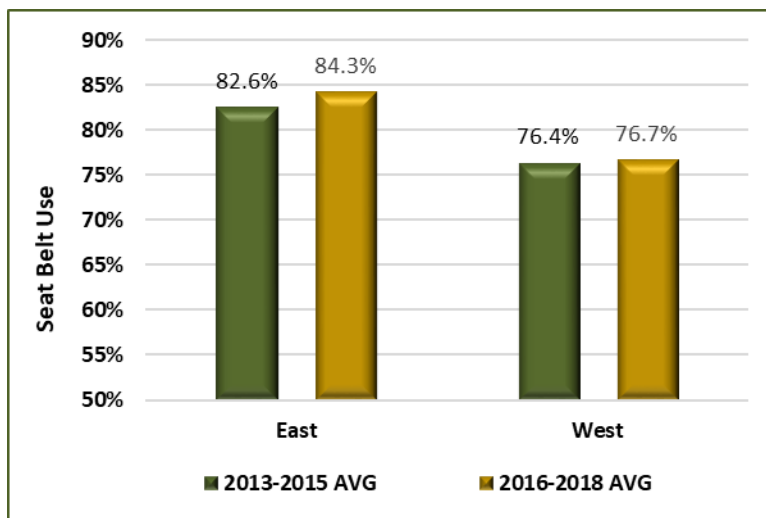
Region	2014	% of Sample	2015	% of Sample	2016	% of Sample	2017	% of Sample	2018	% of Sample
East	13,496	48.5%	13,395	48.2%	12,713	47.4%	11,180	45.4%	12,041	49.4%
West	14,330	51.5%	14,387	51.8%	14,112	52.6%	13,426	54.6%	12,349	50.6%
Total	27,826	100.0%	27,782	100.0%	26,825	100.0%	24,606	100.0%	24,390	100.0%

<sup>3</sup> For details on methodology, certainty counties, and the selection processes, contact NDDOT Safety Division.

Seat belt use is routinely higher in the east than the west as shown in Figure 7. The rate difference between the regions closely resembles differences seen in prior years. Trend lines show a slightly higher trajectory for use in the east region whereas the west region shows the opposite. A 3-year comparison of seat belt use is shown in Figure 8. The average rate in the east was 82.6% from 2013-2015 increasing to 84.3% from 2016-2018. Seat belt use in the west was comparable between the two periods - 76.4% from 2013-2015 and 76.7% from 2016-2018.



**Figure 7: Percent Belted by Region, Unweighted**

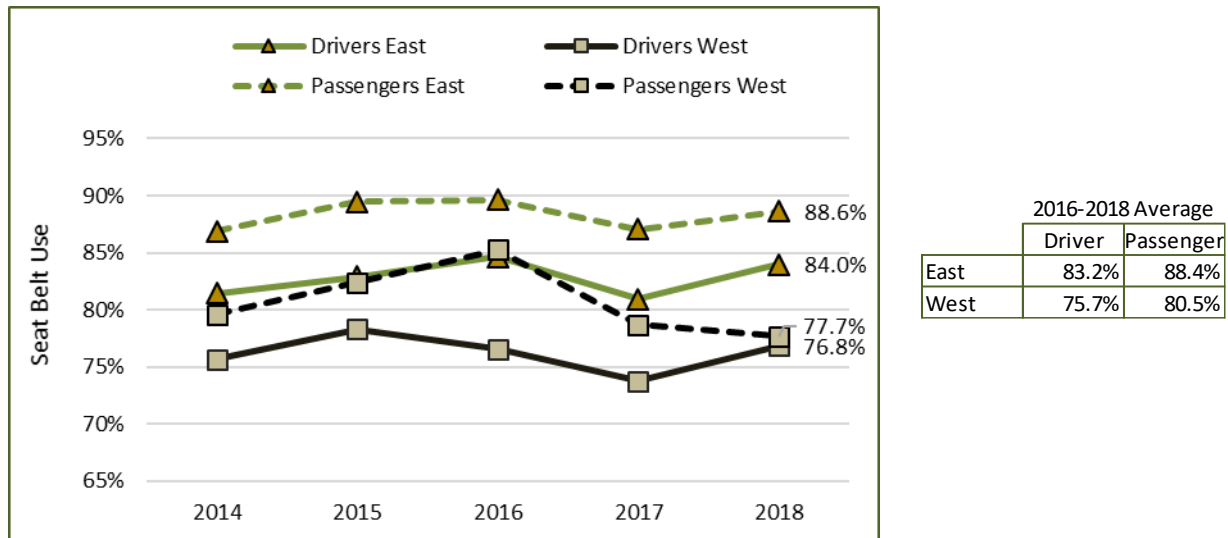


**Figure 8: Seat Belt Use by Region, 3-Year Averages, Unweighted**

A further breakdown of driver and passenger use by region is seen in Figure 9. After a slight decline in 2017, rates of both occupant positions in the east region rebounded, and were observed to be 84.0% for drivers and 88.6% for passengers in 2018. Comparatively, driver rates from the west region also improved in 2018 but continued to represent the lowest use of the four groups at 76.8%. Passenger restraint use in the west region is slightly higher at 77.7%. Seat belt use by truck occupants in the west



region undoubtedly influences the lower rates indicated in the graph. Large truck volume is evident in Burke, Mountrail, Williams, and McKenzie counties with truck share between 55% and 78% in each county. Overall, these counties comprise 43% (n=4191) of the share of occupants in this vehicle type. The disproportionate influence is examined further in the next section.



**Figure 9: Percent Belted by Region and Occupant Position, Annual, Unweighted**

## Results by Vehicle Type

Table 4 shows the fleet distribution annually since 2014. Over that time, the number of cars has continued to decrease from a 28.8% share in 2014 to 22.0% in 2018. Van representation has also declined slightly over this same period and currently represents 6.9% of the sample. The share of SUVs (30.7%) is at the highest level in the 5-year period. Trucks comprise 40.4% of the occupant share in 2018; and historically hold the largest share of vehicle type.

**Table 4: Sample by Vehicle Type**

Vehicles Observed	2014	% of Sample	2015	% of Sample	2016	% of Sample	2017	% of Sample	2018	% of Sample
Car	7,991	28.8%	7,862	28.3%	7,192	26.8%	5,646	22.9%	5,364	22.0%
SUV	6,866	24.8%	7,365	26.5%	7,702	28.7%	7,013	28.5%	7,479	30.7%
Truck	10,610	38.3%	10,471	37.7%	9,811	36.6%	10,213	41.5%	9,857	40.4%
Van	2,251	8.1%	2,084	7.5%	2,120	7.9%	1,734	7.0%	1,690	6.9%
Total	27,718	100.0%	27,782	100.0%	26,825	100.0%	24,606	100.0%	24,390	100.0%

