

SEAT BELT USE IN NORTH DAKOTA



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Thank you to North Dakota Tourism and Gerald Blank for the use
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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 Highway Safety Division.

During the week of June 4-10, 2023, trained observers visited each site in their assigned counties to collect seat belt use observations for drivers and right front-seat passengers in vehicles with gross vehicle weights up to 10,000 lbs. Data were collected for 14,087 drivers and 2,535 right front-seat passengers for a total of 16,622 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 78.5%.

A summary of major findings from the 2023 survey regarding seat belt use in North Dakota follows:

- **County.** Weighted rates of seat belt use by county showed McKenzie County with the highest use at 94.5%, and Stutsman County with the lowest use at 61.3%. Barnes, Burleigh, McLean, Morton, Stark, and Williams counties were also observed to have low use of less than 80% in 2023. Applying three-year averages for trend comparison showed eight counties with improved rates in the 2021-2023 time period over the previous 2018-2020 average. The time period comparisons were not available in three counties that were new to the survey with the 2022 county reselection. The change in the field survey county composition was due to the NHTSA-mandated reselection process that is required in five-year intervals.
- **Vehicle Occupant.** Driver seat belt use was 79.8% while passenger use was 88.0% statewide. At the county level, McKenzie County reflected the highest rate of drivers belted at 93.8%. Driver restraint use was the lowest in McLean County at 66.3%. Cass County reflected the highest passenger belt use at 100%. In addition, Benson, Grand Forks, McKenzie, Mountrail, Rolette, Walsh, and Ward counties had rates of passenger belt use greater than 90%. The lowest rate for passengers was found in Williams County at 75.0%.
- **Region.** Overall rates of seat belt use were higher in the east region at 81.6%, compared with 80.7% in the west region. The current rates reflect a return to regional disparity seen prior to 2022, with the east region overtaking the west region once again. The west region demonstrated an increase of nearly 8 percentage points when comparing rates from the previous three-year average (77.8%) to the most recent three-year average (84.5%), while the east region saw a 1 percentage point decrease. The five-year rates in the east ranged from a high of 85.7% in 2021 to a low of 81.6% in 2023, a possible result of the county reselection

process. Five-year rates in the west ranged from 2022's high of 88.5% to 78.2% in 2020. The regional disparity is less apparent in driver and passenger rates. In 2023, drivers in the east registered use of 80.4%, compared with their counterparts in the west at 79.4%. Passenger rates were 89.0% in the east and 87.4% in the west.

- **Vehicle Type.** The results of the 2023 statewide survey indicated occupants of cars, SUVs, and vans demonstrated restraint use of 79.9%, 88.1%, and 86.6%, respectively. Truck occupants were belted at a lower rate of 75.2%, dropping 8 percentage points from last year's highest recorded rate. The sample size of this demographic (44.0%) combined with the lower usage has historically negatively influenced the overall North Dakota rate. Male occupants in trucks were belted at 72.9% in 2023, compared with 87.9% for females, and had the lowest five-year average at 75.9%.
- **Gender.** In 2023, female occupants continued to show higher rates of seat belt use overall (89.1%) than male occupants (76.1%). When considering rates at the county level, females registered use greater than 80% in 15 of the 16 counties. Male rates reached that same level in only seven counties. The difference in gender rates by county varied from 5.2 to 21.6 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 2023. The highest rate for males was found in SUVs, 83.9%, and the lowest in trucks, 72.9%. By comparison, female rates ranged from a high of 91.0% in vans to a low of 85.0% in cars.
- **Road Type.** Primary roads held the largest share of occupants in the sample (61.2%), followed by secondary roads (36.8%). Local roads had the smallest share (1.9%) mainly due to their selection only in counties designated as metropolitan statistical areas (MSA), which are Fargo, Grand Forks, and Bismarck, per NHTSA protocol. Seat belt use in 2023 was highest on primary roads (83.2%), followed by local roads (81.1%), and secondary roads (77.5%). 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 83.4% on primary roads, 78.4% on secondary roads, and 81.1% on local roads. However, the majority of the sample is from non-MSA counties, with rates of 83.1% on primary roads and 77.2% on secondary roads. Regional differences in shares and use rates by road type were also noticed. MSA counties in the east showed higher rates than those in the west for all road types, while non-MSA counties in the west had higher rates than those in the east.

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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 2023. 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 North Dakota roadways. In 2022, 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. 18,042 – 18,059.

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	Drivers		Passengers		Total
	<i>n</i>	%	<i>n</i>	%	<i>N</i>
2019	19,397	80.7%	4,645	19.3%	24,042
2020	17,836	80.6%	4,283	19.4%	22,119
2021	19,798	81.4%	4,512	18.6%	24,310
2022	13,541	85.4%	2,318	14.6%	15,859
2023	14,087	84.7%	2,535	15.3%	16,622

Table 1 shows the sample size of annual seat belt surveys from 2019 to 2023 by occupant position. Within observations collected in 2023, there were 16,622 occupants: 14,087 drivers, which represented 84.7% of the sample, and 2,535 passengers, which represented 15.3% of the sample. These figures include only vehicle occupants where protection status could be determined per survey protocol.

Total sample size can vary from year to year depending on site locations and traffic flow. While there was an increase in sample size compared with last year, sample sizes were considerably larger in the three years prior to the required site reselection in 2022. According to NDDOT’s Automatic Traffic Data report for June 2023, automatic traffic recorders (ATRs) captured 3.7% more traffic when compared with that of June 2022¹, which was similarly reflected in the sample size. It is not uncommon to have several individual sites capture only a limited number of vehicles. However, these sites are included each year because they are important to an inclusive and representative sample in the aggregate measurement of statewide seat belt use.

The driver-to-passenger ratio can influence overall use rates because use rates among passengers are typically higher than drivers. In 2023, the ratio was 5.6 drivers for every occupant, meaning drivers represented 84.7% of the sample. Table 1 shows a noticeable decline in the driver count and share of passengers since the 2022 site reselection.

¹ North Dakota Department of Transportation. Automatic Traffic Data. June, 2023. <https://www.dot.nd.gov/business/maps-portal.htm#trafficreportsmonthlyandannual>

Table 2: Ratio of Drivers to Passengers, 2018-2023

Ratio	Drivers: Passengers	Drivers as % of Sample
2019	4.8:1	80.7%
2020	4.2:1	80.6%
2021	4.4:1	81.4%
2022	5.8:1	85.4%
2023	5.6:1	84.7%

Overall unweighted results of the 2023 statewide survey indicated 81.0% 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 78.5% for 2023. 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 91.6% in 2022.

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%. Nationally, NOPUS survey data confirm that vehicle occupants in states with primary enforcement of seat belt laws demonstrated higher restraint use (92.2%) than states with secondary or no laws² (89.5%) in 2022. Accordingly, North Dakota aligns more closely with states without primary seat belt laws, and ranks in the bottom half among those states.³ One month prior to the survey, North Dakota lawmakers passed a primary seat belt law, which is set to go into effect on August 1, 2023. 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 this report. Differences in seat belt use among regions of the state, gender, vehicle type, and roadway type are explored for additional insight.

² Highway Loss Data Institute. Seat Belt and Child Seat Laws by State. October, 2022. [Seat Belt Law Table - October 2022](#)

³ National Highway Traffic Safety Administration. Traffic Safety Facts Research Note. December, 2021. [Seat Belt Use in 2021 – Overall Results \(dot.gov\)](#)

