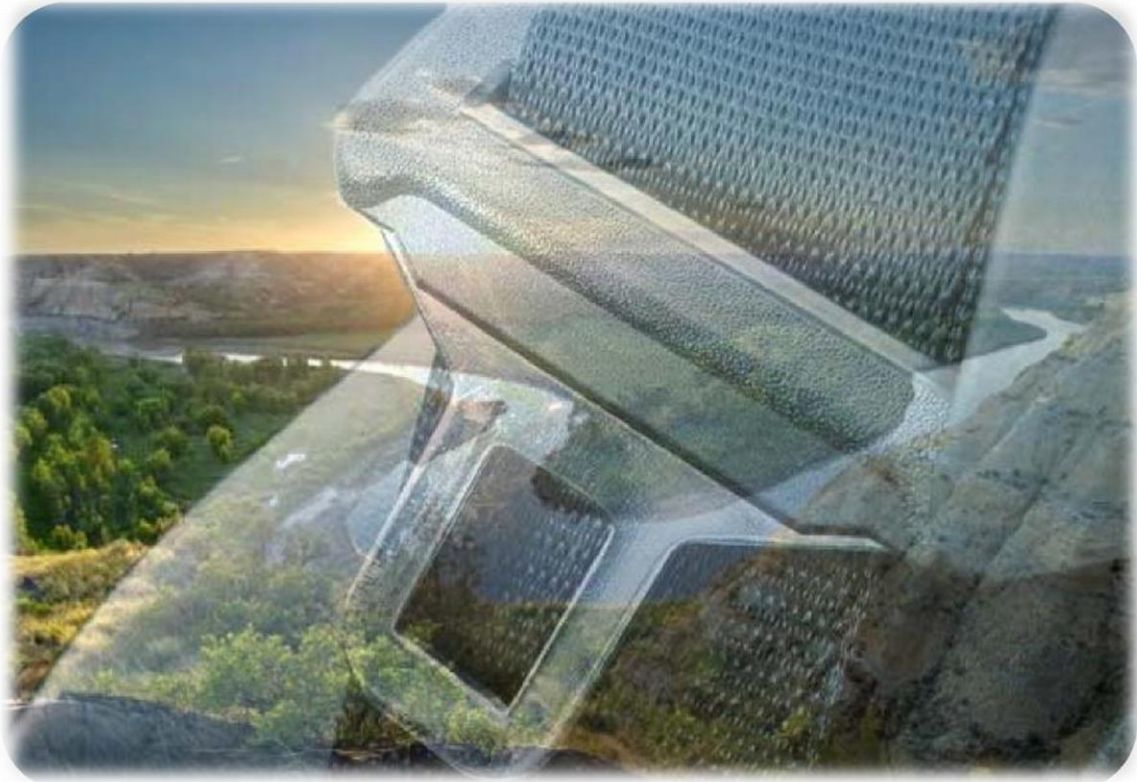


SEAT BELT USE IN NORTH DAKOTA



JUNE 2021

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

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Disclaimer

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EXECUTIVE SUMMARY

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 7-13, 2021, trained observers visited each site in their assigned counties to collect seat belt use for drivers and right front-seat passengers in vehicles with gross vehicle weights up to 10,000 lbs. Data were collected for 19,798 drivers and 4,512 right front-seat passengers for a total of 24,310 vehicle occupants. The observations were conducted at 320 sites across 16 counties. Based on the sampling methodology weighting procedures, the final estimate for statewide seat belt use was 81.9%.

A summary of major findings from the 2021 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 97.0%, and Burke County with the lowest use at 62.4%. Stutsman and Grand Forks counties were also observed to have low use of less than 70% in 2021. Applying three-year averages for trend comparison showed eight counties with improved rates in the 2019-2021 time period over the previous 2016-2018 average. Trends were not available in five counties that were new to the survey with the 2017 county reselection. The change in the county composition was due to the NHTSA-mandated reselection process that is required in five-year intervals.
- **Vehicle Occupant.** Driver seat belt use was 83.2% while passenger use was 92.4% statewide. At the county level, Barnes County reflected the highest rate of drivers belted at 96.1%. Driver restraint use in Burke, Stutsman, and Williams counties was observed to be less than 70%. Barnes County also reflected the highest passenger belt use at 99.2%. In addition, Cass, Griggs, McKenzie, Morton, Mountrail, Richland, Stark, Traill, and Ward counties had rates of passenger belt use greater than 90%. The lowest rate for passengers was found in Benson County at 71.8%.
- **Region.** Overall rates of seat belt use were higher in the east region at 85.7%, compared with 84.2% in the west region. This regional disparity has narrowed throughout the 2017-2021 time period. Rates in the east ranged from a low of 82.2% in 2017 to a high of 85.7% in 2021, while rates in the west were lower, ranging from a low of 74.7% in 2017 to a high of 84.2% in 2021. This regional disparity has also narrowed for drivers and passengers. In 2021, drivers in the east registered use of 83.9%, compared with their counterparts in the west at 82.7%. Passenger rates continued to reflect this trend, with 92.8% usage in the east and 91.9% usage in the west.

- Vehicle Type.** The results of the 2021 statewide survey indicated occupants of cars, SUVs, and vans demonstrated relatively high restraint use with 84.6%, 90.6%, and 89.1%, respectively. Truck occupants, on the other hand, were belted at a lower rate of 79.5%, which reflects a slight increase from last year. The sample size of this demographic (41.1%) combined with the lower usage continues to negatively influence the overall North Dakota rate. Male occupants in trucks were belted at 77.3% in 2021, compared with 91.1% for females, and had the lowest five-year average at 73.3%.
- Gender.** In 2021, female occupants continued to show higher rates of seat belt use overall (91.5%) than male occupants (81.1%). When considering rates at the county level, females registered use greater than 80% in 14 of the 16 counties. Male rates reached that same level in only nine counties. The gender rates by counties varied from 3.2 to 33.9 percentage points. Higher rates hold for females in every county whether they are drivers or passengers.
- Gender and Vehicle Type.** Females had higher rates of seat belt use than males in every vehicle type in 2021. The highest rate for males was found in SUVs, 88.2%, and the lowest in trucks, 77.3%. By comparison, female rates ranged from a high of 92.5% in vans to a low of 88.9% in cars.
- Road Type.** Secondary roads held the largest share of occupants in the sample (47.3%), followed by primary roads (44.2%). Local roads had the smallest share (8.5%) mainly due to their selection only in counties designated as metropolitan statistical areas (MSA) per NHTSA protocol. Seat belt use in 2021 was highest on primary roads (90.8%), followed by secondary roads (80.8%), and local roads (77%). A comparison of results defined by MSA versus non-MSA county designation showed slight variations among road types as well. MSA-classified counties showed rates of use by vehicle occupants as 88.3% on primary roads, 81.1% on secondary roads, and 77.0% on local roads. However, the majority of the sample is from non-MSA counties, with rates of 91.1% on primary roads and 80.8% on secondary roads. Regional differences in shares and use rates by road type were also noticed.

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INTRODUCTION

The Upper Great Plains Transportation Institute (UGPTI), a research, education, and outreach center at North Dakota State University (NDSU) in Fargo, ND, was contracted by the North Dakota Department of Transportation (NDDOT) to conduct a field survey of seat belt use in 2021. The study replicates the sampling methodology previously approved by the NHTSA and 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 an 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 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 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

Statewide Results

Sample Size by Year

Table 1: Survey Sample by Occupant Position

Occupants Observed	2017	% of Sample	2018	% of Sample	2019	% of Sample	2020	% of Sample	2021	% of Sample
Drivers	19,784	80.4%	19,383	79.5%	19,397	80.7%	17,836	80.6%	19,798	81.4%
Passengers	4,822	19.6%	5,007	20.5%	4,645	19.3%	4,283	19.4%	4,512	18.6%
Total	24,606	100.0%	24,390	100.0%	24,042	100.0%	22,119	100.0%	24,310	100.0%

Table 1 shows the size of annual seat belt surveys from 2017-2021 by occupant position. There were 24,310 occupants in 2021, consisting of 19,798 drivers, which represented 81.4% of the sample, and 4,512 passengers, which represented 18.6% of the sample. 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. Apart from last year's decrease, likely an effect of the coronavirus pandemic, the overall sample size has remained relatively consistent. Considering sample sizes from the most recent five-year time period, the current sample size reflects an approximate average, with occupant shares being comparable to previous surveys. It is not uncommon to have several individual sites capture only a limited number of vehicles. However, these sites are important to the aggregate measurement of statewide and county seat belt use, so they are captured each year.

The driver-to-passenger ratio can influence overall use rates. In 2021, the ratio was 4.4 drivers for every occupant, meaning drivers represent 81.4% of the sample. Table 2 shows only minor variations in this ratio since 2017. Driver share of the sample deviated roughly 2 percentage points or less over the time period shown.