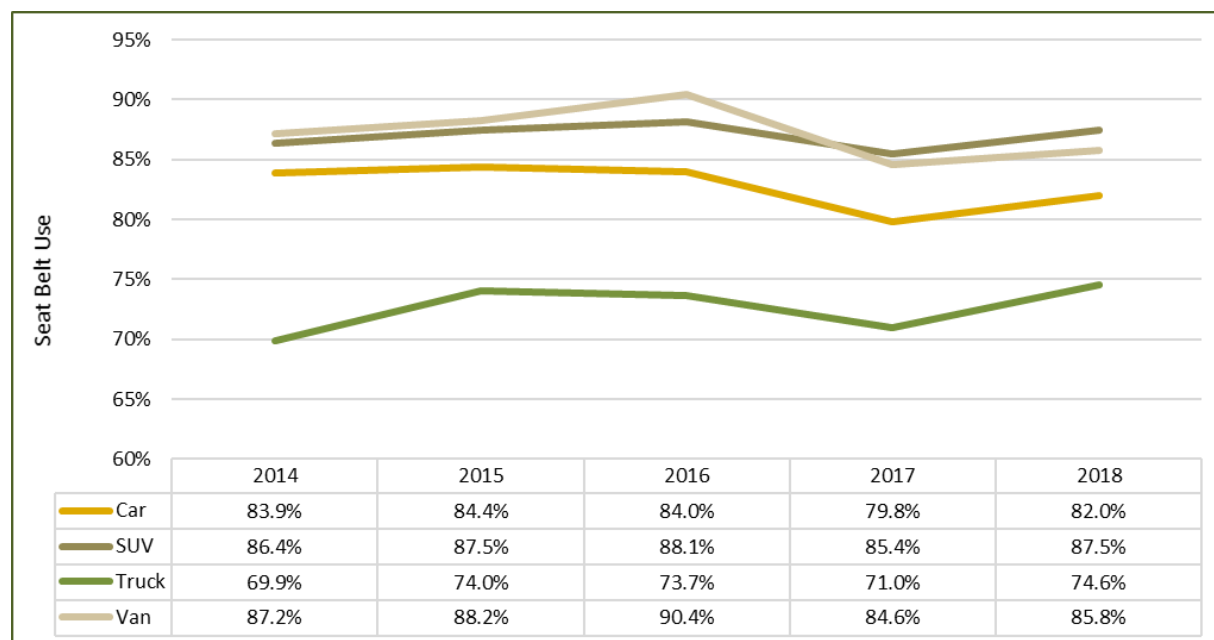
Beginning with the 2012 statewide seat belt survey, North Dakota incorporated the expanded Uniform Criteria vehicle eligibility to define a fleet that included all passenger vehicles with a gross vehicle weight up to 10,000 pounds. This change necessitated the inclusion of various small trucks - e.g. flatbed, utility

service, and small box trucks, etc. Trucks with commercial use indicated by logos on doors or truck body are within the survey scope.

Regionally, trucks represented 47.8% of vehicles in the west, and 32.8% in the east in 2018. The larger vehicle share in the western region, along with the higher volume of trucks, may influence the statewide seat belt rate. The increase of truck share noticed in 2017 and 2018 may be correlated with geography and the addition to this survey of Burke, Mountrail and Williams counties, all located in the Bakken oil region, and each with a truck share representing more than half of their total vehicle counts. This disproportionate number of trucks in the sample may be shaped by North Dakota's oil development. The nature of the travel environments with fewer urban lane miles in the west also likely impacts fleet composition.

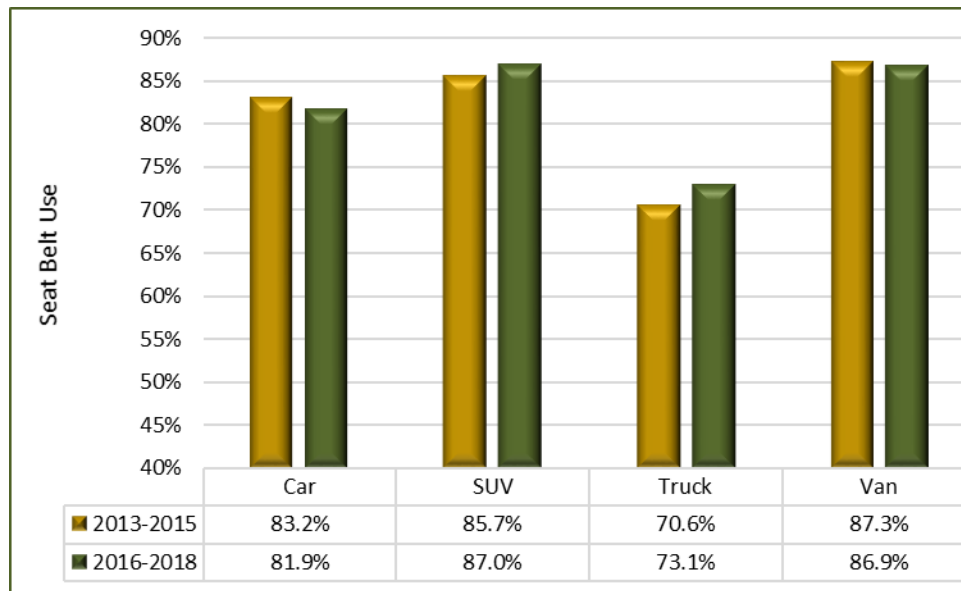
At the county level, this disproportionate share of trucks in the west region was most noticeable in McKenzie County which recorded 78.4% of this vehicle type as a share of the county total, followed by Williams County at 59.4%, Mountrail at 57.9%, and Burke at 55.0%. In the east region, Benson, Grand Forks, and Griggs counties registered the largest shares of trucks, between 40% and 48%.

Annual results for overall seat belt use by vehicle type are shown in Figure 10. SUV and van occupants continue to exhibit the highest rates of use followed by car and truck occupants at 87.5%, 85.8%, 82.0% and 74.6%, respectively. Seat belt use increased in each vehicle type this year, although only truck occupants reached a 5-year high. Nevertheless, this group continues to demonstrate noticeably lower rates than occupants in other vehicle types.



**Figure 10: Percent Belted by Vehicle Type, Annual, Unweighted**

Seat belt use for occupants of each vehicle type is shown in Figure 11 utilizing 3-year averages. Rates in cars and vans are slightly less than in the 2013-2015 period whereas rates for SUVs and trucks are higher. County rates by vehicle type in 2018 are outlined in Table 5.