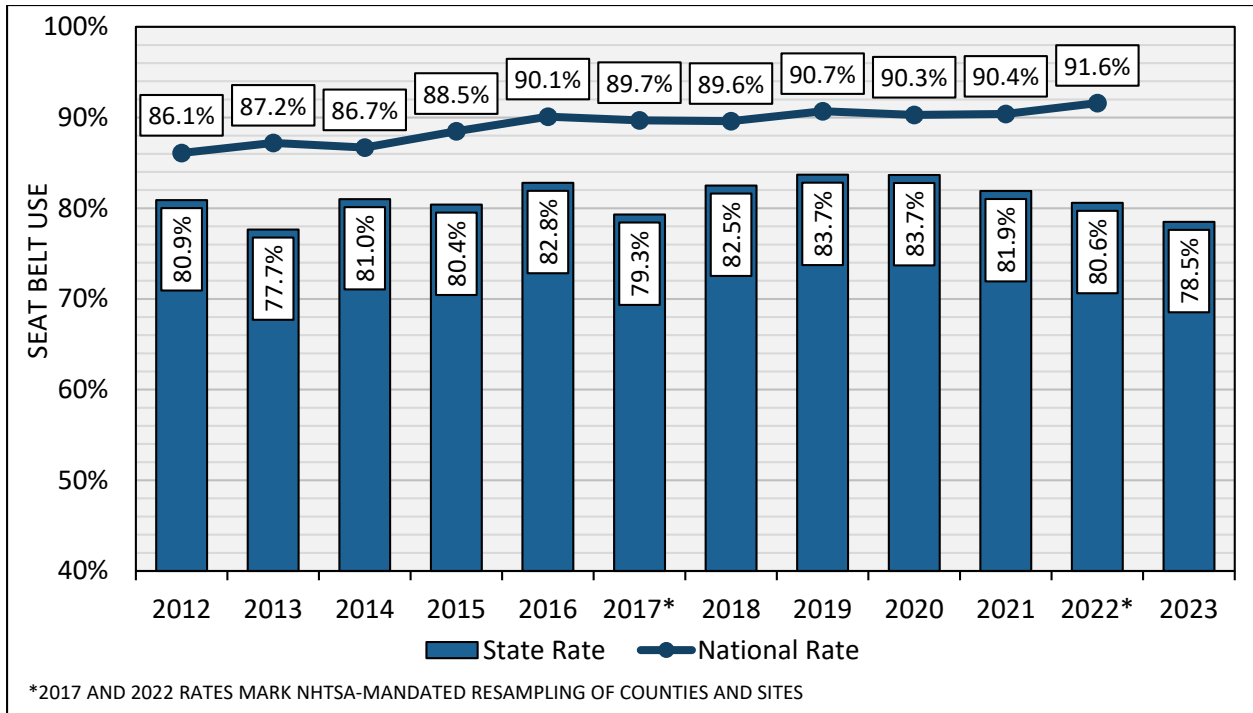


Figure 1: Statewide Seat Belt Use, Weighted

County Results

The 2023 weighted seat belt rates by county are shown in Figure 2. Restraint use ranged from a high of 94.5% in McKenzie County to a low of 61.3% in Stutsman County. In the past, higher seat belt use was generally noticed in counties that follow interstate corridors. More recently, counties without interstate corridors had a slightly higher average rate of 81.2%, compared with the 76.1% belted in interstate corridor counties. This change may have come with the county and observation site reselection in 2022.

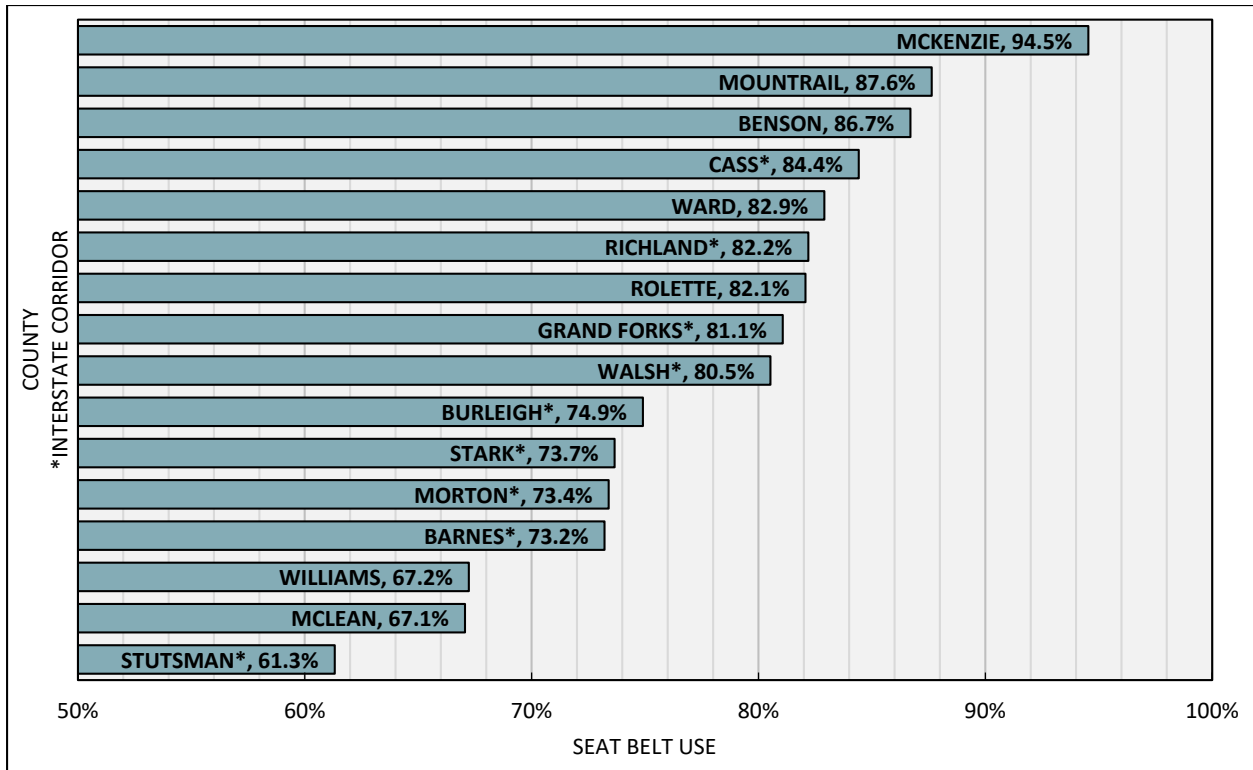


Figure 2: Seat Belt Use by County, 2023, Weighted

Rates vary from year to year at the county level. The changes can reflect sampling differences or special event effects, 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.

To smooth the annual variability, the three-year averages in Figure 3 provide a representation of county rates. This analysis does not offer the earlier three-year averages for comparison on the three counties (McLean, Rolette, and Walsh) that were first-year additions to the survey in 2022 because of the reselection process. 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, McKenzie County leads in belt use at 94.3%. Barnes, Benson, Cass, McKenzie, Mountrail, Richland, Stark, and Ward counties all register rates above 80%. Barnes, Burleigh, Cass, Morton, and Stutsman County rates were lower in the most recent period, while all other county rates increased over time.

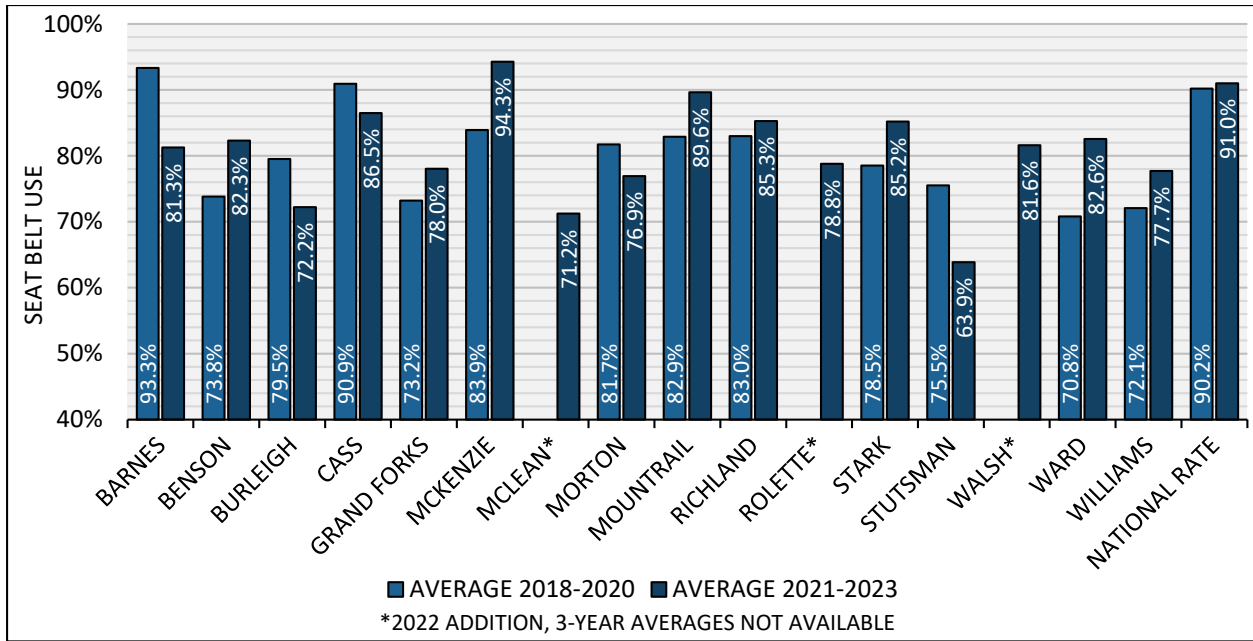


Figure 3: Seat Belt Use by County, Three-Year Averages, Weighted

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. It is important to note the county rates are based on the sites visited as part of the statewide rate sample, thus, may not statistically represent seat belt use in a county.