Table 2: Ratio of Drivers to Passengers, 2017-2021

Ratio	2017	2018	2019	2020	2021
Drivers : Passengers	4.1:1	3.9:1	4.8:1	4.2:1	4.4:1
Drivers as Percent of Sample	80.4%	79.5%	80.7%	80.6%	81.4%

Overall unweighted results of the 2021 statewide survey indicated 84.9% 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 81.9% for 2021. Figure 1 shows annual seat belt use since the 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 90.3% in 2020. Nationally, NOPUS survey data confirm that vehicle occupants in states with primary enforcement of seat belt laws demonstrate higher restraint use (91.1%) than states with secondary laws (87.6%). Accordingly, North Dakota aligns more closely with states without primary seat belt laws, and ranks in the bottom half among those states.¹

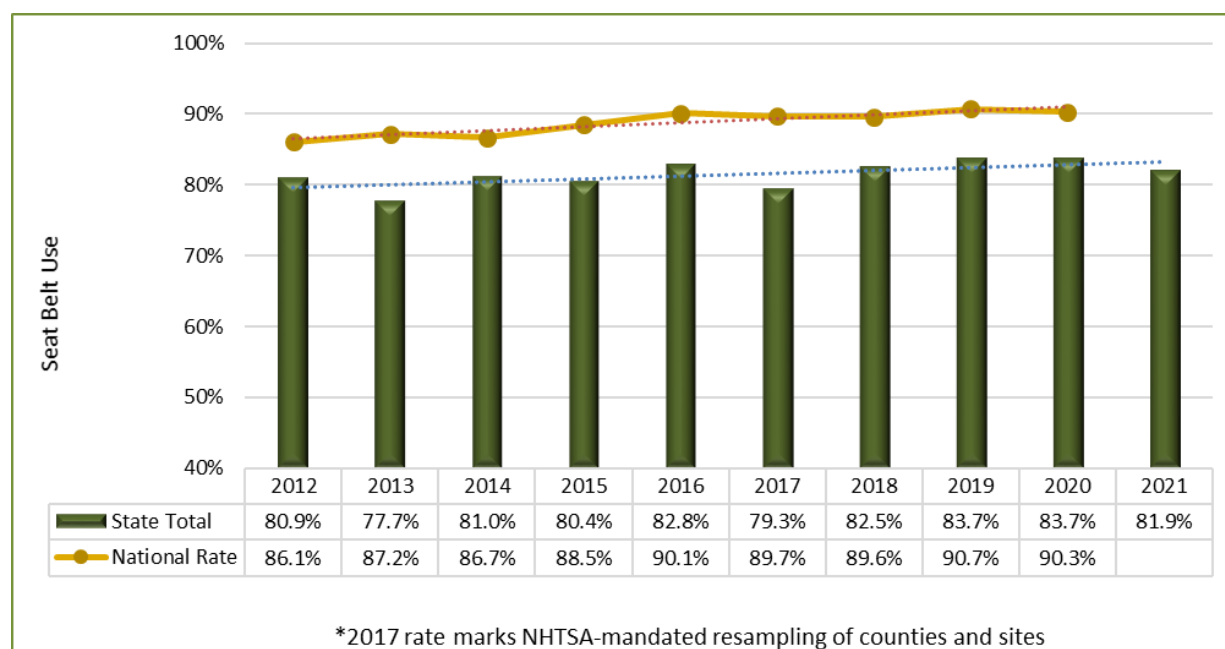


Figure 1: Statewide Seat Belt Use, Weighted

County Results

The 2021 weighted seat belt rates by county are shown in Figure 2. Restraint use ranged from a high of 97.0% in Barnes County to a low of 62.4% in Burke County. Higher seat belt use is generally noticed in counties that follow interstate corridors, and this was supported again in the 2021 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 Williams County, which is in western North Dakota, with relatively high truck² traffic shares and no interstate roadways. Additional details on these issues are provided later in sections of the report addressing region, vehicle type, and roadway variation in seat belt use rates.

¹ National Highway Traffic Safety Administration. Traffic Safety Facts Research Note. February, 2021. [Seat Belt Use in 2020 – Overall Results \(dot.gov\)](https://www.nhtsa.gov/press-releases/2021/02/02/seat-belt-use-in-2020-overall-results)

²Truck definition is trucks with a gross vehicle weight of less than 10,000 lbs. These include 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.

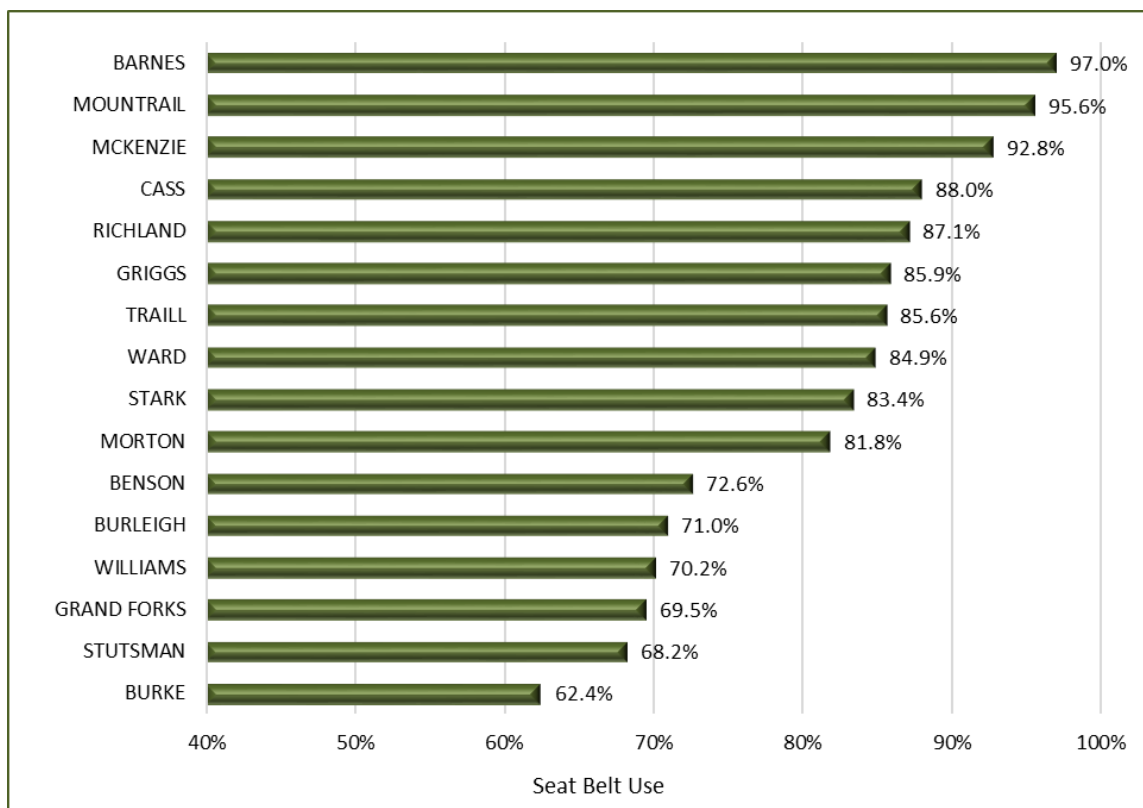


Figure 2: Seat Belt Use by County, 2021, Weighted

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

The three-year averages used for trend comparison show variations in seat belt use in several counties. In the most recent three-year time frame, Barnes County leads in belt use at 94.1%. Cass, McKenzie, Morton, Mountrail, Richland, Stark, and Traill counties all register rates above 80%. The preceding statewide data are based on the weighted county sampling frame. However, the following sections of this report describe strata frequencies that are unadjusted because of survey design.

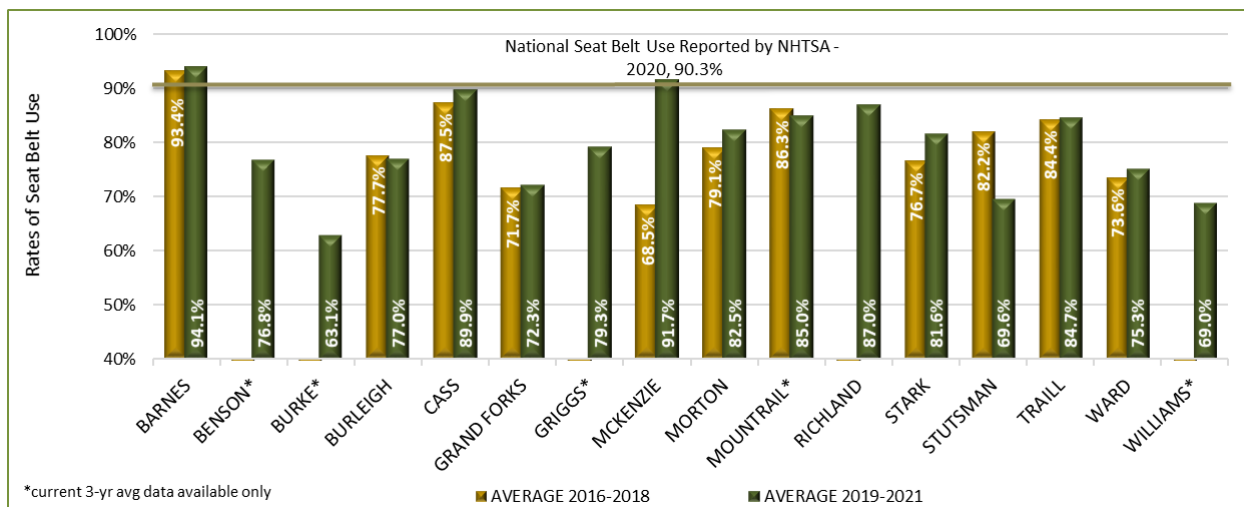


Figure 3: Seat Belt Use by County, Three-Year Averages, Weighted

Results for Vehicle Occupants by Position

Figure 4 illustrates seat belt use by occupant position in 2021. At the county level, driver use ranged from a low in Burke County of 62.1% to a high of 96.1% in Barnes County. The spread in passenger use was 71.8% to 99.2% in Benson and Barnes counties, respectively. Annual surveys confirm that, as a rule, passengers buckle up at higher rates than drivers. The 2021 survey showed just one county, Benson, with lower restraint use among passengers than drivers.