**Figure 11: Seat Belt Use by Vehicle Type, 3-Year Averages, Unweighted**

**Table 5: Percent Belted by County and Vehicle Type, 2018, Unweighted**

2018							
Car		SUV		Truck		Van	
Barnes	94.2%	Barnes	97.2%	Barnes	92.9%	Barnes	94.4%
Benson	64.8%	Benson	73.1%	Benson	61.3%	Benson	82.5%
Burke	75.8%	Burke	74.6%	Burke	55.7%	Burke	90.0%
Burleigh	79.6%	Burleigh	88.1%	Burleigh	73.5%	Burleigh	76.8%
Cass	86.3%	Cass	94.0%	Cass	80.7%	Cass	92.1%
Grand Forks	83.8%	Grand Forks	88.2%	Grand Forks	68.7%	Grand Forks	82.2%
Griggs	75.0%	Griggs	90.1%	Griggs	61.3%	Griggs	85.0%
McKenzie	72.6%	McKenzie	84.3%	McKenzie	69.7%	McKenzie	59.5%
Morton	71.2%	Morton	90.6%	Morton	77.0%	Morton	87.5%
Mountrail	93.6%	Mountrail	93.2%	Mountrail	84.6%	Mountrail	93.0%
Richland	73.8%	Richland	87.5%	Richland	68.4%	Richland	80.2%
Stark	84.8%	Stark	85.9%	Stark	78.0%	Stark	89.0%
Stutsman	89.0%	Stutsman	95.1%	Stutsman	81.6%	Stutsman	91.4%
Traill	85.7%	Traill	89.3%	Traill	77.3%	Traill	91.2%
Ward	70.8%	Ward	74.7%	Ward	65.7%	Ward	73.8%
Williams	87.2%	Williams	88.7%	Williams	81.6%	Williams	79.4%

The 2018 results are consistent with long-term trends for seat belt use in North Dakota and other states that do not have primary seat belt laws, are largely rural in nature, and have a high proportion of trucks. While seat belt use by occupants in trucks has increased in recent years, Table 5 shows this demographic with rates of less than 70% in nearly half of the counties. This lower use, coupled with the proportion of trucks in the sample, can reduce both county rates and the overall state rate.

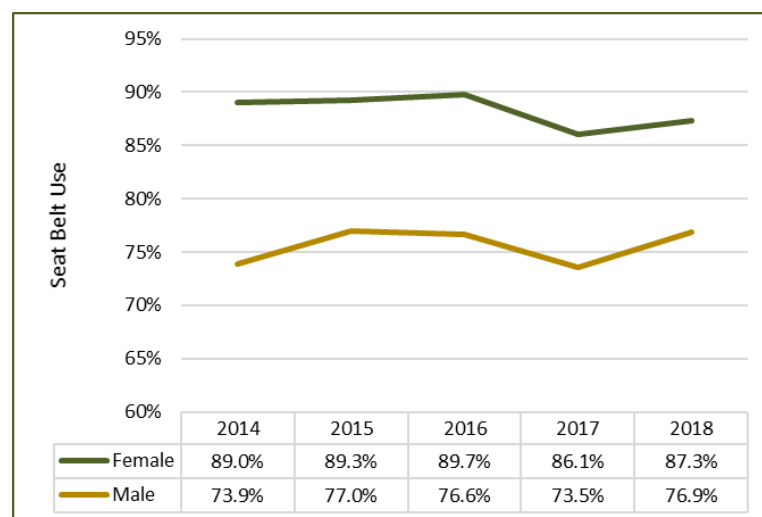
## Results by Occupant Gender and Position

Minimal year-to-year variation in sample composition is observed for occupant gender, summarized in Table 6. Overall, males represented 61.9% and females 37.1% of the sample in 2018. In a small percentage of observations, 1%, occupant gender was unable to be determined, but occupant protection was still recorded. These cases are included in all of the analyses except where gender is one of the variables of interest. Removing these observations for these parts of the analyses has no effect on the overall numbers, but is mentioned here for comprehensive reporting.

**Table 6: Sample by Gender**

Gender Observed	2014	% of Sample	2015	% of Sample	2016	% of Sample	2017	% of Sample	2018	% of Sample
Female	10,109	36.5%	10,458	37.6%	10,559	39.4%	8,817	35.8%	9,049	37.1%
Male	17,581	63.4%	17,309	62.3%	16,035	59.8%	15,624	63.5%	15,099	61.9%
Unknown	28	0.1%	15	0.1%	231	0.9%	165	0.7%	242	1.0%
Total	27,718	100.0%	27,782	100.0%	26,825	100.0%	24,606	100.0%	24,390	100.0%

Survey results for seat belt use by gender continued a pattern of higher rates of use by female occupants. Females demonstrated use of 87.3% in 2018, and have consistently registered in the upper 80% range throughout the last five years (Figure 12). By comparison, male restraint use has regularly been less than 80% although the gender gap has narrowed since 2014. Males were observed to be using seat belts at a rate of 76.9% in 2018.



**Figure 12: Percent Belted by Gender, Annual, Unweighted**

Table 7 shows restraint use by county and gender in 2018. Females were observed to have rates above 80% in thirteen of the sixteen surveyed counties. In comparison, fewer than half the counties showed male rates at that same level. In fact, male use in several counties was much lower. Benson, Griggs, and Ward showed male use less than 70%, while Burke registered less than 60% use.

**Table 7: Percent Belted by Gender & County, 2018**

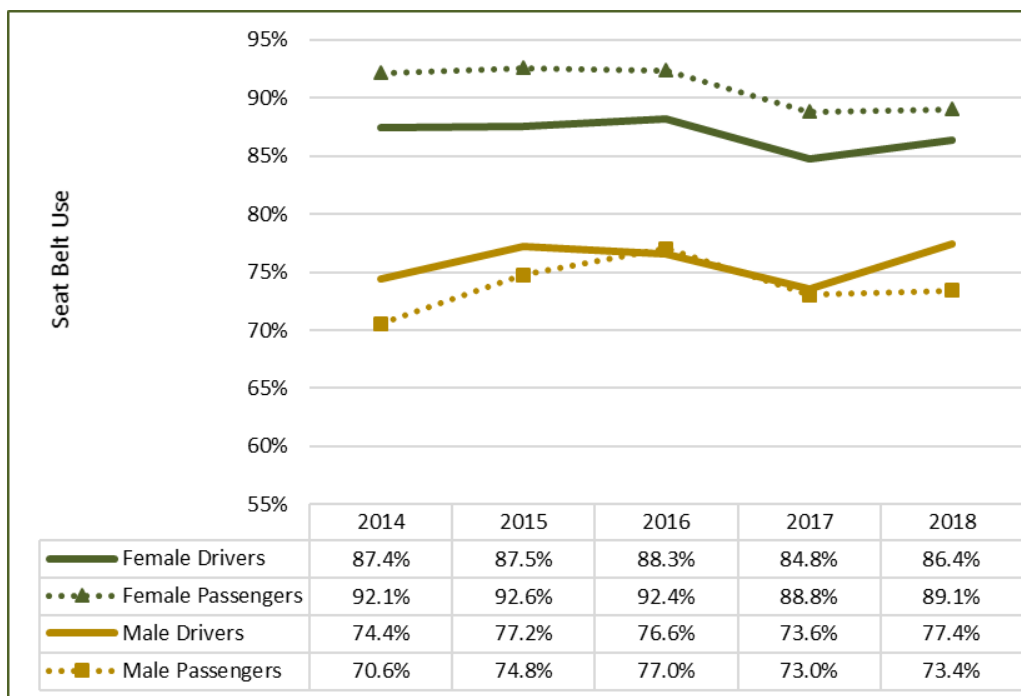
2018			
FEMALE OCCUPANTS		MALE OCCUPANTS	
Barnes	98.0%	Barnes	93.0%
Benson	72.2%	Benson	62.7%
Burke	81.8%	Burke	55.3%
Burleigh	89.3%	Burleigh	73.9%
Cass	94.0%	Cass	83.4%
Grand Forks	89.4%	Grand Forks	71.0%
Griggs	88.4%	Griggs	66.8%
McKenzie	78.3%	McKenzie	70.3%
Morton	88.6%	Morton	76.0%
Mountrail	92.0%	Mountrail	86.3%
Richland	86.5%	Richland	70.4%
Stark	84.9%	Stark	80.6%
Stutsman	95.3%	Stutsman	83.9%
Traill	87.3%	Traill	83.0%
Ward	78.4%	Ward	65.0%
Williams	87.1%	Williams	82.5%

The sample by gender and occupant position also remains stable from year to year. Although the sample size is smaller since the reselection process in 2017, the gender distribution of drivers and passengers is proportionate to prior years. As described in Table 8, drivers were more than twice as likely to be male than female (13,268 compared to 5,943). In contrast, there were roughly 40% fewer male passengers than female (3,106 compared to 1,831).