Results for Vehicle Occupants by Position

Figure 4 illustrates seat belt use by occupant position in 2023. At the county level, driver use ranged from a low of 66.3% in McLean County to a high of 93.8% in McKenzie County. Passenger use ranged from 75.0% in Williams County to 100% in Cass County. Annual surveys confirm that, as a rule, passengers buckle up at higher rates than drivers. This was seen in the 2023 survey, with all counties holding higher passenger rates than driver rates except for McKenzie County, where the passenger rate was less than one percentage point lower than the driver rate.

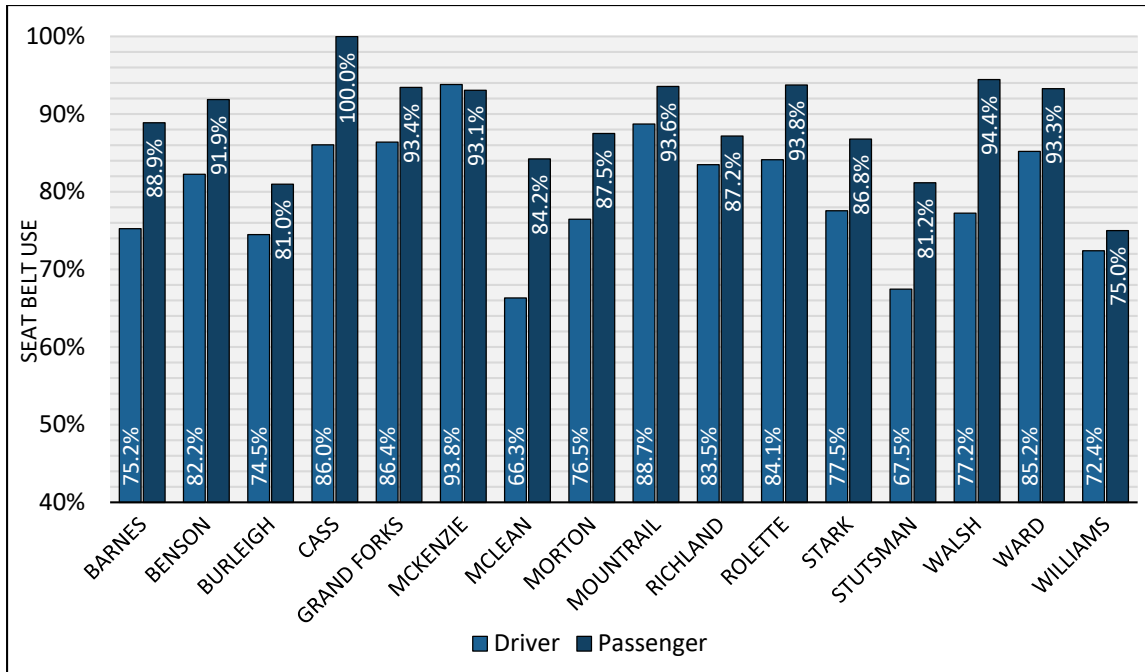


Figure 4: Percent Belted by Occupant Position & County, Unweighted, 2023

Considering the state as a whole, the unweighted estimates of seat belt use in 2023 were 79.8% for drivers and 88.0% for passengers, with an overall estimate of the seat belt use rate of 81.0% for drivers and passengers combined (Figure 5). These rates compare with 85.9%, 88.4%, and 86.3%, respectively, in 2022.

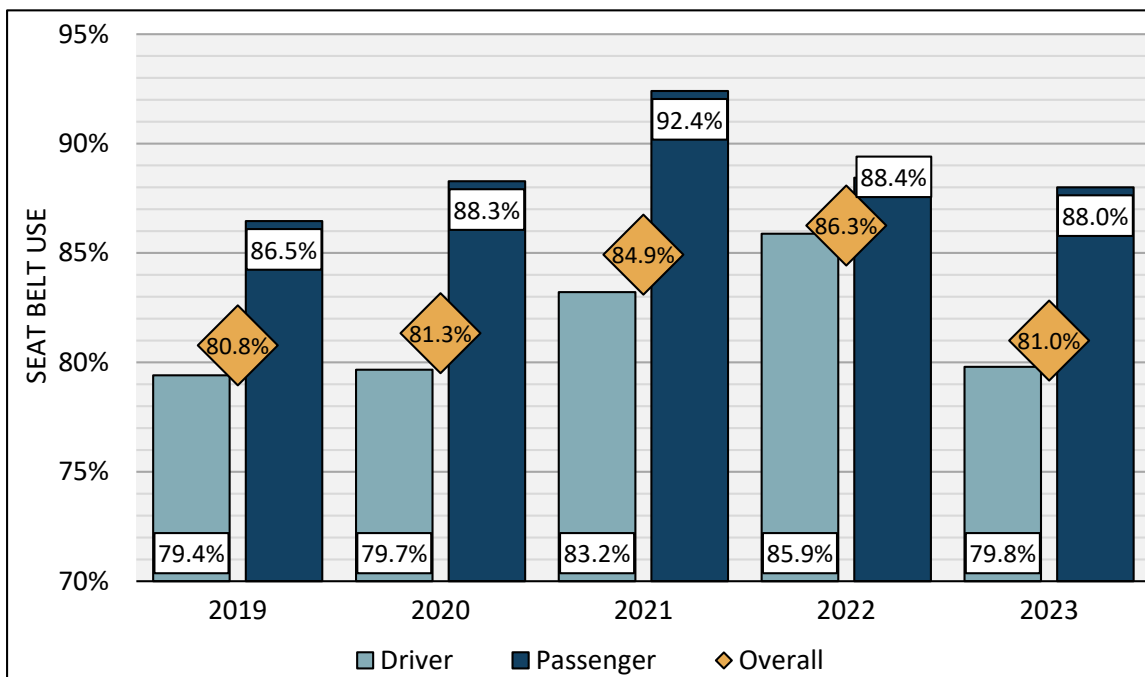


Figure 5: Percent Belted by Position, Annual, Unweighted

Results by North Dakota Regions

The survey sampling methodology groups the state into an east/west regional division (Figure 6). Each region is represented by eight counties. Both east and west regions contain “certainty” counties, five in the east and seven in the west, with the rest selected from the remaining counties in each region.⁴

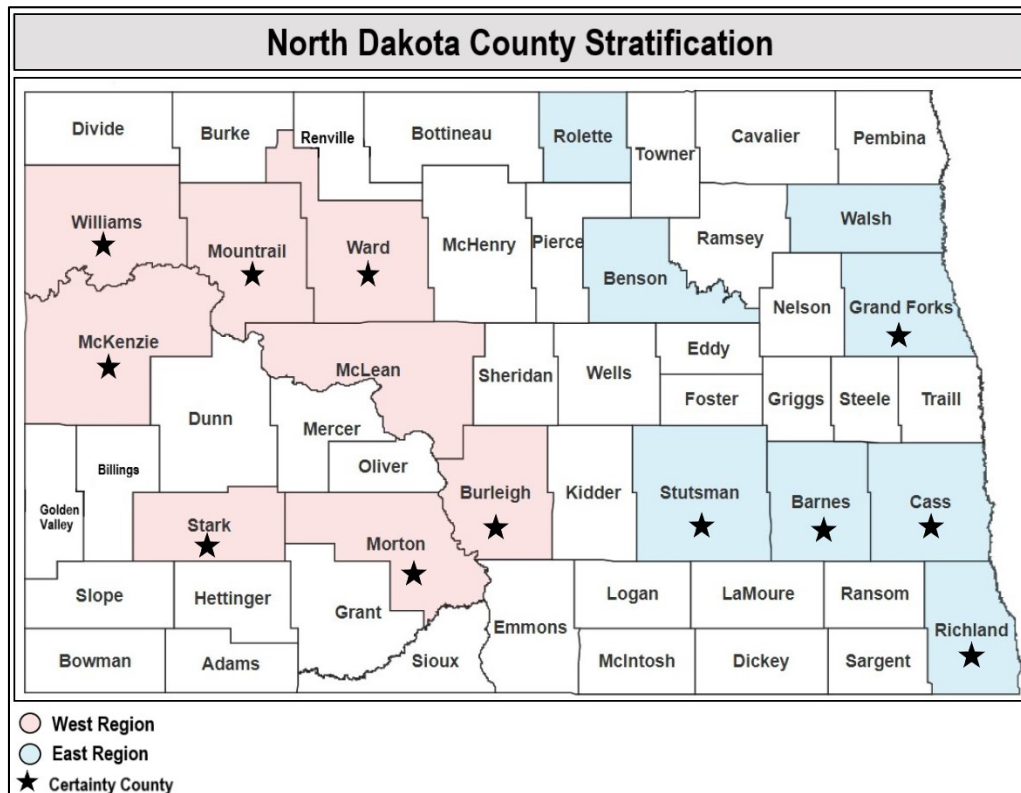


Figure 6: North Dakota County Stratification

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. Two-thirds of the sample data was collected in western North Dakota from 9,510 occupants. The remaining proportion of 6,349 occupants was observed in eastern North Dakota.