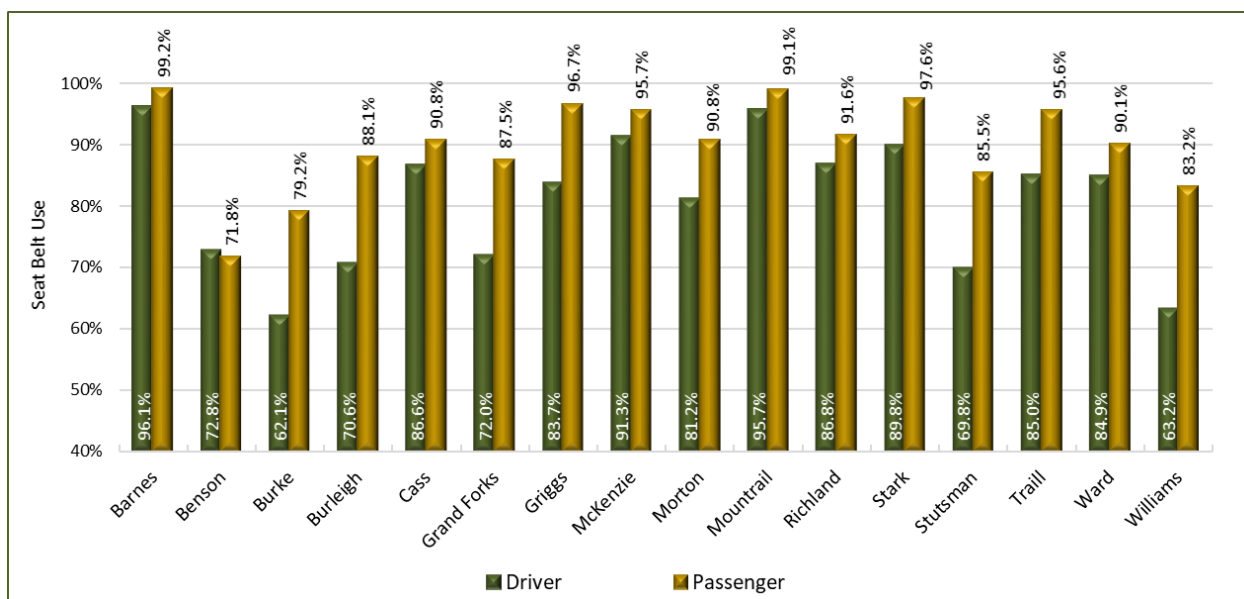


Figure 4: Percent Belted by Position and County, Annual, Unweighted

Considering the state as a whole, the unweighted estimates of seat belt use in 2021 were 83.2% for drivers and 92.4% for passengers, with an overall estimate of the seat belt use rate of 84.9% for drivers

and passengers combined (Figure 5). These rates compare with 79.7%, 88.3%, and 81.3%, respectively, in 2020.

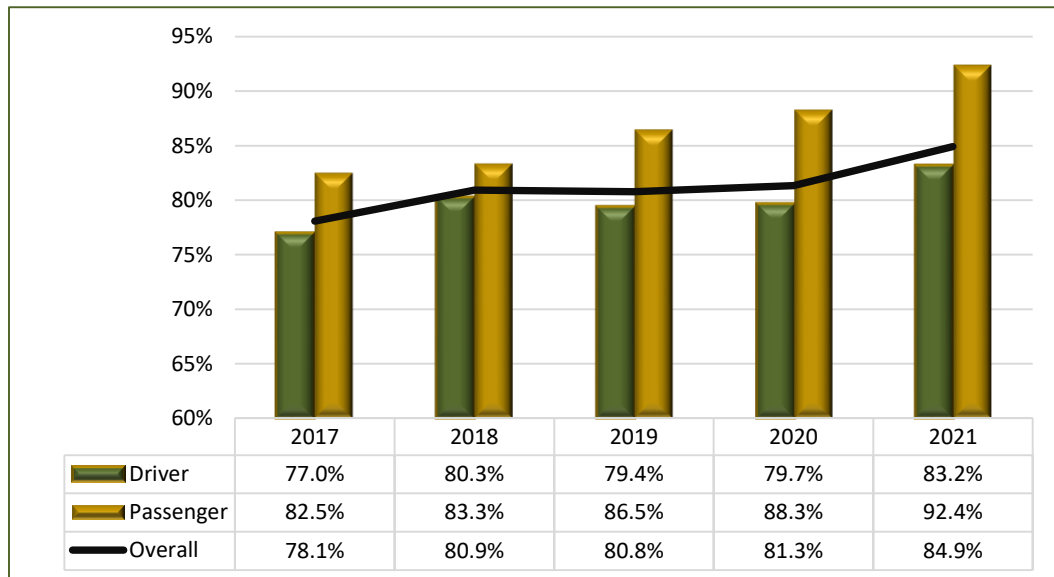


Figure 5: Percent Belted by Position, Annual, Unweighted

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 the enactment of a primary seat belt law, which NHTSA suggests would increase 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.³

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

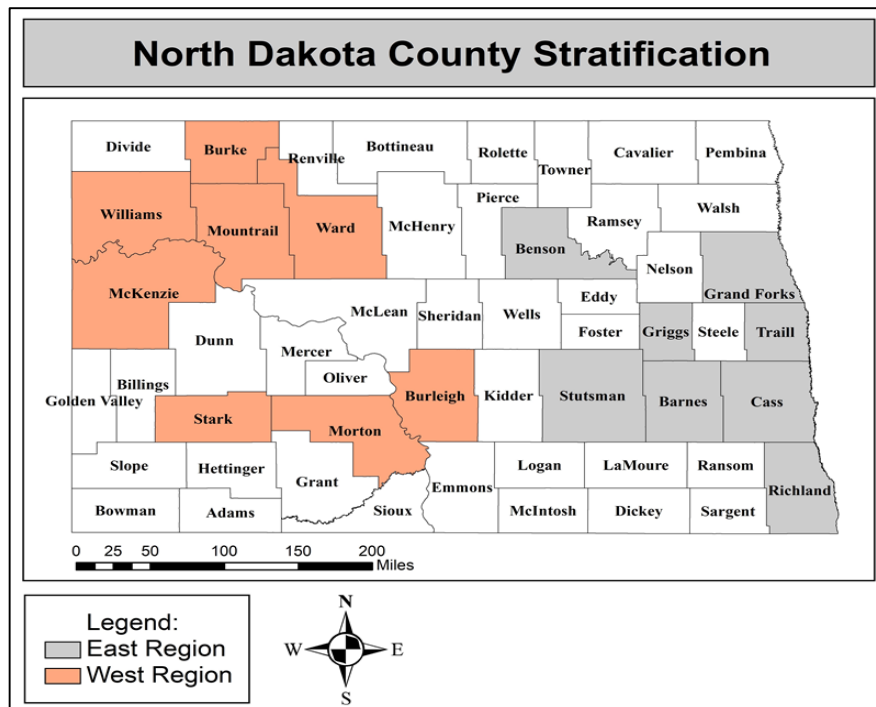


Figure 6: North Dakota County Stratification

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. Seat belt data collected from western North Dakota totaled 12,855 occupants, compared with 11,455 from the eastern half of the state. This represented 52.9% and 47.1% of the sample, respectively.

Table 3: Sample Size By Region

Region	2017	% of Sample	2018	% of Sample	2019	% of Sample	2020	% of Sample	2021	% of Sample
East	11,180	45.4%	12,041	49.4%	11,620	48.3%	9,917	44.8%	11,455	47.1%
West	13,426	54.6%	12,349	50.6%	12,422	51.7%	12,202	55.2%	12,855	52.9%
Total	24,606	100.0%	24,390	100.0%	24,042	100.0%	22,119	100.0%	24,310	100%

Historically, seat belt use has been routinely higher in the east than the west, as shown in Figure 7. However, this year, the rates in the east (85.7%) and west (84.2%) show a closing of the gap with a difference of less than 2 percentage points. The comparison of seat belt use in Figure 8 shows an average rate in the east of 84.3% from 2016-2018 and 84.8% from 2019-2021. Seat belt use in the west was lower, yet increased between the two periods, 76.7% from 2016-2018 and 80.2% from 2018-2021.