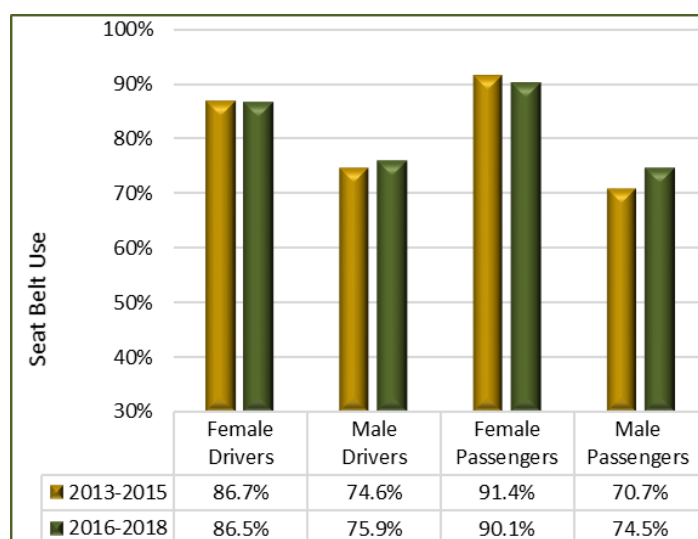
**Table 8: Sample by Gender and Position**

Occupants Observed	2014	% of Sample	2015	% of Sample	2016	% of Sample	2017	% of Sample	2018	% of Sample
<b>Drivers:</b>										
Male	15,478	55.8%	15,346	55.2%	14,119	52.6%	13,702	55.7%	13,268	54.4%
Female	6,710	24.2%	6,904	24.9%	6,770	25.2%	5,966	24.2%	5,943	24.4%
<b>Passengers:</b>										
Male	2,103	7.6%	1,963	7.1%	1,916	7.1%	1,922	7.8%	1,831	7.5%
Female	3,399	12.3%	3,554	12.8%	3,789	14.1%	2,851	11.6%	3,106	12.7%
<b>Unknown:</b>	28	0.1%	15	0.1%	231	0.9%	165	0.7%	242	1.0%
<b>Total</b>	27,718	100.0%	27,782	100.0%	26,825	100.0%	24,606	100.0%	24,390	100.0%

Survey results corroborate higher rates of use by females regardless of occupant position. Passenger seat belt use by both genders in this survey approximated 2017 rates, however, an upturn in driver rates by both genders was observed in 2018 (Figure 13). Female passenger and driver rates were 89.1% and 86.4%, respectively. Male rates were considerably lower at 73.4% for passengers and 77.4% for drivers. The gap between male driver and passenger use reemerged in 2018 after narrowing in the previous two surveys. Female counterparts show more disparity between occupant position in those same years.



**Figure 13: Percent Belted by Gender and Position, Annual, Unweighted**



**Figure 14: Seat Belt Use by Gender & Position, 3-Year Averages, Unweighted**

Although female occupants continue to use seat belts at higher rates than their male counterparts, a comparison of 3-year averages suggests an increase in belt use for male occupants, particularly male passengers (Figure 14). Rates for male drivers were 74.6% in 2013-2015, and 75.9% in 2016-2018. Male passenger rates increased from 70.7% to 74.5%, respectively. Similar use was indicated in both time periods by female drivers, and there was a slight decrease by female passengers.

Additional detail is found in Table 9 which shows seat belt use by county in 2018. There are wide-ranging rates in individual counties in all occupant positions.

**Table 9: Percent Belted by Gender and Position by County, 2018, Unweighted**

2018							
FEMALE DRIVERS		FEMALE PASSENGERS		MALE DRIVERS		MALE PASSENGERS	
Barnes	97.8%	Barnes	98.3%	Barnes	92.5%	Barnes	96.3%
Benson	70.3%	Benson	77.8%	Benson	63.3%	Benson	57.8%
Burke	76.1%	Burke	87.5%	Burke	57.3%	Burke	43.2%
Burleigh	89.3%	Burleigh	89.5%	Burleigh	74.1%	Burleigh	72.6%
Cass	92.8%	Cass	96.3%	Cass	83.6%	Cass	81.8%
Grand Forks	88.2%	Grand Forks	94.1%	Grand Forks	70.9%	Grand Forks	72.7%
Griggs	87.9%	Griggs	90.0%	Griggs	66.9%	Griggs	66.7%
McKenzie	81.5%	McKenzie	71.3%	McKenzie	74.0%	McKenzie	50.2%
Morton	89.1%	Morton	88.0%	Morton	76.5%	Morton	73.5%
Mountrail	96.4%	Mountrail	85.1%	Mountrail	89.0%	Mountrail	72.4%
Richland	85.2%	Richland	91.0%	Richland	69.0%	Richland	89.2%
Stark	83.2%	Stark	87.2%	Stark	80.2%	Stark	86.5%
Stutsman	94.2%	Stutsman	96.5%	Stutsman	83.2%	Stutsman	88.4%
Traill	88.9%	Traill	84.1%	Traill	84.2%	Traill	73.9%
Ward	76.1%	Ward	84.8%	Ward	65.1%	Ward	64.0%
Williams	87.9%	Williams	81.3%	Williams	81.9%	Williams	100.0%