Table 3: Sample Size by Region

Occupants Observed	East		West		Total <i>N</i>
	<i>n</i>	%	<i>n</i>	%	
2019	11,620	48.3%	12,422	51.7%	24,042
2020	9,917	44.8%	12,202	55.2%	22,119
2021	11,455	47.1%	12,855	52.9%	24,310
2022	6,349	40.0%	9,510	60.0%	15,859
2023	6,552	39.4%	10,070	60.6%	16,622

⁴For details on methodology, certainty counties, and the selection processes, contact NDDOT Safety Division.

Historically, seat belt use has been routinely higher in the east than the west until 2022, as shown in Figure 7. This year the difference between regional rates was less than 1 percentage point. Both regions saw a decrease in rates from 2022, with the east decreasing by just over 1 percentage point, and the west by nearly 8 percentage points. The comparison of seat belt use in Figure 8 shows an average rate in the east of 84.5% from 2018 to 2020 and 83.4% from 2021 to 2023. Seat belt use in the west increased between the two periods, from 77.8% in 2018-2020 to 84.5% in 2021-2023.

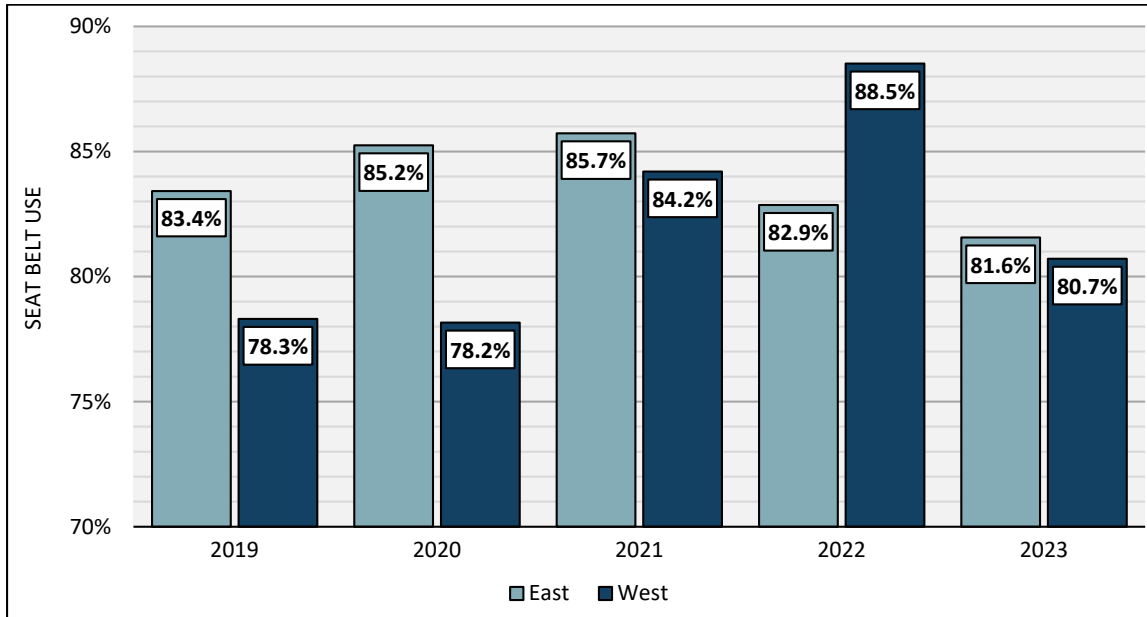


Figure 7: Percent Belted by Region, Unweighted

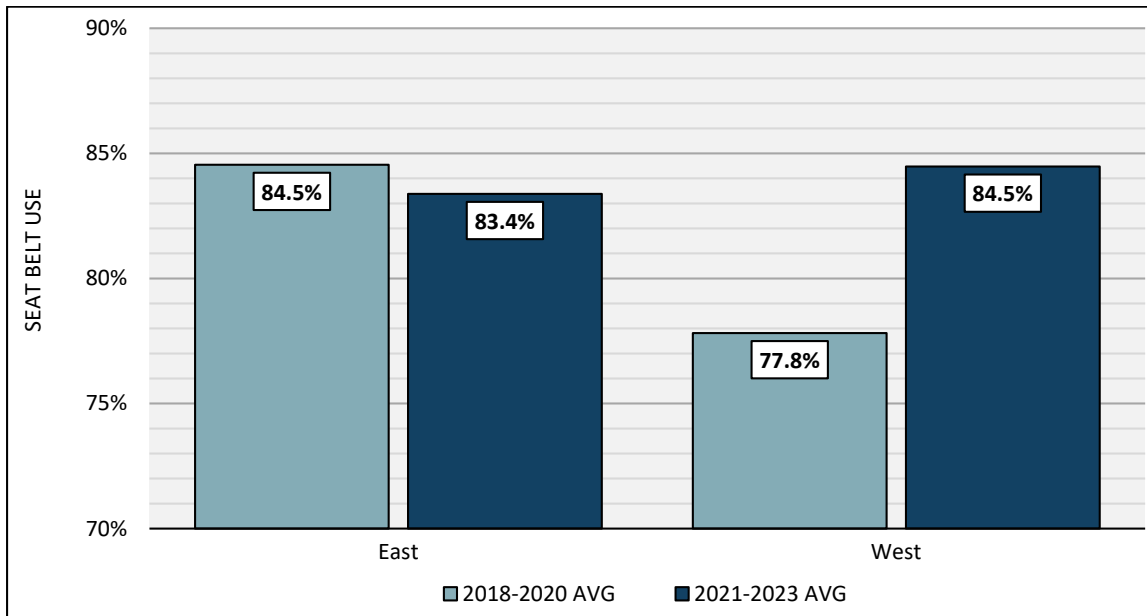


Figure 8: Seat Belt Use by Region, Three Year Averages, Unweighted

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 rates in the east are 80.4% for drivers and 89.0% for passengers, which represents the highest usage of the four occupant groups. Drivers in the west demonstrated the lowest usage rate of 79.4%, dropping 9 percentage points from 2022’s rate, aligning more closely to rates found prior to the site reselection process. The passenger rate was 87.4% in the west.