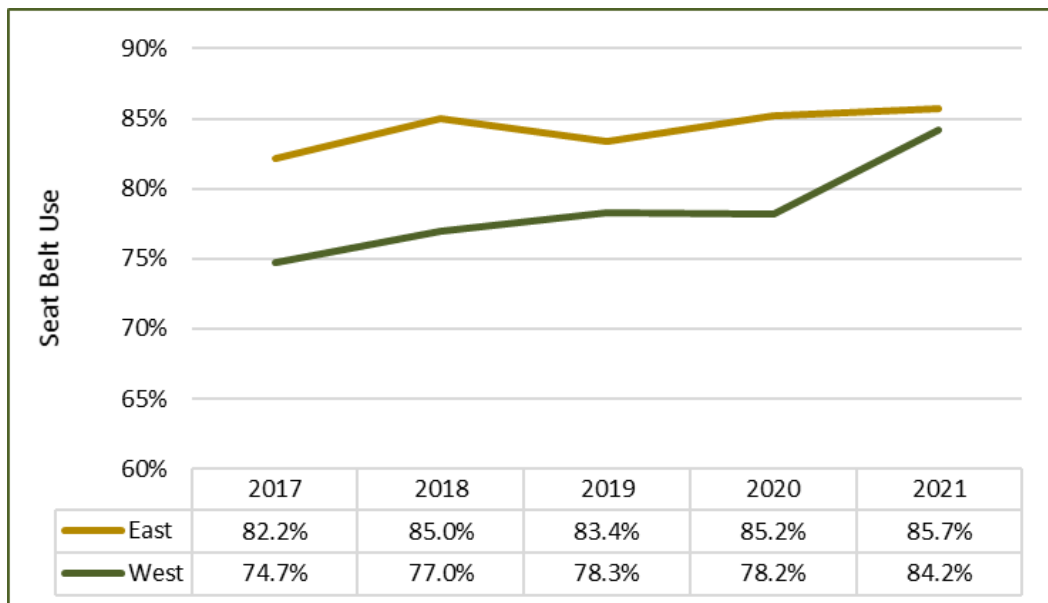


Figure 7: Percent Belted by Region, Unweighted

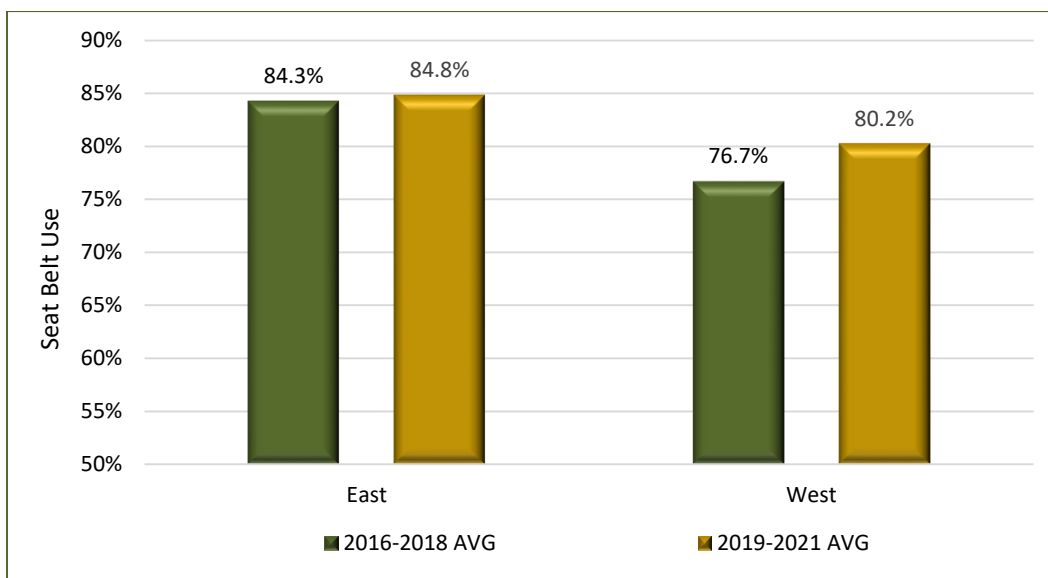


Figure 8: Seat Belt Use by Region, Three Year Averages, Unweighted

A further breakdown of driver and passenger use by region is seen in Figure 9. Minor up and down fluctuations in belt use by both occupant positions from the east region are seen during the five-year span shown in the graph. Currently, the rate for drivers in the east is 83.9% and for passengers is 92.8%. Driver rates in the west region continue to represent the lowest usage of the four occupant groups, at 82.7%. A noticeable rise this year in passenger usage to a five-year high of 91.9% was observed in this region.

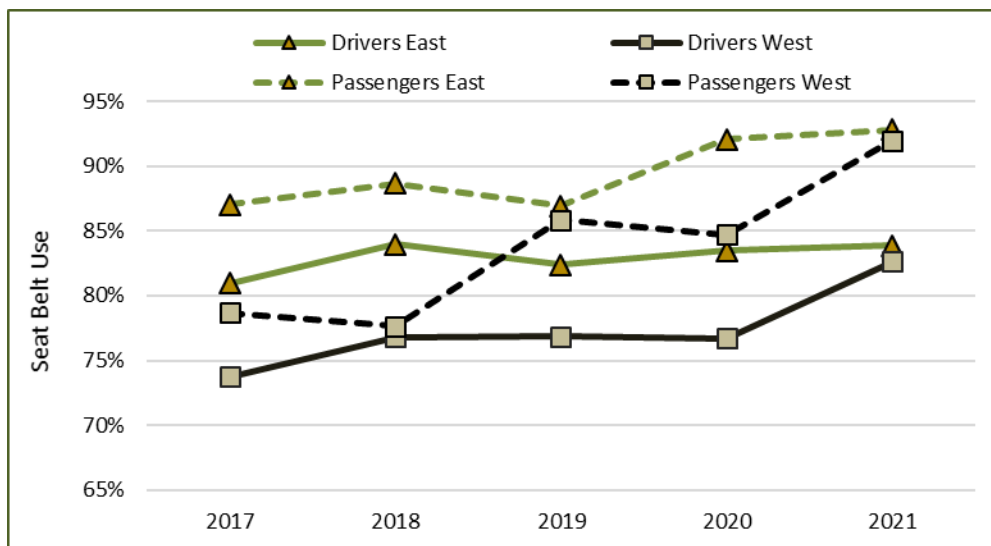


Figure 9: Percent Belted by Region and Occupant Position, Annual, Unweighted

Historically, lower seat belt usage in the west region was explained by the high prevalence of truck occupants, who've typically exhibited the lowest rate of use among vehicle types. For example, large truck volume of greater than 50% was observed in Burke, McKenzie, Mountrail, and Williams counties. Truck share was as high as 73.8% in McKenzie County. Overall, this region accounts for 60.5% (n=6,043) of the statewide share of occupants in this vehicle type. However, because rates of use between regions are more closely aligned in 2021, the disproportionate influence of truck occupants is less apparent.

Results by Vehicle Type

Table 4 shows the fleet distribution annually since 2017. During that time, the number of cars surveyed has decreased from the 22.9% share in 2017 to 17.1% in 2021. Van representation has also declined slightly over this same period, and currently represents 5.9% of the sample. The share of SUVs (35.9%) has increased from last year's five-year high of 31.4% share. Trucks make up 41.1% of the occupant share in 2021, and historically hold the largest share of vehicle type.

Table 4: Sample by Vehicle Type

Vehicles Observed	2017	% of Sample	2018	% of Sample	2019	% of Sample	2020	% of Sample	2021	% of Sample
Car	5,646	22.9%	5,364	22.0%	5,620	23.4%	4,122	18.6%	4,168	17.1%
SUV	7,013	28.5%	7,479	30.7%	6,616	27.5%	6,955	31.4%	8,723	35.9%
Truck	10,213	41.5%	9,857	40.4%	10,255	42.7%	9,754	44.1%	9,988	41.1%
Van	1,734	7.0%	1,690	6.9%	1,551	6.5%	1,288	5.8%	1,431	5.9%
Total	24,606	100.0%	24,390	100.0%	24,042	100.0%	22,119	100.0%	24,310	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, small box trucks, etc. Trucks with commercial use indicated by logos on doors or truck body are within the survey scope.

Regionally, trucks represented 47.0% of vehicles in the west, and 34.4% in the east. The larger share of vehicles in the western region (52.8%), along with the higher volume of trucks, may influence the statewide seat belt rate. The larger truck share noticed since 2017 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 73.8% of this vehicle type as a share of the county total. This was followed by Williams County at 61.9%, Mountrail at 59.4%, and Burke at 55.0%. In the east region, Griggs (48.6%), Benson (42.9%), and Stutsman (42.2%) counties registered the largest shares of trucks.

Annual results for overall seat belt use by vehicle type are shown in Figure 10. SUV and van occupants continue to demonstrate the highest usage rates at 90.6% and 89.1%, respectively, followed by car and truck occupants at 84.6% and 79.5%, respectively. Truck occupants continue to have noticeably lower rates than occupants in other vehicle types.

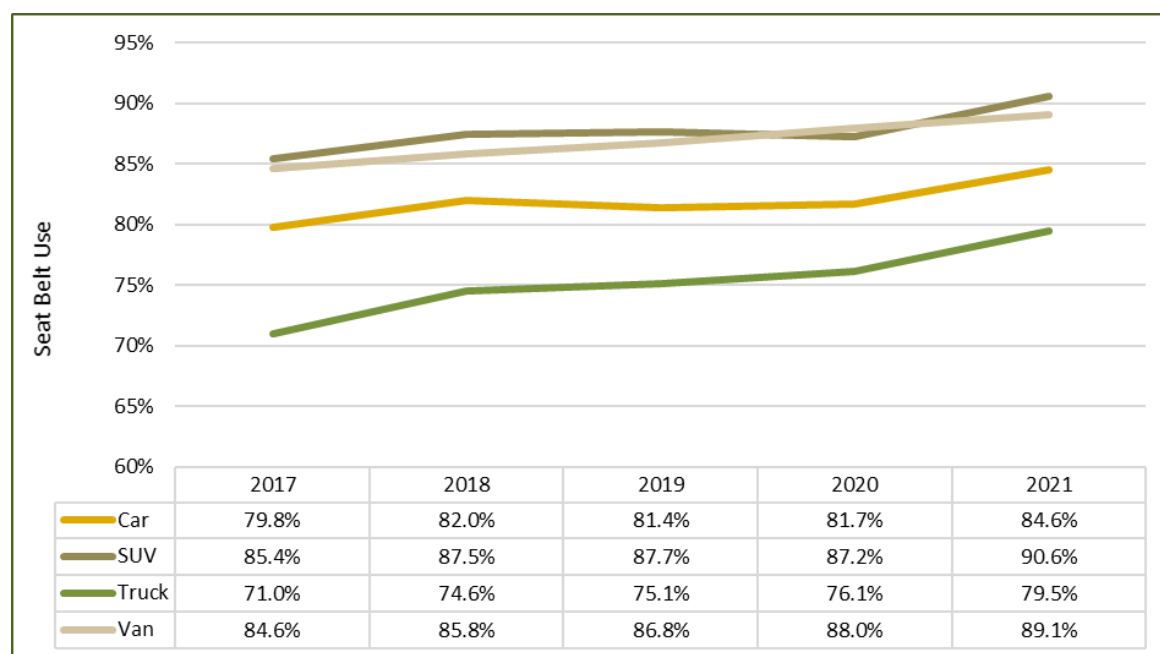


Figure 10: Percent Belted by Vehicle Type, Annual, Unweighted

The three-year averages used to measure belt use for occupants of each vehicle type show marginal differences between the three-year periods (Figure 11). Individual county rates by each vehicle type are found in Table 5.