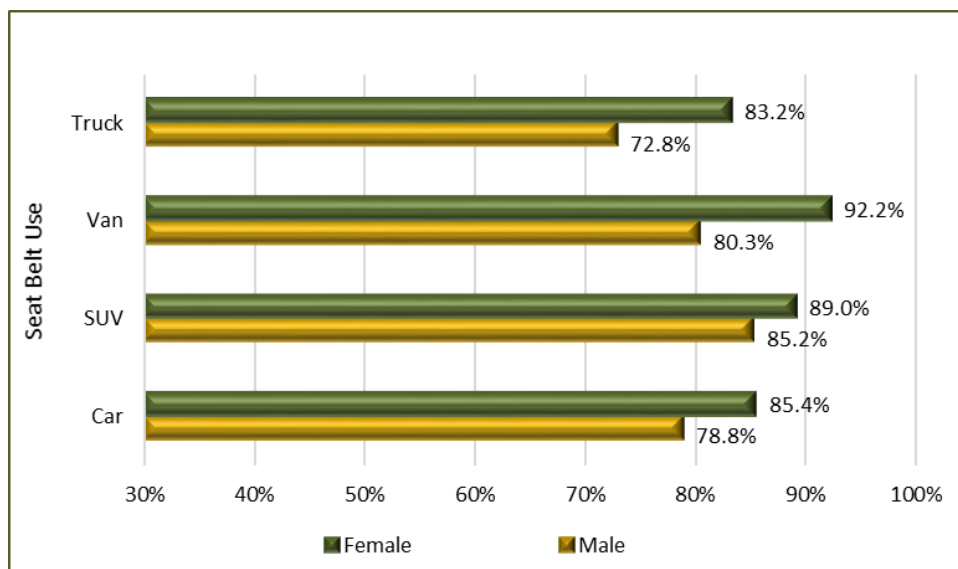
## Results by Gender and Vehicle Type

Examining survey sample size without respect to the driver/passenger demographic shows the ratio of male to female occupants is about 1.67 to 1 in 2018 (Table 10). When considering vehicle type, males show lower representation in SUVs, but higher shares of the overall sample in all other vehicle types. A rather large gender imbalance continues to be noticed in the truck category, where males were 84% of the overall occupant share of this vehicle type.

**Table 10: Sample by Vehicle Type and Gender**

Occupants Observed	2014	% of Sample	2015	% of Sample	2016	% of Sample	2017	% of Sample	2018	% of Sample
<b>Male</b>										
Car	4,131	14.9%	4,046	14.6%	3,531	13.2%	2,997	12.2%	2,843	11.7%
SUV	3,211	11.6%	3,303	11.9%	3,359	12.5%	2,937	11.9%	3,089	12.7%
Truck	9,054	32.7%	8,824	31.8%	8,049	30.0%	8,699	35.4%	8,248	33.8%
Van	1,185	4.3%	1,136	4.1%	1,096	4.1%	991	4.0%	919	3.8%
<b>Female</b>										
Car	3,856	13.9%	3,812	13.7%	3,568	13.3%	2,590	10.5%	2,438	10.0%
SUV	3,643	13.1%	4,056	14.6%	4,261	15.9%	4,017	16.3%	4,316	17.7%
Truck	1,547	5.6%	1,642	5.9%	1,725	6.4%	1,483	6.0%	1,551	6.4%
Van	1,063	3.8%	948	3.4%	1,005	3.7%	727	3.0%	744	3.1%
<b>Unknown:</b>	28	0.1%	15	0.1%	231	0.9%	165	0.7%	242	1.0%
<b>Total</b>	27,718	100.0%	27,782	100.0%	26,825	100.0%	24,606	100.0%	24,390	100.0%

Differences in seat belt use by gender varied across the vehicle types (Figure 15). In the 2018 survey, male occupants were belted from a low of 72.8% in trucks to a high of 85.2% in SUVs. Females were belted at rates above 80% in all vehicle types – ranging from a low of 83.2% in trucks, to a high of 92.2% in vans.

**Figure 15: Percent Belted by Gender and Vehicle Type, 2018, Unweighted**

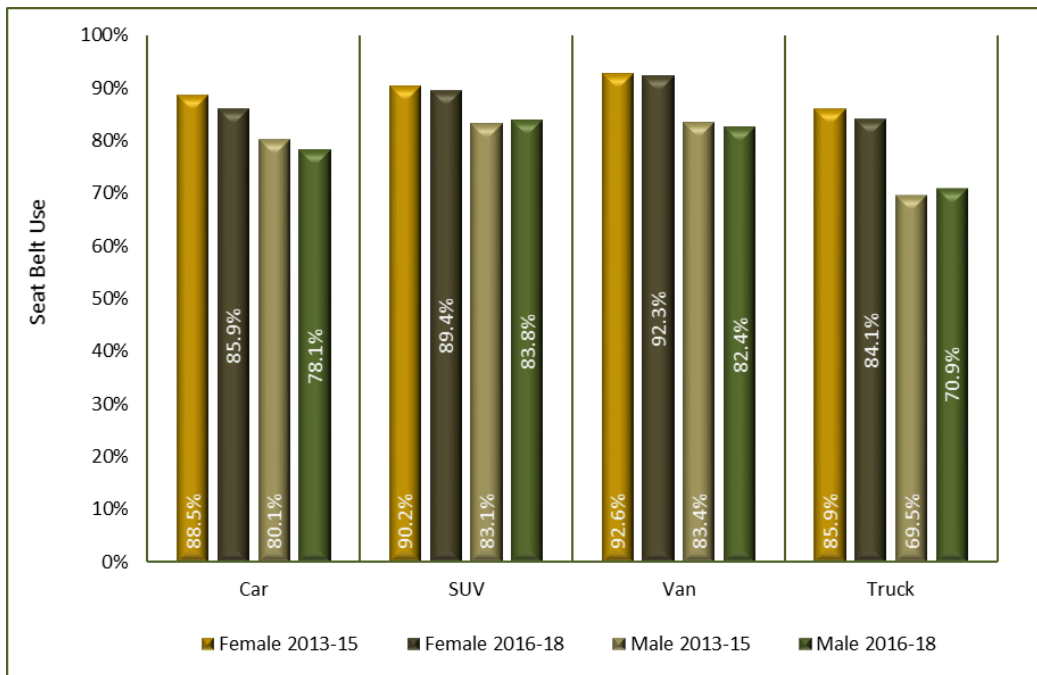
Although the size of the disparity between gender belt use shifts from year-to-year, male use is shown to be lower than female use in every vehicle type in every year by as much as 18.6 percentage points in trucks in 2014 to as little as 3.8 percentage points in SUVs in 2018 (Table 11). Female rates are consistently high throughout the five years, at least 83.2%. By contrast, annual rates for male belt use are much lower with the highest use at 86.6%. Both genders are observed to have the lowest use in trucks, and this is also where the gender difference is most noticeable.



**Table 11: Annual Percent Belted by Gender and Vehicle Type, Unweighted**

Male	2014	2015	2016	2017	2018
Car	79.6%	80.7%	79.1%	76.5%	78.8%
SUV	82.5%	83.7%	84.4%	81.7%	85.2%
Van	82.4%	84.4%	86.6%	80.4%	80.3%
Truck	67.2%	71.8%	71.0%	68.9%	72.8%
Female	2014	2015	2016	2017	2018
Car	88.5%	88.4%	88.7%	83.5%	85.4%
SUV	89.9%	90.5%	91.0%	88.2%	89.0%
Van	92.6%	92.7%	94.5%	90.1%	92.2%
Truck	85.7%	86.0%	86.0%	83.0%	83.2%

Minor reductions in seat belt use by females are reflected in all vehicle types comparing 2013-2015 to 2016-2018 (Figure 16). Male occupants show similar reductions in belt use in cars and vans. However, there were small upticks in rates in SUVs and trucks between the two periods.