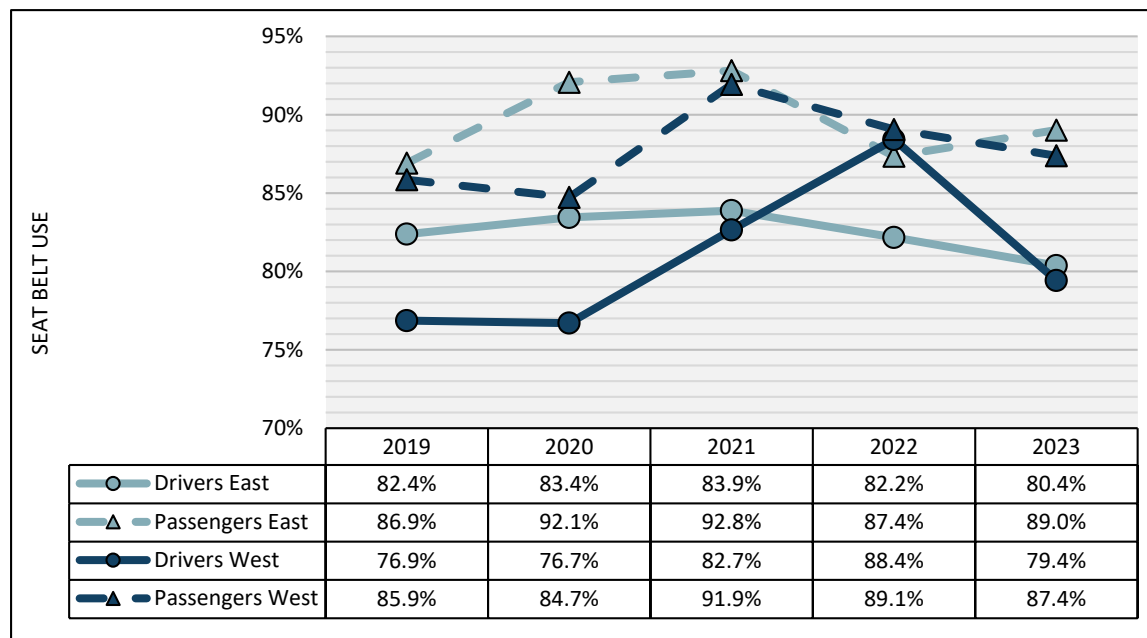


Figure 9: Percent Belted by Region & Occupant Position, Annual, Unweighted

Historically, lower seat belt usage in the west region was explained by the high prevalence of truck occupants, who have typically exhibited the lowest rate of use among vehicle types. For example, large truck volume of greater than 50% was observed in McKenzie, Mountrail, and Williams counties. Overall, the west region accounts for 66.0% of the statewide share of occupants in this vehicle type. While rates of use in the west have risen, the disproportionate influence of truck occupants is still apparent.

Results by Vehicle Type

Table 4 shows the fleet distribution annually since 2019. During that time, the number of cars observed has decreased from the 23.4% share in 2019 to 16.0% in 2023. Van representation has also declined slightly over this same period, and currently represents the smallest share (5.1%) of the sample. The share of SUVs (35.0%) has been consistent since 2021. Trucks make up 44.0% of the occupant share in 2023, and historically hold the largest share of vehicle type and the lowest seat belt use rate.

Table 4: Sample by Vehicle Type

Occupants Observed	Car		Truck		SUV		Van		Total
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>N</i>
2019	5,620	23.4%	10,255	42.7%	6,616	27.5%	1,551	6.5%	24,042
2020	4,122	18.6%	9,754	44.1%	6,955	31.4%	1,288	5.8%	22,119
2021	4,168	17.1%	9,988	41.1%	8,723	35.9%	1,431	5.9%	24,310
2022	3,015	19.0%	6,404	40.4%	5,623	35.5%	817	5.2%	15,859
2023	2,657	16.0%	7,306	44.0%	5,810	35.0%	849	5.1%	16,622

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 lbs. 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 47.9% of vehicles in the west and 37.9% in the east. The larger share of vehicles in the western region (60.6%), along with the higher volume of trucks, may influence the statewide seat belt rate. The larger truck share may have historically been correlated with the proximity to the Bakken oil region, particularly in McKenzie, Mountrail, Ward, and Williams counties, where the truck share represented more than half of their total vehicle counts. The nature of the travel environments, with fewer urban lane miles in the west, also likely impacted fleet composition. However, it should be noted that McKenzie and Mountrail county truck occupants demonstrated use rates of 91.9% and 86.4%, respectively, in 2023. From this, we might infer that low belt use rates in truck occupants is more widespread than in previous survey years.

At the county level, this disproportionate share of trucks in the west region was most noticeable in McKenzie County, where trucks made up 74.5% of the share of vehicles observed. This was followed by 63.4% in Mountrail and 54.1% in Williams County. In the east region, Benson (43.9%), Walsh (42.9%), and Rolette (42.5%) counties registered the largest shares of trucks. Of these six counties, five demonstrated belt use rates lower than 90.0%.

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 88.1% and 86.6%, respectively, followed by car and truck occupants at 79.9% and 75.2%, respectively. Truck occupants are consistently least likely to be belted, but rates had been increasing over time, hitting a high of 83.3% in 2022. Current rates, however, reflect a decline in usage, returning to the mid-70% rate trends seen in earlier survey years.

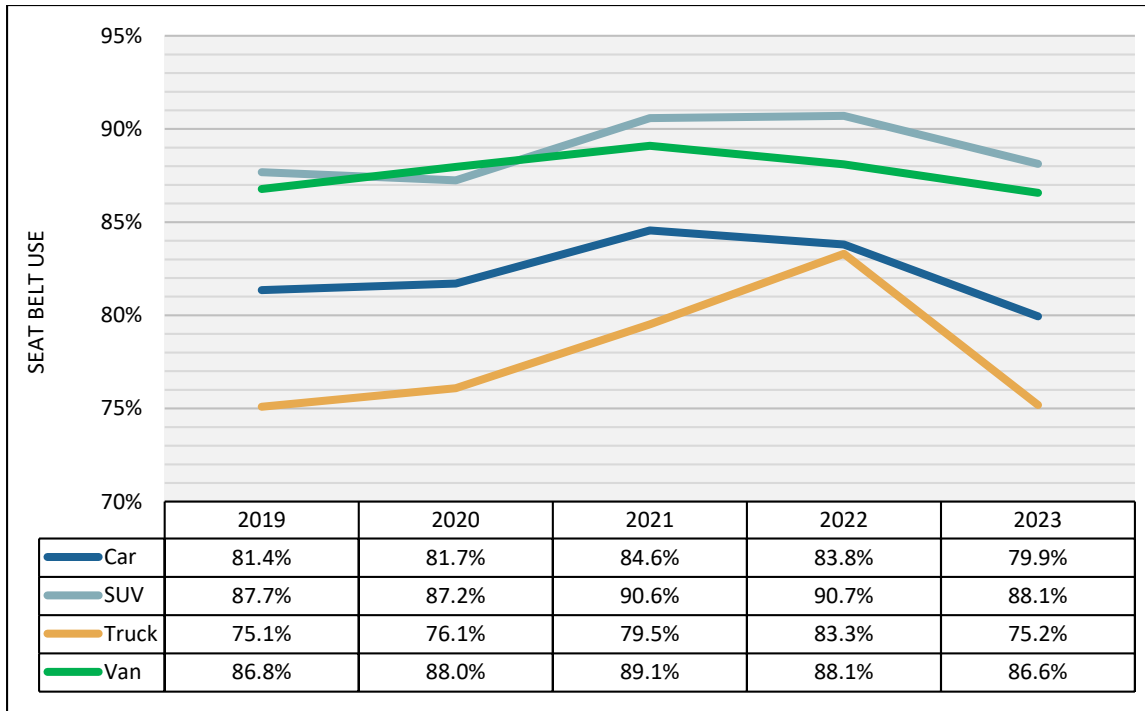


Figure 10: Percent Belted by Vehicle Type, Annual, Unweighted

The three-year averages used to measure belt use for occupants of cars, SUVs, and vans show marginal increases between the three-year periods (Figure 11). Truck occupants have again demonstrated the most change, increasing seat belt use by approximately 4 percentage points. Individual county rates by each vehicle type are found in Table 5.

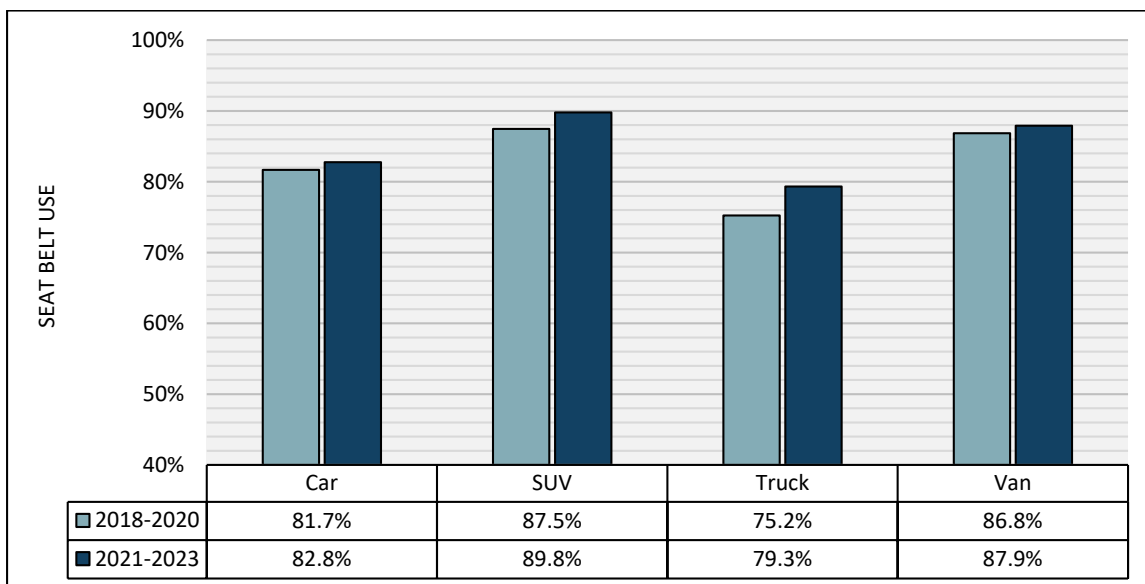


Figure 11: Seat Belt Use by Vehicle Type, Three-Year Averages, Unweighted

The 2023 results are consistent with long-term trends for seat belt use in North Dakota and other states that, a) do not have primary seat belt laws, b) are largely rural in nature, and c) 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 all but three 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 & Vehicle Type, 2023, Unweighted