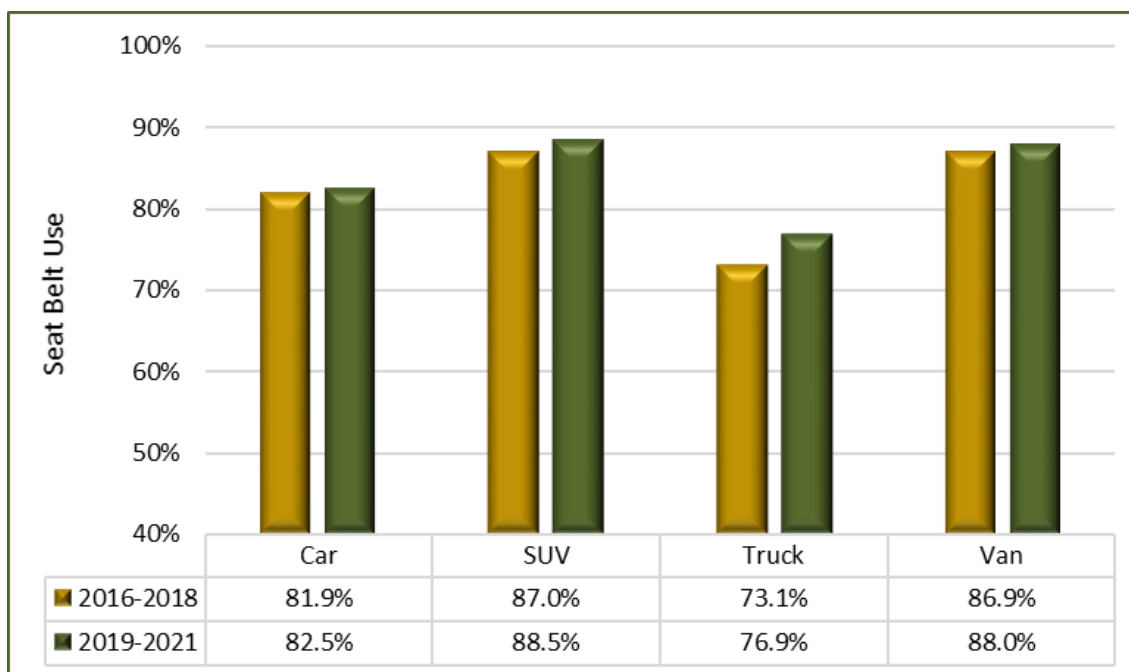


Figure 11: Seat Belt Use by Vehicle Type, Three-Year Averages, Unweighted

The 2021 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 80% in 10 of the 16 observed counties. This lower use, coupled with the proportion of trucks in the sample, can reduce both county rates and the overall state rate.

Table 5: Percent Belted by County and Vehicle Type, 2021, Unweighted

2021							
Car		SUV		Truck		Van	
Barnes	97.2%	Barnes	98.4%	Barnes	94.5%	Barnes	97.5%
Benson	71.4%	Benson	75.3%	Benson	72.5%	Benson	63.6%
Burke	85.7%	Burke	78.8%	Burke	52.8%	Burke	100.0%
Burleigh	70.8%	Burleigh	81.4%	Burleigh	66.5%	Burleigh	78.7%
Cass	90.5%	Cass	90.9%	Cass	78.1%	Cass	90.0%
Grand Forks	74.5%	Grand Forks	84.1%	Grand Forks	62.8%	Grand Forks	61.5%
Griggs	94.2%	Griggs	90.3%	Griggs	79.4%	Griggs	96.0%
McKenzie	95.4%	McKenzie	98.5%	McKenzie	89.4%	McKenzie	100.0%
Morton	73.1%	Morton	92.4%	Morton	77.6%	Morton	87.2%
Mountrail	95.2%	Mountrail	99.2%	Mountrail	95.3%	Mountrail	92.7%
Richland	87.6%	Richland	93.6%	Richland	81.7%	Richland	87.1%
Stark	90.0%	Stark	94.5%	Stark	88.9%	Stark	93.7%
Stutsman	66.0%	Stutsman	77.9%	Stutsman	70.1%	Stutsman	85.1%
Traill	88.3%	Traill	92.7%	Traill	78.7%	Traill	92.4%
Ward	83.8%	Ward	91.4%	Ward	80.7%	Ward	85.7%
Williams	61.4%	Williams	77.2%	Williams	62.7%	Williams	81.1%

Results by Occupant Gender and Position

Minimal year-to-year variation in sample composition is observed for occupant gender and summarized in Table 6. Overall, males represented 62.9% and females 36.6% of the sample in 2021. In a small percentage of observations, 0.5%, occupant gender could not 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	2017	% of Sample	2018	% of Sample	2019	% of Sample	2020	% of Sample	2021	% of Sample
Female	8,817	35.8%	9,049	37.1%	8,800	36.6%	8,242	37.3%	8,909	36.6%
Male	15,624	63.5%	15,099	61.9%	14,921	62.1%	13,695	61.9%	15,287	62.9%
Unknown	165	0.7%	242	1.0%	321	1.3%	182	0.8%	114	0.5%
Total	24,606	100.0%	24,390	100.0%	24,042	100.0%	22,119	100.0%	24,310	100.0%

Survey results for seat belt use by gender continued a pattern of higher rates of use by female occupants. Females demonstrated 91.5% usage in 2021, 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%, until this this year when observed to be belted at a rate of 81.1%.

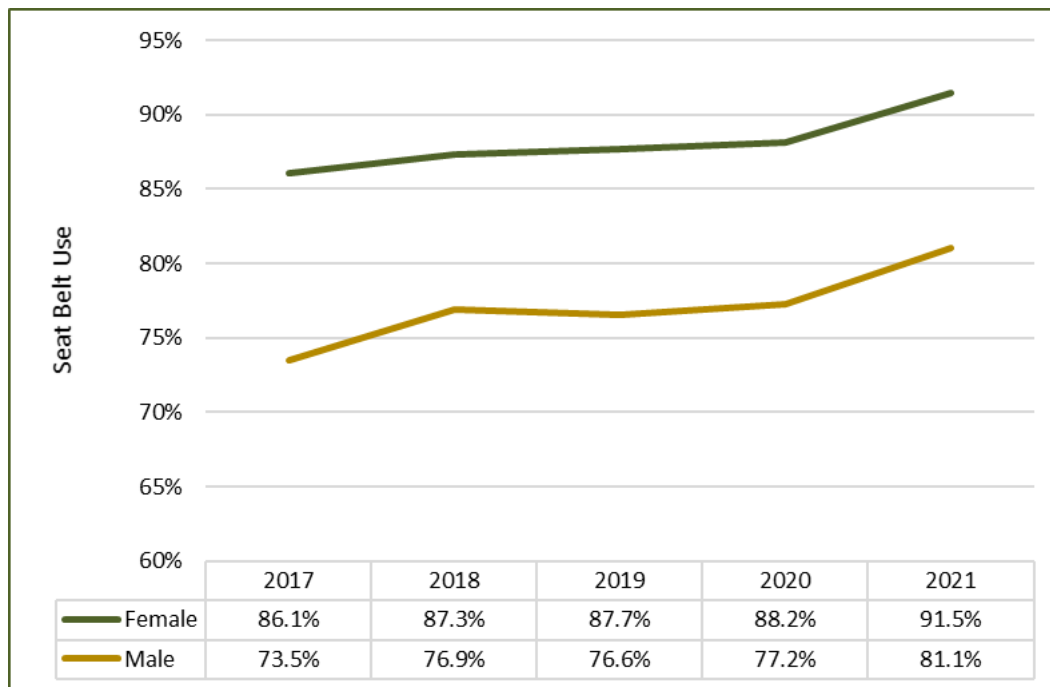


Figure 12: Percent Belted by Gender, Annual, Unweighted

Table 7 shows restraint use by county and gender. Female occupants were observed to have rates above 85% in

12 of 16 counties. In comparison, only four counties showed male rates at the same level. In fact, male belt use in several counties was much lower. Burke, Williams, Grand Forks, Burleigh, Benson, and Stutsman all showed males were buckled less than the time.

The sample by gender and occupant position also remains stable from year to year. As described in 8, drivers were more than twice as likely to be male female (13,858 compared with 5,888). In contrast, were roughly 35% fewer male passengers than (1,429 compared with 3,021).

Survey results corroborate higher rates of seat belt females regardless of occupant position (Figure 13). passengers used restraints at a rate of 95.8 %, the usage of gender and occupant positions. This was followed by female drivers at 89.2%. Male rates considerably lower at 85.1% for passengers and for drivers. Male passengers' seat belt use has surpassed male driver seat belt use for the third consecutive year, therefore resulting in male drivers holding the lowest usage rate. Figure 14 shows a comparison of three-year averages.

Table 7: Percent Belted by Gender & County, 2021

2021			
FEMALE OCCUPANTS		MALE OCCUPANTS	
Barnes	98.7%	Barnes	95.5%
Benson	77.2%	Benson	69.3%
Burke	86.5%	Burke	52.6%
Burleigh	80.5%	Burleigh	68.8%
Cass	93.4%	Cass	83.3%
Grand Forks	85.4%	Grand Forks	65.1%
Griggs	92.8%	Griggs	82.8%
McKenzie	100.0%	McKenzie	89.9%
Morton	91.4%	Morton	78.5%
Mountrail	99.0%	Mountrail	94.8%
Richland	92.7%	Richland	84.7%
Stark	96.0%	Stark	89.0%
Stutsman	79.0%	Stutsman	69.9%
Traill	94.3%	Traill	82.2%
Ward	92.0%	Ward	81.5%
Williams	80.4%	Williams	61.2%

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Table 8: Sample by Gender and Position

Occupants Observed	2017	% of Sample	2018	% of Sample	2019	% of Sample	2020	% of Sample	2021	% of Sample
Drivers:										
Male	13,702	55.7%	13,268	54.4%	13,188	54.9%	12,124	54.8%	13,858	57.0%
Female	5,966	24.2%	5,943	24.4%	6,001	25.0%	5,647	25.5%	5,888	24.2%
Passengers:										
Male	1,922	7.8%	1,831	7.5%	1,733	7.2%	1,571	7.1%	1,429	5.9%
Female	2,851	11.6%	3,106	12.7%	2,799	11.6%	2,595	11.7%	3,021	12.4%
Unknown:	165	0.7%	242	1.0%	321	1.3%	182	0.8%	114	0.5%
Total	24,606	100.0%	24,390	100.0%	24,042	100.0%	22,119	100.0%	24,310	100.0%