**Figure 16: Seat Belt Use by Gender and Vehicle Type, 3-Year Averages, Unweighted**

## Results by Road Type

Roadways are classified into three road types and broadly described as follows:

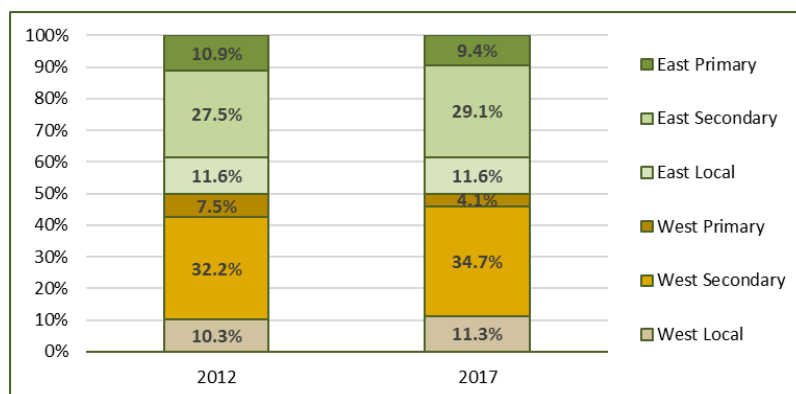
- Primary road – divided, limited-access, e.g. interstates
- Secondary road – main arteries usually in the U.S./state/county highway system
- Local neighborhood road/rural road/city street – paved, non-arterial streets

There were 12,041 observations collected from the east region and 12,349 from the west during the 2018 survey. Primary, secondary and local roadways accounted for 41.8%, 48.7%, and 9.5% of the vehicle occupants, respectively. Sample distribution by road type and region is diverse as shown in Table 12. Through 2016, more observations were collected from primary and local road sites in the east, and fewer observations from sites located on secondary roads. The NHTSA-mandated reselection of sites for the 2017 survey heightened the regional disparity in road classification sample sizes. There was a sizeable decrease in the local road sample in the east from previous years resulting in similar sample distribution on this road type between the regions in 2017 and 2018 surveys. The number of observations from secondary roads in the west is more than double those in the east. Sample variations are associated with revisions in the number of sites drawn in each road type between 2012 and 2017, as well as contrasting traffic volume at new site locations.

**Table 12: Sample by Road Type**

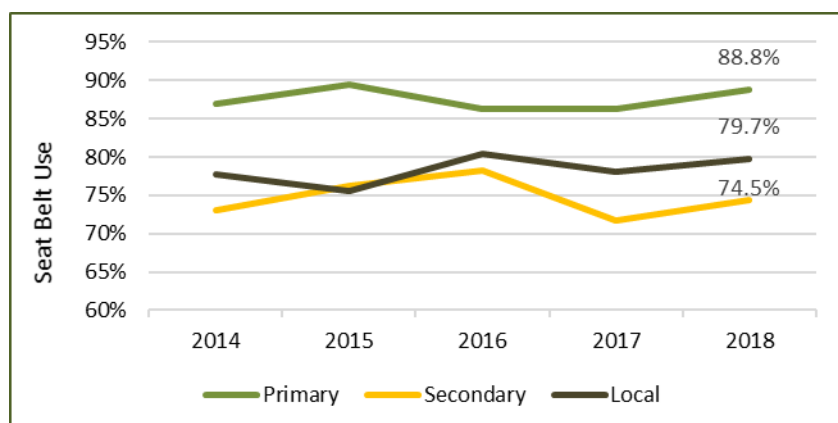
Occupants Observed	2014	% of Sample	2015	% of Sample	2016	% of Sample	2017	% of Sample	2018	% of Sample
<b>East</b>										
Primary	7,324	26.4%	7,133	25.7%	6,884	25.7%	7,290	29.6%	7680	31.5%
Secondary	4,045	14.6%	3,982	14.3%	3,735	13.9%	3,001	12.2%	3223	13.2%
Local	2,127	7.7%	2,280	8.2%	2,094	7.8%	889	3.6%	1138	4.7%
<b>Total East</b>	<b>13,496</b>	<b>48.7%</b>	<b>13,395</b>	<b>48.2%</b>	<b>12,713</b>	<b>47.4%</b>	<b>11,180</b>	<b>45.4%</b>	<b>12,041</b>	<b>49.4%</b>
<b>West</b>										
Primary	4,154	15.0%	4,282	15.4%	4,571	17.0%	2,597	10.6%	2515	10.3%
Secondary	8,828	31.8%	8,572	30.9%	8,119	30.3%	9,727	39.5%	8664	35.5%
Local	1,240	4.5%	1,533	5.5%	1,422	5.3%	1,102	4.5%	1170	4.8%
<b>Total West</b>	<b>14,222</b>	<b>51.3%</b>	<b>14,387</b>	<b>51.8%</b>	<b>14,112</b>	<b>52.6%</b>	<b>13,426</b>	<b>54.6%</b>	<b>12,349</b>	<b>50.6%</b>
<b>Total</b>	<b>27,718</b>	<b>100.0%</b>	<b>27,782</b>	<b>100.0%</b>	<b>26,825</b>	<b>100.0%</b>	<b>24,606</b>	<b>100.0%</b>	<b>24,390</b>	<b>100.0%</b>

Contextual information is provided in Figure 17 identifying the proportion of sites by road type established with the amended methodology in 2012 followed by the reselection in 2017. These sample disparities, along with diverse habits of restraint use, factor into the regional differences in rates. Although the weighted results do include adjustments for changes to road site characteristics, the unweighted results may be influenced by the site mix and underlying characteristics such as higher use rates on interstate corridors.



**Figure 17: Percent of 320 Survey Sites by Road Type, 2012 and 2017**

Figure 18 shows vehicle occupants on primary roadways were belted at a rate considerably higher than the occupants on secondary and local roads. Restraint use in 2018 on primary roads (88.8%) was higher than the preceding two-years. Rates on secondary roads (74.5%) also increased, but lagged behind the high seen in 2016. Occupants traveling this road type demonstrate the lowest rates of the three road classifications. Other than in 2015, occupants on local roads (79.7%) consistently used restraints at higher levels than those on secondary roads.