2023							
Car		SUV		Truck		Van	
Barnes	80.5%	Barnes	83.7%	Barnes	69.0%	Barnes	90.8%
Benson	76.3%	Benson	93.7%	Benson	80.3%	Benson	88.5%
Burleigh	76.2%	Burleigh	79.4%	Burleigh	70.1%	Burleigh	74.1%
Cass	86.0%	Cass	92.8%	Cass	78.5%	Cass	90.3%
Grand Forks	90.1%	Grand Forks	94.1%	Grand Forks	77.1%	Grand Forks	92.9%
McKenzie	97.8%	McKenzie	99.5%	McKenzie	91.9%	McKenzie	96.0%
McLean	59.2%	McLean	75.4%	McLean	68.8%	McLean	75.8%
Morton	71.3%	Morton	87.3%	Morton	69.9%	Morton	83.7%
Mountrail	91.4%	Mountrail	95.6%	Mountrail	86.4%	Mountrail	100.0%
Richland	85.0%	Richland	90.9%	Richland	74.8%	Richland	98.1%
Rolette	81.3%	Rolette	95.1%	Rolette	79.3%	Rolette	91.4%
Stark	83.9%	Stark	88.6%	Stark	69.8%	Stark	88.0%
Stutsman	68.1%	Stutsman	82.3%	Stutsman	59.9%	Stutsman	68.2%
Walsh	81.8%	Walsh	87.0%	Walsh	71.1%	Walsh	100.0%
Ward	83.8%	Ward	94.2%	Ward	79.9%	Ward	86.3%
Williams	71.0%	Williams	82.4%	Williams	66.0%	Williams	87.0%

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 62.0% and females 37.3% of the sample in 2023. In a small percentage of observations, 0.7%, occupant gender could not be determined, but occupant protection was still recorded. These cases are included in all 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

Occupants Observed	Female		Male		Unknown		Total <i>N</i>
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
2019	8,800	36.6%	14,921	62.1%	321	1.3%	24,042
2020	8,242	37.3%	13,695	61.9%	182	0.8%	22,119
2021	8,909	36.6%	15,287	62.9%	114	0.5%	24,310
2022	6,091	38.4%	9,693	61.1%	75	0.5%	15,859
2023	6,201	37.3%	10,299	62.0%	122	0.7%	16,622

Survey results for seat belt use by gender continued the trend of higher rates of use by female occupants. Females demonstrated 89.1% usage in 2023 and have consistently registered at 87.7% or more throughout the last five years (Figure 12). Male restraint use had been trending upward, but following an all-time high of 83.5% set in 2022, use decreased to 76.1% in 2023.

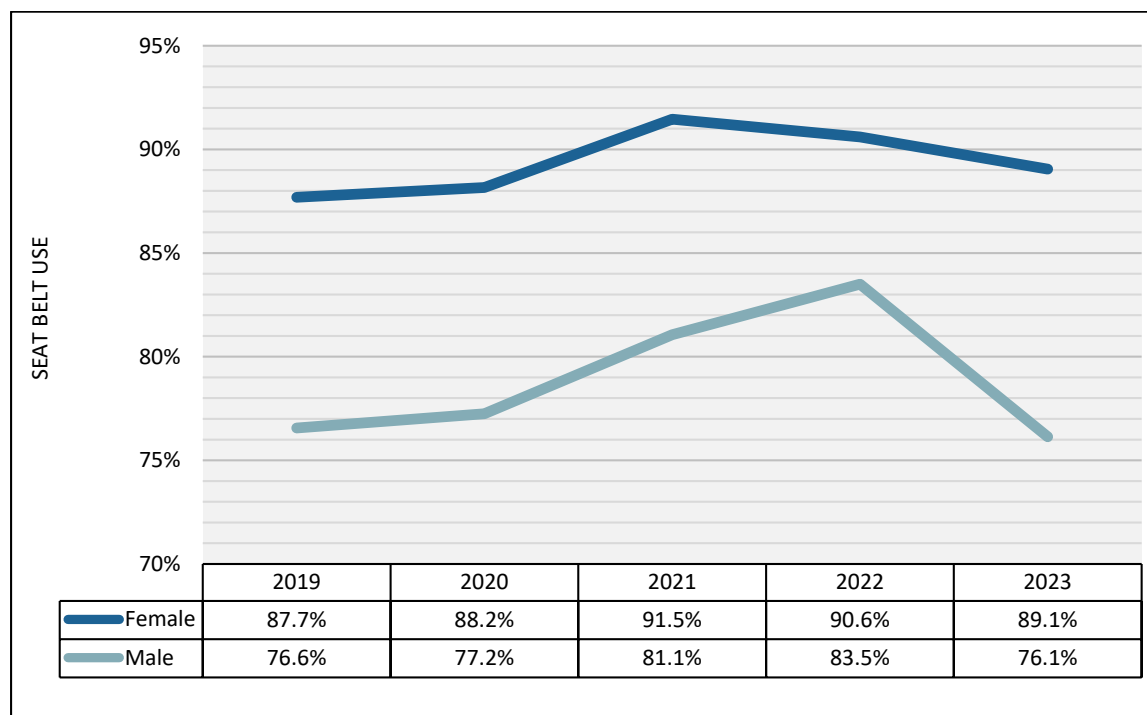


Figure 12: Percent Belted by Gender, Annual, Unweighted

Table 7 shows restraint use by county and gender. Female occupants were observed to have rates above 80% in all but one county (McLean, 75.7%). In comparison, seven counties showed male rates at that same level. In fact, the male seat belt use rate was lower than the female rate in every county. McKenzie County held the highest rates for both genders; McLean and Stutsman held the lowest for females and males, respectively.

The sample by gender and occupant position also remains stable from year to year. As described in Table 8, drivers were more than twice as likely to be male than female (9,431 compared with 4,588). In contrast, passengers were nearly twice as likely to be female than male (1,613 compared with 868).

Survey results corroborate higher rates of seat belt use by females regardless of occupant position (Figure 13). Female passengers used restraints at a rate of 92.8%, the highest usage of gender and occupant positions. This was followed by female drivers at 87.7%. Male rates were considerably lower at 75.9% for drivers and 78.9% for passengers.

Table 7: Percent Belted by Gender & County, 2023

2023		
COUNTY	FEMALE	MALE
Barnes	87.2%	71.0%
Benson	89.4%	81.5%
Burleigh	80.7%	71.6%
Cass	93.1%	82.5%
Grand Forks	95.2%	82.1%
McKenzie	97.8%	92.6%
McLean	75.7%	66.3%
Morton	90.3%	68.7%
Mountrail	94.7%	87.5%
Richland	91.6%	79.3%
Rolette	94.0%	80.6%
Stark	91.0%	71.3%
Stutsman	82.5%	61.8%
Walsh	92.7%	73.4%
Ward	93.9%	80.8%
Williams	82.5%	67.7%

Table 8: Sample by Gender & Position

Occupants Observed	<u>Male</u>				<u>Female</u>				<u>Unknown</u>		Total N
	Driver		Passenger		Driver		Passenger		All Positions		
	n	%	n	%	n	%	n	%	n	%	
2019	13,188	54.9%	1,733	7.2%	6,001	25.0%	2,799	11.6%	321	1.3%	24,042
2020	12,124	54.8%	1,571	7.1%	5,647	25.5%	2,595	11.7%	182	0.8%	22,119
2021	13,858	57.0%	1,429	5.9%	5,888	24.2%	3,021	12.4%	114	0.5%	24,310
2022	8,833	55.7%	860	5.4%	4,683	29.5%	1,408	8.9%	75	0.5%	15,859
2023	9,431	56.7%	868	5.2%	4,588	27.6%	1,613	9.7%	122	0.7%	16,622