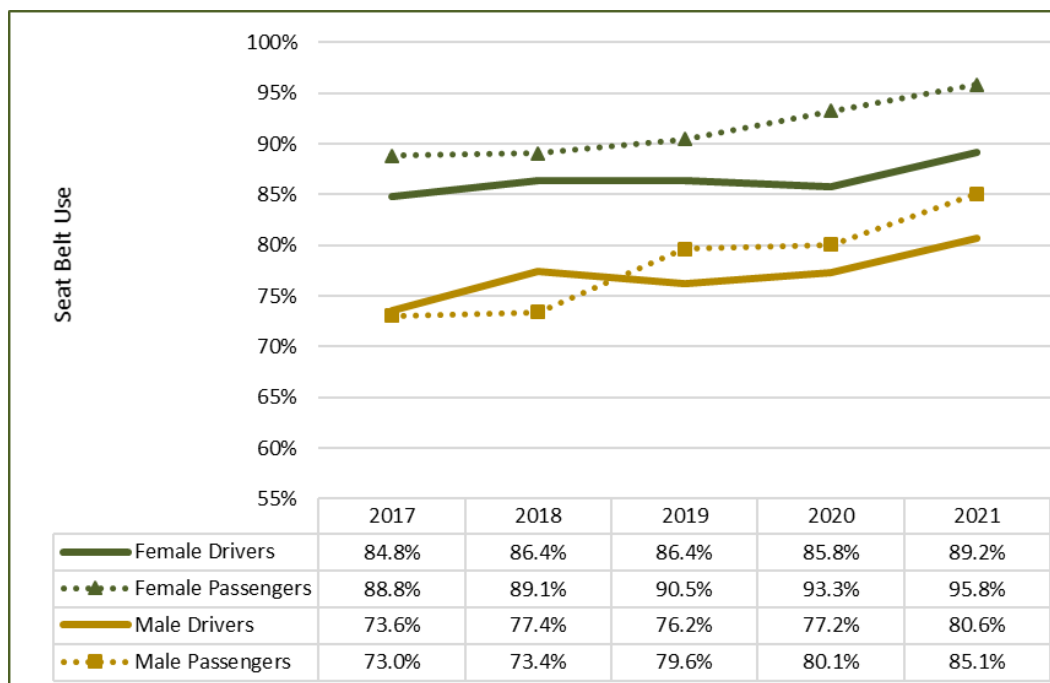


Figure 13: Percent Belted by Gender & Position, Annual, Unweighted

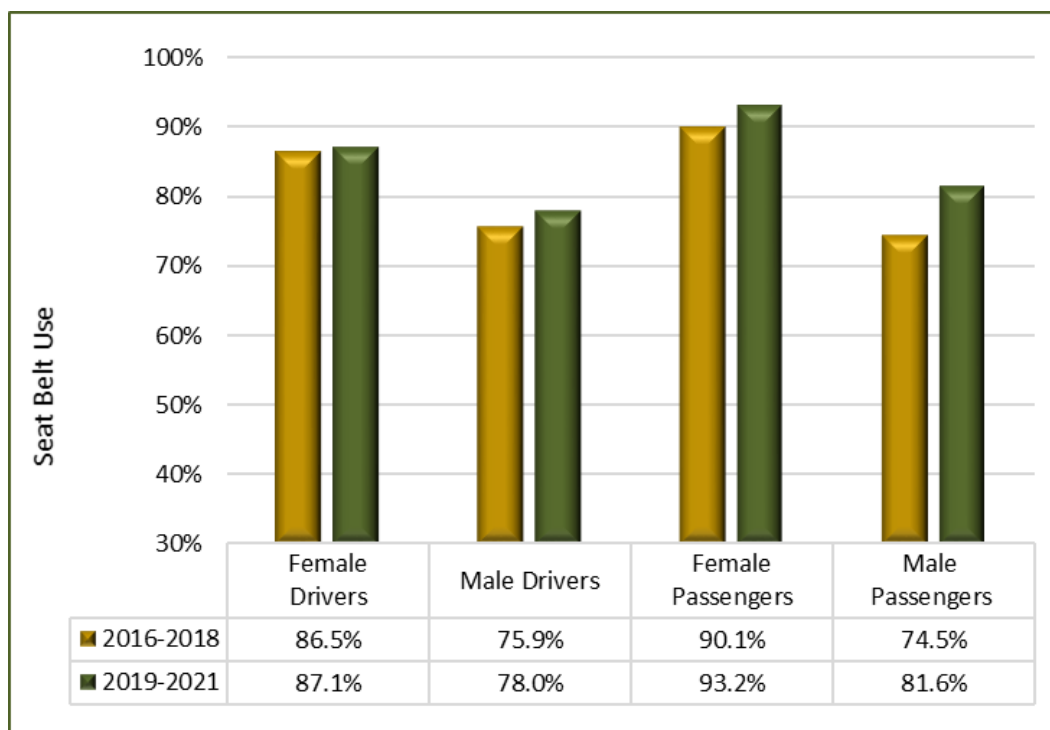


Figure 14: Seat Belt Use by Gender & Position, Three-Year Averages, Unweighted

There are wide-ranging seat belt use rates in individual counties in all occupant positions (Table 9). At the county level, female drivers' rates were generally high with only four counties below 80%. Male drivers were found to have use rates below 80% in Burke (50.9%), Williams (59.7%), Grand Forks (64.9%), Burleigh (67.6%), Stutsman (69.2%), Benson (70.2%), and Morton (78.8%). As noted previously in this report, female and male passenger rates are higher overall.

Table 9: Percent Belted by Gender & Position by County, 2021, Unweighted

2021							
FEMALE DRIVERS		FEMALE PASSENGERS		MALE DRIVERS		MALE PASSENGERS	
Barnes	98.0%	Barnes	99.7%	Barnes	95.2%	Barnes	97.8%
Benson	77.2%	Benson	77.3%	Benson	70.2%	Benson	58.3%
Burke	84.3%	Burke	90.7%	Burke	50.9%	Burke	62.1%
Burleigh	76.2%	Burleigh	90.4%	Burleigh	67.6%	Burleigh	82.9%
Cass	93.5%	Cass	93.2%	Cass	82.8%	Cass	86.2%
Grand Forks	84.2%	Grand Forks	95.5%	Grand Forks	64.9%	Grand Forks	70.0%
Griggs	89.5%	Griggs	100.0%	Griggs	81.7%	Griggs	92.3%
McKenzie	100.0%	McKenzie	100.0%	McKenzie	89.8%	McKenzie	93.3%
Morton	87.1%	Morton	96.9%	Morton	78.8%	Morton	76.4%
Mountrail	98.8%	Mountrail	100.0%	Mountrail	94.5%	Mountrail	98.1%
Richland	91.6%	Richland	94.4%	Richland	84.3%	Richland	86.6%
Stark	93.9%	Stark	98.0%	Stark	88.5%	Stark	95.7%
Stutsman	71.1%	Stutsman	90.2%	Stutsman	69.2%	Stutsman	75.4%
Traill	92.1%	Traill	100.0%	Traill	81.4%	Traill	88.8%
Ward	91.4%	Ward	94.2%	Ward	81.5%	Ward	82.4%
Williams	74.4%	Williams	92.0%	Williams	59.7%	Williams	72.6%

Results by Gender and Vehicle Type

Examining the survey sample size without respect to the driver/passenger demographic shows the ratio of male to female occupants is about 1.7 to 1 in 2021 (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 large gender imbalance continues to be noticed in the truck category, where males were 84.2% of the overall occupant share of this vehicle type.

Table 10: Sample by Vehicle Type and Gender

Occupants Observed	2017	% of Sample	2018	% of Sample	2019	% of Sample	2020	% of Sample	2021	% of Sample
Male										
Car	2,997	12.2%	2,843	11.7%	2,856	11.9%	2,131	9.6%	2,348	9.7%
SUV	2,937	11.9%	3,089	12.7%	2,576	10.7%	2,756	12.5%	3,750	15.4%
Truck	8,699	35.4%	8,248	33.8%	8,671	36.1%	8,087	36.6%	8,392	34.5%
Van	991	4.0%	919	3.8%	818	3.4%	721	3.3%	797	3.3%
Female										
Car	2,590	10.5%	2,438	10.0%	2,666	11.1%	1,950	8.8%	1,790	7.4%
SUV	4,017	16.3%	4,316	17.7%	3,926	16.3%	4,135	18.7%	4,926	20.3%
Truck	1,483	6.0%	1,551	6.4%	1,500	6.2%	1,604	7.3%	1,565	6.4%
Van	727	3.0%	744	3.1%	708	2.9%	553	2.5%	628	2.6%
Unknown:	165	0.7%	242	1.0%	321	1.3%	182	0.8%	114	0.5%
Total	24,606	100.0%	24,390	100.0%	24,042	100.0%	22,119	100.0%	24,310	100.0%

Differences in seat belt use by gender varied across vehicle types (Figure 15). In the 2021 survey, male occupants were belted from a low of 77.3% in trucks to a high of 88.2% in SUVs. Females were belted at rates above 80% in all vehicle types, ranging from a low of 88.9% in cars to a high of 92.5% in vans.