**Figure 18: Percent Belted by Road Type, Annual, Unweighted**

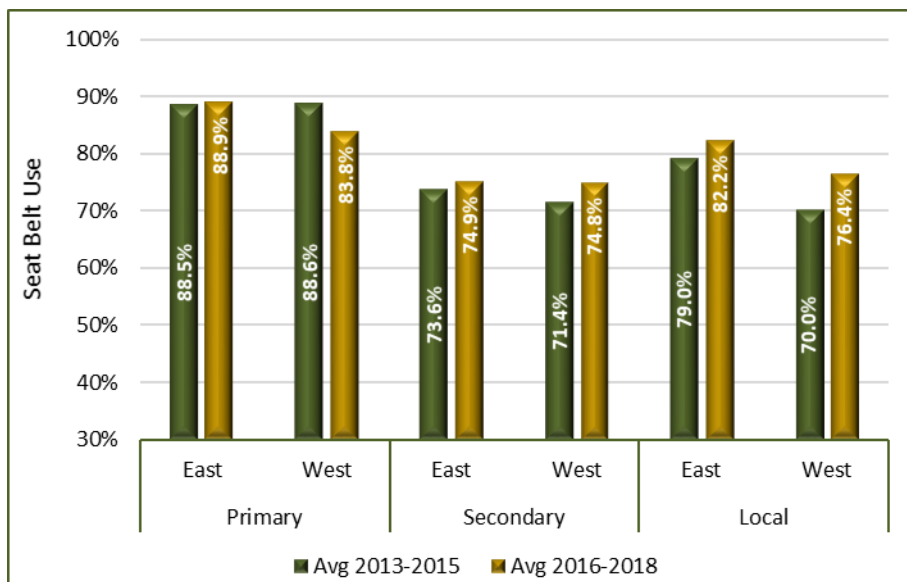
Annual rates stratified by region and road type are shown in Table 13. Restraint use on primary roads in the east region ranges from 86.3% to 91.0%, while corresponding roads in the west region range from 79.0% to 88.1%. Use on secondary roads fluctuates between 72.6% and 77.5% in the east, and 71.5% and 74.3% in the west. Occupants traveling local roads were belted at rates ranging from 80.4% to 83.1%, and 67.8% and 76.5% in the east and west regions, respectively. With the occasional exception, rates of use are higher in the east on every road type.

**Table 13: Annual Percent Belted by Region & Road Type, Unweighted**

EAST	2014	2015	2016	2017	2018
Primary	88.1%	90.4%	91.0%	86.3%	89.5%
Secondary	74.1%	75.6%	77.5%	72.6%	74.8%
Local	80.7%	80.8%	83.1%	80.4%	83.1%
WEST	2014	2015	2016	2017	2018
Primary	85.1%	88.1%	79.0%	86.0%	86.4%
Secondary	72.7%	76.5%	78.5%	71.5%	74.3%
Local	72.5%	67.8%	76.5%	76.3%	76.3%
TOTAL	2014	2015	2016	2017	2018
Primary	87.0%	89.5%	86.2%	86.2%	88.8%
Secondary	73.1%	76.2%	78.2%	71.7%	74.5%
Local	77.7%	75.6%	80.4%	78.2%	79.7%

To balance the year-to-year variability of rates in each road type, Figure 19 compares 3-year averages. The averages for 2016-2018 show an increase over 2013-2015 averages in seat belt use on all road types in both regions except on primary roads in the west. Regionally the east and west average is uniform on

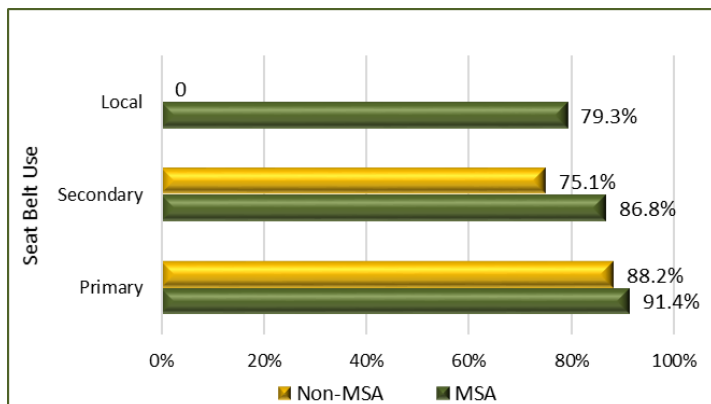
secondary roads in both terms, 74.9% in the east and 74.8% in the west, but show more divergence on primary and local roads.



**Figure 19: Seat Belt Use by Roadway Type, 3-Year Averages, Unweighted**

Additional insight is found in delineating restraint use by road type and metropolitan statistical areas (MSA). MSA counties are defined as a core area consisting of a larger population nucleus and adjacent communities with high economic and social involvement (U.S. Census Bureau). The designated MSA counties in the North Dakota observational seat belt survey are Burleigh/Morton, Cass, and Grand Forks.

The data shown in Figure 20 is unweighted and does not account for the allocation of sites by road type in the two categories. Analysis shows higher restraint use in MSA counties on primary and secondary roads compared to the same road types in non-MSA counties. Vehicle occupants in MSA counties were buckled up at a relatively high rate of 91.4% on primary roads followed by 86.8% on secondary roads. Occupants on local roads in MSA counties were restrained at a lower rate, 79.3%. Local road sites were outside the sampling frame in non-MSA counties, so a comparison of that road type is not available.



**Figure 20: Percent Belted by Road Type & Metropolitan Statistical Areas, 2018, Unweighted**

Table 14 shows sample size and restraint use by MSA designation, road type, and region. A preponderance of observations from the primary road type was collected in non-MSA counties in the east (n=7351) compared to the west (n=1999). Regardless of this difference, the rate of belted occupants on primary road segments was comparable, 88.9% in the east and 85.5% in the west. Primary roads in MSA counties were also observed to have similar rates in each region, 93.9% and 90.2%, respectively.

**Table 14: Seat Belt Use by Region and MSA Designations**

		East		West	
		Sample	Belted	Sample	Belted
Primary	MSA	329	93.9%	516	90.2%
	non-MSA	7351	88.9%	1999	85.5%
Secondary	MSA	235	81.6%	54	92.0%
	non-MSA	2988	74.9%	8610	75.3%
Local	MSA	1138	82.6%	1170	76.0%
	non-MSA	n.a.	n.a.	n.a.	n.a.

For occupants traveling on secondary roads, 98% of the overall observations were collected in non-MSA counties. Again, noting the disparate size of the sample between regions, the rates were equal at 74.9% in the east and 75.3% in the west. A greater difference between regions was found on secondary roads in MSA counties, 81.6% in the east and 92.0% in the west.

As mentioned previously, observations were collected on local roads in MSA counties only per NHTSA protocol guidance. The sample size by region was similar, with rates moderately higher in the east than the west, 82.6% and 76.0%, respectively.

## FIELD SURVEY PROTOCOL

**Table 15: Summary of the Seat Belt Use Survey**

<b>Methodology</b>	Multistage Stratified Cluster Design with Probability Proportional to Size Sampling
<b>Source of Samples</b>	NHTSA supplied FARS, VMT, and road segment data
<b>Geographic Coverage</b>	State of North Dakota
<b>Identified Regions</b>	East West

<b>Selected Counties</b>	<u>East Region:</u> Barnes, Benson, Cass, Grand Forks, Griggs, Richland, Stutsman, Traill <u>West Region:</u> Burke, Burleigh, McKenzie, Morton, Mountrail, Stark, Ward, Williams
<b>Number of Sites</b>	320
<b>Survey Period</b>	June 4-10, 2018
<b>Observation Duration Per Site</b>	60 minutes
<b>Sample Size</b>	24,390 vehicle occupants (includes all vehicles where either the driver or passenger or both had a known protection status)

## Standard Error and Confidence Intervals

The standard error of the state seat belt use rate measures the amount of random sampling error in the survey results. The smaller the standard error, the more accurate the seat belt use rate when compared to the true, but unknown, seat belt use rate for North Dakota. Assuming the design of the survey accurately measures the variable of interest, the larger the survey sample the more accurate the results.