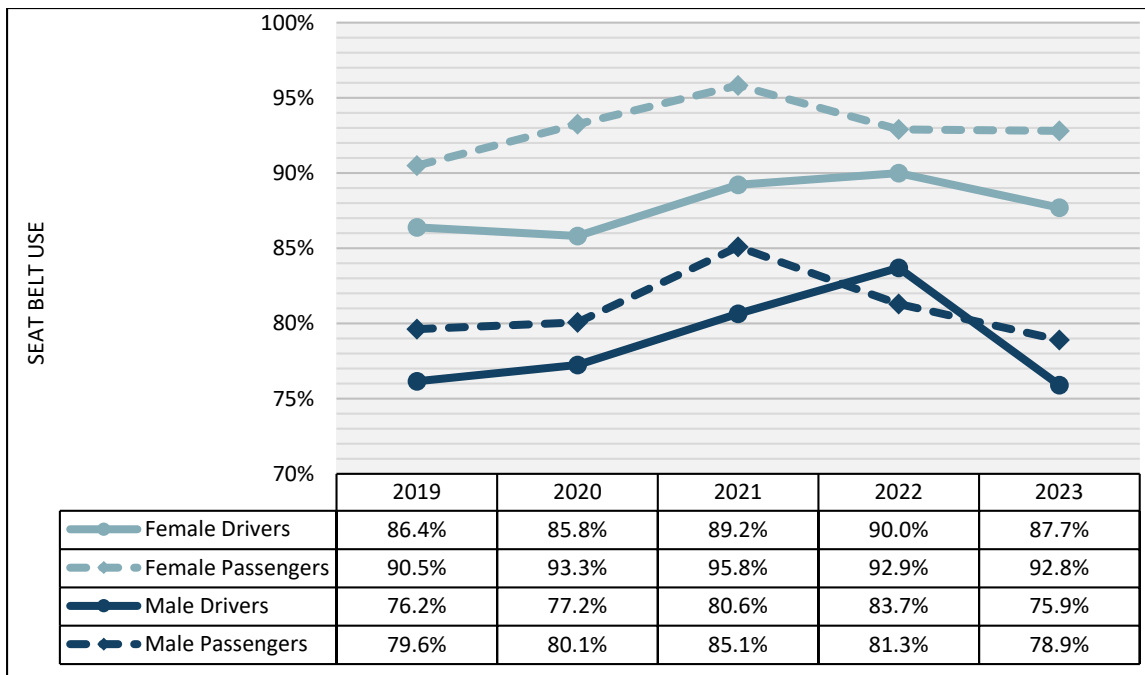


Figure 13: Percent Belted by Gender & Position, Annual, Unweighted

Figure 14 shows a comparison of three-year averages. Both genders demonstrated increased use regardless of occupant position in the most recent three-year period, with male passengers showing the most improvement. The gender disparity in rates between time periods remained relatively constant, with the difference in rates being approximately 9 percentage points for drivers and 12.5 for passengers.

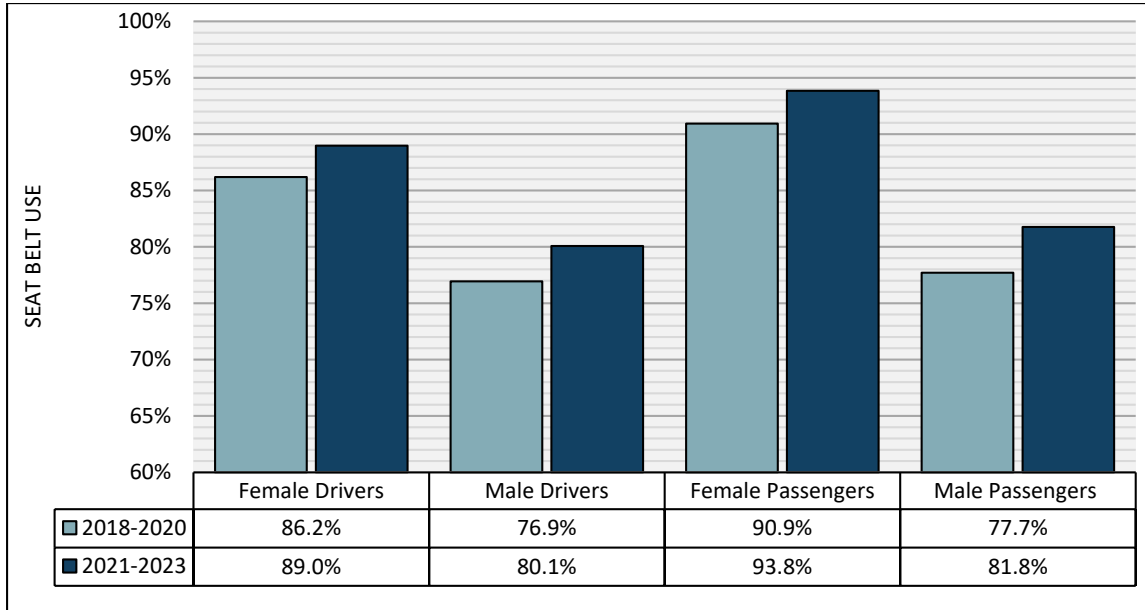


Figure 14: Seat Belt Use by Gender & Position, Three-Year Averages, Unweighted

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 two counties below 80%. Seat belt use in this group ranged from 98.2% in McKenzie County to 68.6% in McLean. Male drivers were found to have use rates below 80% in 10 counties, and ranged from 92.8% to 60.5% in McKenzie and Stutsman

counties, respectively. Female passengers' use rates were also generally high, with three counties at 100% use, and the remaining above 80%. Male passengers' rates varied from a high of 92.6% in McKenzie County to 61.8% in Stutsman County.

Table 9: Percent Belted by Gender & Position by County, 2023, Unweighted

2023							
FEMALE DRIVERS		FEMALE PASSENGERS		MALE DRIVERS		MALE PASSENGERS	
Barnes	84.3%	Barnes	91.5%	Barnes	70.1%	Barnes	71.0%
Benson	86.8%	Benson	94.3%	Benson	80.1%	Benson	81.5%
Burleigh	79.0%	Burleigh	86.6%	Burleigh	71.5%	Burleigh	71.6%
Cass	93.0%	Cass	100.0%	Cass	82.5%	Cass	82.5%
Grand Forks	93.9%	Grand Forks	100.0%	Grand Forks	82.6%	Grand Forks	82.1%
McKenzie	98.2%	McKenzie	96.7%	McKenzie	92.8%	McKenzie	92.6%
McLean	68.6%	McLean	87.2%	McLean	64.8%	McLean	66.3%
Morton	88.7%	Morton	95.2%	Morton	68.8%	Morton	68.7%
Mountrail	93.5%	Mountrail	96.9%	Mountrail	87.3%	Mountrail	87.5%
Richland	91.5%	Richland	93.3%	Richland	79.5%	Richland	79.3%
Rolette	91.7%	Rolette	100.0%	Rolette	80.0%	Rolette	80.6%
Stark	89.3%	Stark	94.5%	Stark	71.2%	Stark	71.3%
Stutsman	80.5%	Stutsman	87.3%	Stutsman	60.5%	Stutsman	61.8%
Walsh	91.1%	Walsh	96.2%	Walsh	73.0%	Walsh	73.4%
Ward	93.8%	Ward	94.2%	Ward	79.7%	Ward	80.8%
Williams	82.1%	Williams	84.5%	Williams	68.2%	Williams	67.7%

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 2023 (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 accounted for 85.0% of the overall occupant share of this vehicle type.