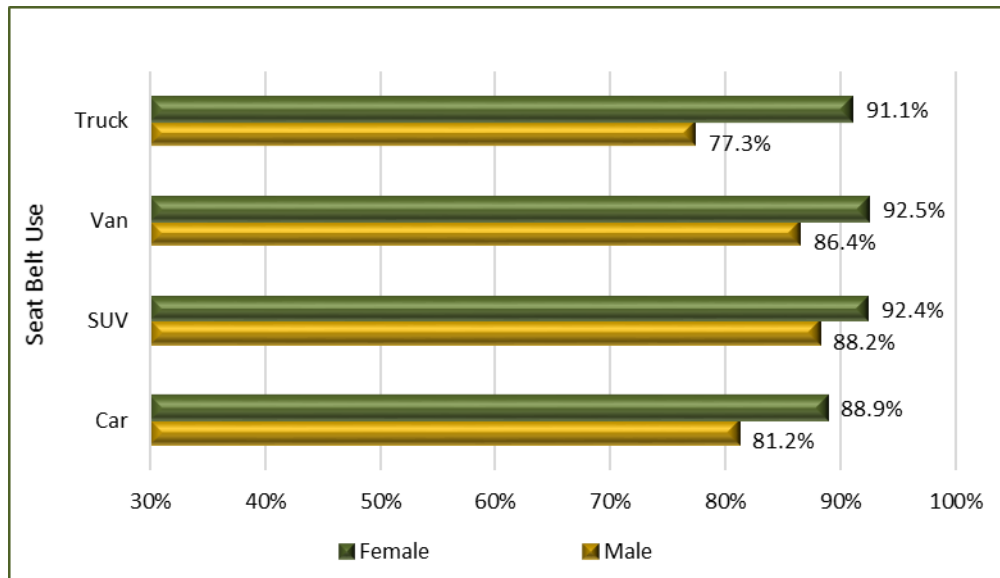


Figure 15: Percent Belted by Gender and Vehicle Type, 2021, Unweighted

Although the size of the disparity between gender seat belt use shifts from year to year, male use is lower than female use in every vehicle type in every year by as much as 14.1 percentage points in trucks in 2017 to as little as 3.8 percentage points in SUVs in 2018 (Table 11). Throughout the five-year period, female rates are consistently high, with usage of at least 83%. By contrast, annual rates for male seat belt use are much lower, with the rates ranging between 68.9% and 88.2% throughout the same time frame. Males are observed to have the lowest usage in trucks (77.3%), while females had the lowest usage in cars (88.9%) for the second consecutive year.

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

Male	2017	2018	2019	2020	2021
Car	76.5%	78.8%	77.3%	78.3%	81.2%
SUV	81.7%	85.2%	84.4%	84.2%	88.2%
Van	80.4%	80.3%	82.8%	85.2%	86.4%
Truck	68.9%	72.8%	73.4%	73.9%	77.3%
Female	2017	2018	2019	2020	2021
Car	83.5%	85.4%	85.4%	85.7%	88.9%
SUV	88.2%	89.0%	89.6%	89.3%	92.4%
Van	90.1%	92.2%	91.4%	91.7%	92.5%
Truck	83.0%	83.2%	85.0%	86.9%	91.1%

When comparing 2016-2018 with 2019-2021 averages, seat belt use by females across vehicle types has remained stable (Figure 16). Male occupants show similar stability across vehicle types. Yet, rates have increased by close to 4 percentage points for both genders, in trucks, between the two periods.

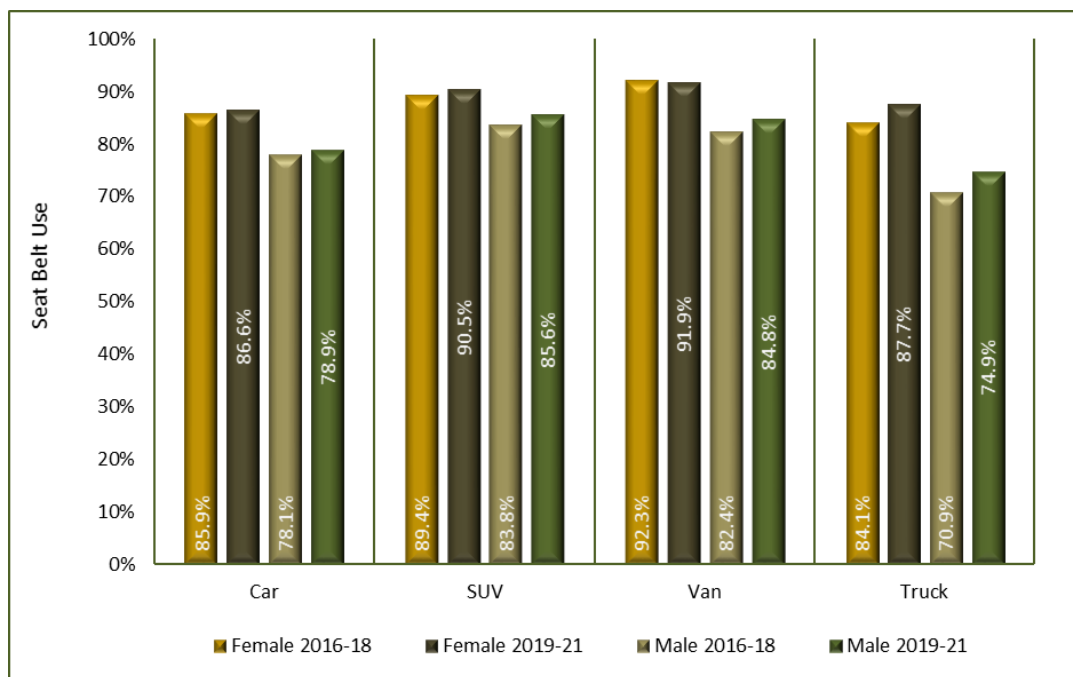


Figure 16: Seat Belt Use by Gender and Vehicle Type, Three-Year Averages, Unweighted

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 11,455 observations collected from the east region and 12,855 from the west during the 2021 survey. Primary, secondary, and local roadways accounted for 44.2%, 47.3%, and 8.5% 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, as well as the primary road sample in the west, over previous years. 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	2017	% of Sample	2018	% of Sample	2019	% of Sample	2020	% of Sample	2021	% of Sample
East										
Primary	7,290	29.6%	7,680	31.5%	7,430	30.9%	6,029	27.3%	7,302	30.0%
Secondary	3,001	12.2%	3,223	13.2%	3,085	12.8%	2,949	13.3%	3,126	12.9%
Local	889	3.6%	1,138	4.7%	1,105	4.6%	939	4.2%	1,027	4.2%
Total East	11,180	45.4%	12,041	49.4%	11,620	48.3%	9,917	44.8%	11,455	47.1%
West										
Primary	2,597	10.6%	2,515	10.3%	1,737	7.2%	2,476	11.2%	3,455	14.2%
Secondary	9,727	39.5%	8,664	35.5%	9,539	39.7%	8,576	38.8%	8,369	34.4%
Local	1,102	4.5%	1,170	4.8%	1,146	4.8%	1,150	5.2%	1,031	4.2%
Total West	13,426	54.6%	12,349	50.6%	12,422	51.7%	12,202	55.2%	12,855	52.9%
Total	24,606	100.0%	24,390	100.0%	24,042	100.0%	22,119	100.0%	24,310	100%

Contextual information is provided in Figure 17, which identifies 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.

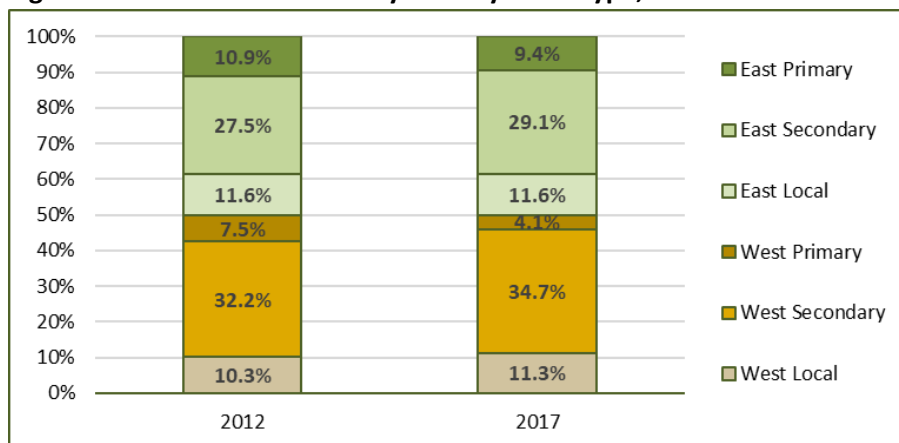
Figure 17: Percent of 320 Survey Sites by Road Type, 2012 and 2017

Figure 18 shows vehicle occupants traveling primary roadways were belted at a higher rate (90.8%) than occupants on secondary and local roads. These occupants routinely used seat belts at rates from 85.7% to 90.8% within the five-year time frame. Belt use by occupants on local roads since 2017 has held steady between 77% and 82.2%. In the past, occupants in vehicles on secondary roads have had the lowest seat belt use rates of the three road classifications. However, this year, seat belt use on local roads dropped below that of secondary roads, breaking the five-year trends for both road types.

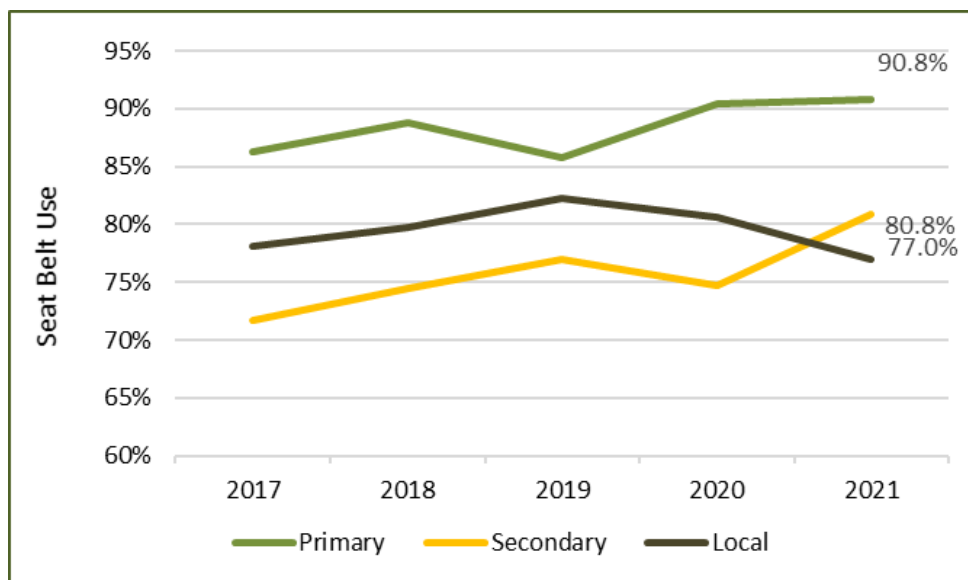


Figure 18: Percent Belted by Road Type, Annual, Unweighted

Annual rates stratified by region and road type over a five-year period are identified in Table 13. Restraint use on primary roads in the east region ranges from 86.2% to 89.9%, while corresponding roads in the west region range from 83.6% to 92.7%. Use on secondary roads fluctuates between 72.6% and 77.7% in the east and 71.5% and 82.1% in the west. Occupants traveling local roads were belted at rates ranging from 80.4% to 86% and 76.3% to 79% the east and west regions, respectively. With the one exception, use rates are higher in the west on each road type.