The standard error for the state seat belt use was calculated to be 0.007% using SAS statistical software. From this, a 95% confidence interval for the state seat belt use can be determined. The 95% confidence interval means that statistically there is only a 5% chance that the actual statewide seat belt percentage falls outside the range of 81.1% to 83.9%.

**Table 16: Confidence Interval**

95% Confidence Interval and Estimated Standard Error for the 2018 State Seat Belt Use				
Occupants	State Rate	Standard Error	95% CI Lower Limit	95% CI Upper Limit
24,390	82.5%	0.007%	81.1%	83.9%

## Nonresponse Rate

A factor that could potentially bias the results and invalidate the survey is exceedingly high nonresponse rates. A nonresponse occurs when the observer tries but cannot determine an occupant's seat belt use. In the 2018 survey, 19,383 drivers and 5,007 passengers were observed for a total of 24,390 vehicle occupants. Seat belt use could not be determined for 1,384 vehicle occupants resulting in a nonresponse rate of 5.5%. As stipulated in NHTSA's guidelines, the nonresponse rate did not exceed the allowable maximum of 10% so no re-sampling was necessary.

## Protocols

### Observers

Observers contracted to conduct the 2018 statewide seat belt survey were required to complete online training. The training module covered survey methods and observer responsibilities, as well as knowledge points requiring correct responses in order to move forward in the module. Completion of training was verified by the survey administrator.

All observers were required to have a current driver's license with proof of adequate vehicle insurance. They were required to use seat belts and wear safety vests while conducting field observations.

### Observational Protocols

The observational protocols used in the 2018 study adhere to the Uniform Criteria as outlined in the Federal Register.

Observations were conducted Monday through Sunday. The day of the week and time of day were randomly chosen for one site within each county. The remaining sites within each county were arranged based on the first site to minimize travel time and costs. This predetermined order of daily observation sites was provided to each observer before the survey. A complete list of county observation sites is available in the survey certification documentation submitted to NHTSA. The traffic direction of vehicles to be observed was randomly chosen in advance and was limited to one direction.

An 11-hour block of daylight, from 7 a.m. to 6 p.m., was identified as the observational period. Observations at each site occurred in the predetermined time slot, requiring a 60-minute observation period, which began at the start of the pre-determined time slot - or the first 5-minute interval after arrival at the site if the observer was delayed - and ended 60 minutes later.

### Traffic Conditions and Data Collection Problems

Observers were trained to cope with traffic problems in the following manner:

- When traffic was heavy and there were too many vehicles to observe, recording was done as long as possible and then stopped until the observer could catch up with observations. Some vehicles were, therefore, outside the sample. When this occurred, counting resumed after no more than a one-minute pause. Once an observer's eyes were locked on a vehicle, a record of that vehicle was required on the observation form.
- At sites with more than one lane of traffic in the predetermined direction, observations were made from the lane closest to the observer.

## **Site Accessibility Problems**

Field observers could terminate observations at a preselected site if any of the following circumstances arose: (1) weather conditions that would hinder the accuracy of the observations; (2) heavy traffic flow that might endanger the safety of the observer; or (3) road conditions that rendered observations unfeasible, such as road construction, detoured traffic, or a crash site. In these circumstances, observers were directed to contact the project coordinator immediately for assignment of an alternate site if a suitable vantage point could not be established approximate to the detour.

## **Observed Vehicles**

All vehicles with a gross vehicle weight up to 10,000 lbs. were observed and classified on the observation form as cars, vans, sport utility vehicles, and trucks. Large trucks (semi or large box), large emergency vehicles (ambulance/fire), and RVs/motor homes were not included in the survey.

## **Observations**

Type of vehicle, gender, and seat belt use for both drivers and right front seat passengers were recorded. Observations occurred from within the observer's vehicle whenever possible. The observer was parked as close as possible to the road for accurate observation without compromising observer safety. If observations could not be conducted from within the vehicle, the observer was allowed to stand off the roadway. Observers were required to wear an ANSI-approved Type-2 safety vest at all times to enhance the visibility of the observer.

## **Problems Encountered by Observers**

If traffic, observer safety, or construction issues were problematic, alternate sites were available through the project coordinator. Observer placement was managed according to site protocols. Intermittent problems relating to road construction and inclement weather did not seriously impede schedules, and hour-long observations were fulfilled as described in the protocol with on-time arrival at subsequent sites not seriously impacted. In accordance with the Federal Register, if scheduled observations were not carried out for any of the above reasons, a return visit would have been arranged the following week adhering to the original prescribed schedule for data collection.

## **Quality Assurance**

### **Observers**

Online training was offered at the observers' convenience. All contracted observers were required to complete the online training prior to survey week. Completion was verified and follow-up phone calls were made to first-time observers to answer any questions and ensure full understanding of observer duties and survey protocols.

During observation week, quality control personnel carried out unannounced site visits (one per county)



to verify observers were located within valid road segments, conforming to the prearranged day of week/time of day schedules, and properly recording seat belt data. It is required that quality control personnel visit any new observers during their initial observation day to assure protocol compliance and verify safe observation practices.

### **Data Entry**

Steps were taken to ensure quality control with respect to data entry. Each site packet was checked to ensure the number of observation sheets submitted was the same as that noted by the observers. Database records were verified to match the number of observations. An accuracy check was done on a systematic sample of records and was measured at greater than 99.9% for every field. Errors discovered during quality assurance checks were corrected prior to completion of all analyses.

## **CONCLUSION**

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Uniform Criteria published in 2011 guided the development of methodology used for seat belt surveys in North Dakota from 2012 through 2016. This methodology changed the focus from population-based criterion to traffic-crash-related fatalities data for county sampling. The federal criteria mandated a reselection of observation sites at 5-year intervals. This reselection requirement was carried out in 2017 without further modifications to the survey design.

For the 2018 statewide survey, observers recorded seat belt use for 19,383 drivers and 5,007 right front-seat passengers, for a total of 24,390 vehicle occupants. The unweighted estimates of seat belt use were 80.3% for drivers, 83.3% for passengers, and 80.9% overall. Adjusting the raw state rate for the survey design and weights resulted in an overall weighted state rate of 82.5% which is the generalizable seat belt use rate for the state. Rates by strata such as gender, vehicle type, region, roadway, population density, and distraction are unweighted due to the sample design.

North Dakota's weighted seat belt rate of 82.5% falls below the most recent seat belt results published by NHTSA of 89.7% nationally. The gap is less disparate when compared to states with similar seat belt laws (secondary) where NHTSA reports restraint use of 85.7% (2017). In general, the findings in the 2018 North Dakota statewide survey are consistent with the findings of previous surveys. Experiences from other states indicate that improvement in seat belt use will likely only occur through some type of significant change such as implementation of a primary seat belt law, increased funding for additional enforcement, or possibly higher fines (NHTSA).