Table 13: Percent Belted by Region and Road Type, Unweighted

Occupants Observed	2017	2018	2019	2020	2021
East					
Primary	86.3%	89.5%	86.2%	89.7%	89.9%
Secondary	72.6%	74.8%	75.7%	77.0%	77.7%
Local	80.4%	83.1%	86.0%	82.6%	80.4%
West					
Primary	86.0%	86.4%	83.6%	92.2%	92.7%
Secondary	71.5%	74.3%	77.3%	74.0%	82.0%
Local	76.3%	76.3%	78.6%	79.0%	73.6%
Total					
Primary	86.2%	88.8%	85.7%	90.4%	90.8%
Secondary	71.7%	74.5%	76.9%	74.8%	80.8%
Local	78.2%	79.7%	82.2%	80.6%	77.0%

When balancing the year-to-year variability of rates in each road type (Figure 19), little difference is seen between the time periods on most road types in the two regions. However, an increase in restraint use on primary roads in

the west region in 2019-2021 is noted. Regionally the east and west averages are relatively uniform on secondary roads in both periods.

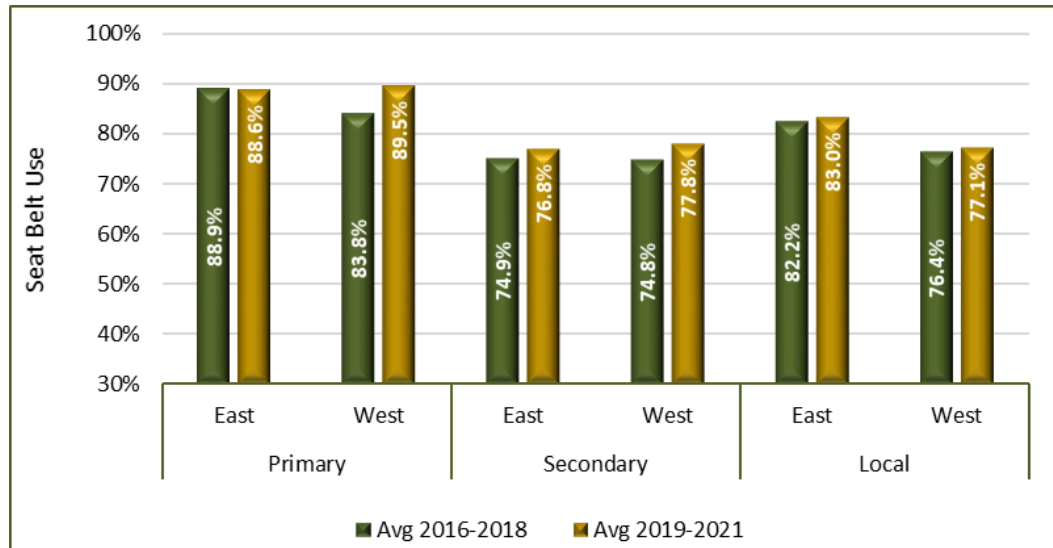


Figure 19: Seat Belt Use by Roadway Type, Three-Year Averages, Unweighted

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 are unweighted and do not account for the allocation of sites by road type in the two categories. Analysis shows restraint use in MSA counties on secondary roads (81.1%) similarly compared with the same road type in non-MSA counties (80.8%). Vehicle occupants in non-MSA counties were buckled up at a relatively high rate of 91.1% on primary roads compared with MSA counties at 88.3%. Occupants on local roads in MSA counties were restrained at the lowest rate (77%). Local road sites were outside the sampling frame in non-MSA counties, so a comparison of that road type is not available.

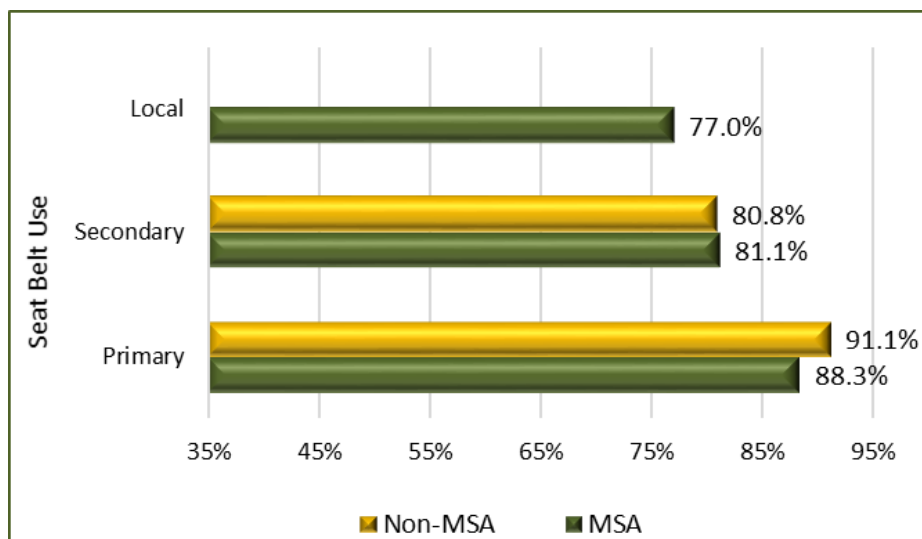


Figure 20: Percent Belted by Road Type & Metropolitan Statistical Areas, 2021, Unweighted

Sample size and restraint use by MSA designation, road type, and region are shown in Table 14. Vehicle observations from primary roads were predominantly collected in non-MSA counties in the east (n=6,957) compared with the west (n=2,903). Survey data indicated the rate of belted occupants on primary road segments was 89.8% in the east and 94.1% in the west. Primary roads in MSA counties were observed to have rates of 93% and 85.3% in the east and west, respectively.

For occupants traveling on secondary roads, 97.2% of the overall observations were collected in non-MSA counties. Noting the disparate size of the sample between regions, the rates were lower in the east at 77.5% than in the west at 81.9%. Likewise, vehicle occupants on secondary roads in MSA counties were observed to have lower rates of use in the east at 79.6% than in the west at 87.3%. 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 somewhat higher in the east than the west at 80.4% and 73.6%, respectively.

Table 14: Seat Belt Use by Region and MSA Designations

Occupants Observed		East		West	
Road Type	MSA	Sample	Belted	Sample	Belted
Primary	MSA	345	93.0%	552	85.3%
	non-MSA	6957	89.8%	2903	94.1%
Secondary	MSA	255	79.6%	63	87.3%
	non-MSA	2871	77.5%	8306	81.9%
Local	MSA	1027	80.4%	1031	73.6%
	non-MSA	n.a.	n.a.	n.a.	n.a.

FIELD SURVEY PROTOCOL

Table 15: Summary of the Seat Belt Use Survey

Methodology	Multistage stratified cluster design with probability proportional to size sampling
Source of Samples	NHTSA supplied FARS, VMT, and road segment data
Geographic Coverage	State of North Dakota
Identified Regions	East West
Selected Counties	<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
Number of Sites	320
Survey Period	June 7-13, 2021
Observation Duration Per Site	60 minutes
Sample Size	24,310 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 with 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 0.004% using SAS statistical software. From this, a 95% confidence interval for state seat belt use can be determined. The 95% confidence interval means that, statistically, there is only a 5% chance the actual statewide seat belt percentage falls outside the 81% to 82.8% range.

Table 16: Confidence Interval

95% Confidence Interval and Estimated Standard Error for 2021 State Seat Belt Use				
Occupants	State Rate	Standard Error	95% CI Lower Limit	95% CI Upper Limit
24,310	81.9%	0.004%	81.0%	82.8%

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 2021 survey, 19,798 drivers and 4,512 passengers were observed for a total of 24,310 vehicle occupants. Seat belt use could not be determined for 812 vehicle occupants, resulting in a nonresponse rate of 3.2%. As stipulated in NHTSA's guidelines, the nonresponse rate did not exceed the allowable maximum of 10%, so no resampling was necessary.

Protocols

Observers

Observers contracted to conduct the 2021 statewide seat belt survey were required to complete online training. The training module covered survey methods, observer responsibilities, and instructions for operation of tablets for electronic data collection. Knowledge points required the trainee's 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 2021 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 predetermined time slot—or the first five-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 while 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 was required that quality control personnel visit any new observers during their initial observation day to assure protocol compliance and verify safe observation practices.

CONCLUSION

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 fatality data for county sampling. The federal criteria mandated a reselection of observation sites at five-year intervals. This reselection requirement was carried out in 2017 without further modifications to the survey design.

For the 2021 statewide survey, observers recorded seat belt use for 19,798 drivers and 4,512 right front-seat passengers, for a total of 24,310 vehicle occupants. The unweighted estimates of seat belt use were 83.2% for drivers, 92.4% for passengers, and 84.9% overall. Adjusting the raw state rate for the survey design and weights resulted in an overall weighted state rate of 81.9%, 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 81.9% falls below the national estimate of 90.3% according to the most recent NHTSA report (February 2021). The gap is less disparate when compared to states with similar seat belt laws (secondary) where NHTSA reports a restraint use rate of 87.6% (2020). In general, the findings in the 2021 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).