Table 10: Sample by Vehicle Type & Gender

Occupants Observed	2019		2020		2021		2022		2023	
	n	%	n	%	n	%	n	%	n	%
Male										
Car	2,856	11.9%	2,131	9.6%	2,348	9.7%	1,722	10.9%	1,460	8.8%
SUV	2,576	10.7%	2,756	12.5%	3,750	15.4%	2,170	13.7%	2,167	13.0%
Truck	8,671	36.1%	8,087	36.6%	8,392	34.5%	5,363	33.8%	6,184	37.2%
Van	818	3.4%	721	3.3%	797	3.3%	438	2.8%	488	2.9%
Female										
Car	2,666	11.1%	1,950	8.8%	1,790	7.4%	1,270	8.0%	1,157	7.0%
SUV	3,926	16.3%	4,135	18.7%	4,926	20.3%	3,432	21.6%	3,599	21.7%
Truck	1,500	6.2%	1,604	7.3%	1,565	6.4%	1,017	6.4%	1,091	6.6%
Van	708	2.9%	553	2.5%	628	2.6%	372	2.3%	354	2.1%
Unknown:	321	1.3%	182	0.8%	114	0.5%	75	0.5%	122	0.7%
Total	24,042	100.0%	22,119	100.0%	24,310	100.0%	15,859	100.0%	16,622	100.0%

Differences in seat belt use by gender varied across vehicle types (Figure 15). In the 2023 survey, male occupants were belted at rates ranging from a low of 72.9% in trucks to a high of 83.9% in SUVs. Females were belted at rates above 80% in all vehicle types, ranging from a low of 85.0% in cars to a high of 91.0% in vans.

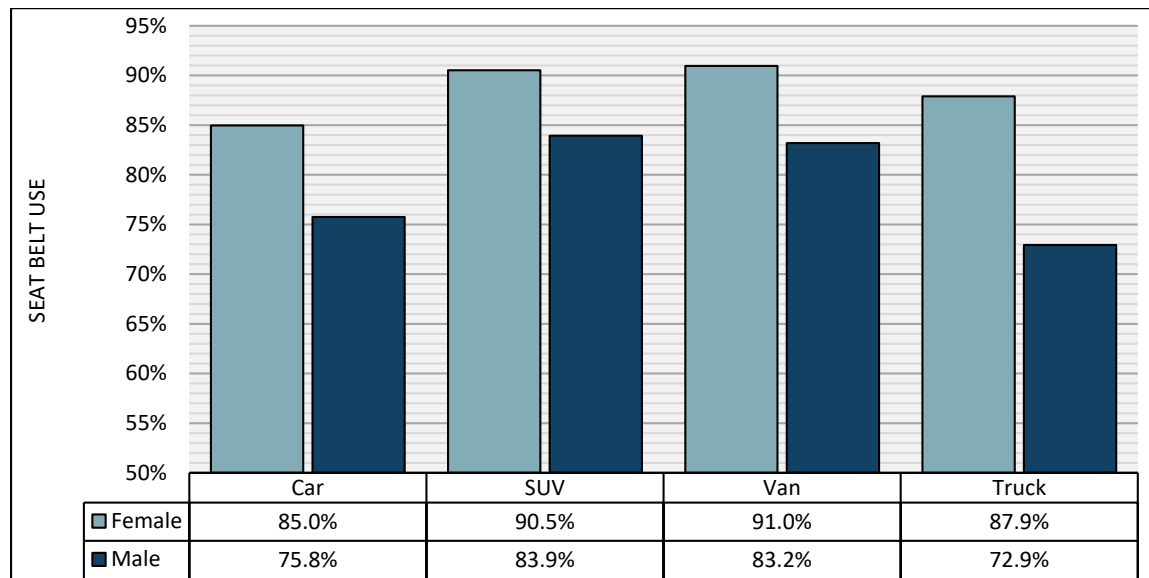


Figure 15: Percent Belted by Gender & Vehicle Type, 2023, Unweighted

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 15 percentage points in trucks in 2023 (Table 11). Throughout the five-year period, female rates are consistently high, with usage rates ranging between 85.0% and 92.5%. By contrast, annual rates for male seat belt use are much lower, with the rates ranging between 72.9% and 88.2% throughout the same time frame. Males are observed to have the lowest usage in trucks (72.9%) for the fifth consecutive year, while females had the lowest usage in cars (85.0%) for the fourth consecutive year.

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

	2019	2020	2021	2022	2023
Male					
Car	77.3%	78.3%	81.2%	82.2%	75.8%
SUV	84.4%	84.2%	88.2%	87.9%	83.9%
Van	82.8%	85.2%	86.4%	85.4%	83.2%
Truck	73.4%	73.9%	77.3%	81.9%	72.9%
Female					
Car	85.4%	85.7%	88.9%	85.9%	85.0%
SUV	89.6%	89.3%	92.4%	92.4%	90.5%
Van	91.4%	91.7%	92.5%	91.1%	91.0%
Truck	85.0%	86.9%	91.1%	90.4%	87.9%

When comparing the 2018-2020 with 2021-2023 averages, seat belt use by females across vehicle types has remained stable with minor increases (Figure 16). Male occupants show similar trends across vehicle types. Yet, rates have increased by at least 4 percentage points for both genders, in trucks, between the two periods.

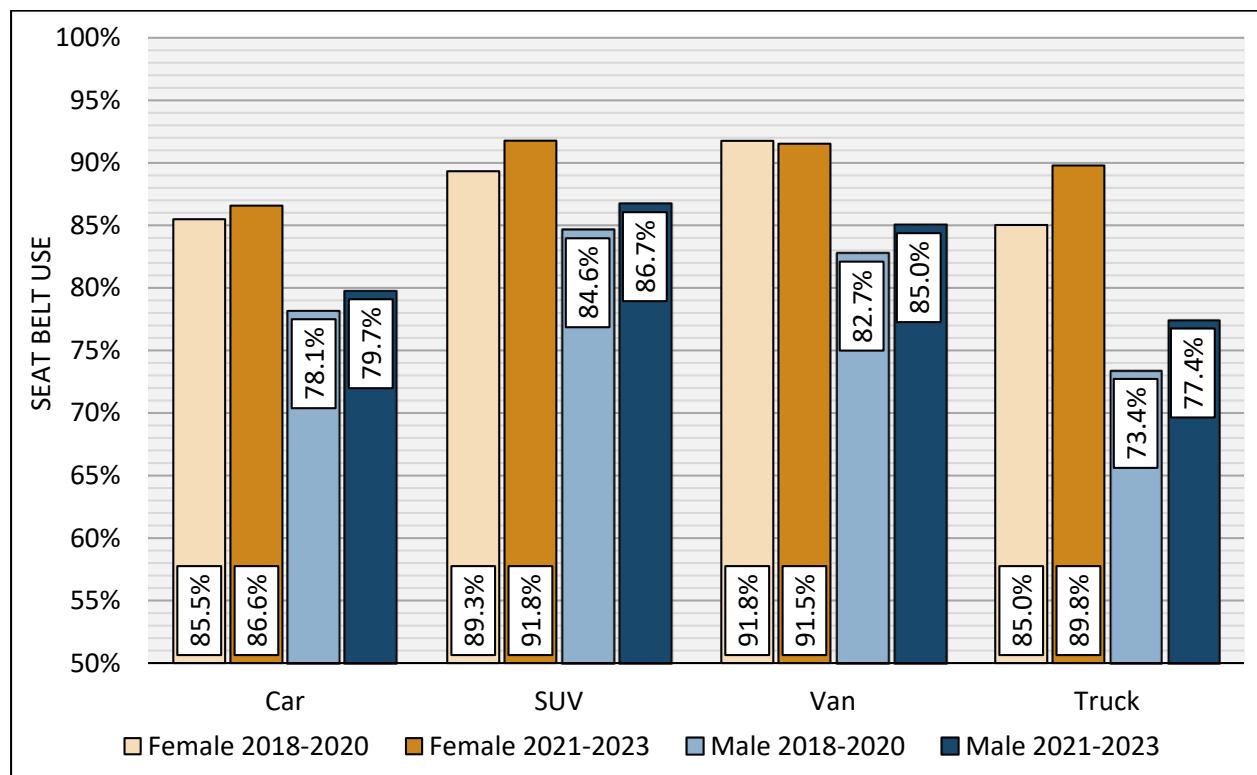


Figure 16: Seat Belt Use by Gender & Vehicle Type, Three-Year Averages, Unweighted

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 6,552 observations collected from the east region and 10,070 from the west during the 2023 survey. Primary, secondary, and local roadways accounted for 61.2%, 36.8%, and 1.9% of the vehicle occupants, respectively. Sample distribution by road type and region is diverse, as shown in Table 12. Sample variations are associated with revisions in the number of sites drawn in each road type when NHTSA-mandated reselection of sites occurs at five-year intervals. Contrasting traffic volume in newly selected counties and site locations are factors as well.

Table 12: Sample by Road Type

Occupants Observed	<u>2019</u>		<u>2020</u>		<u>2021</u>		<u>2022</u>		<u>2023</u>	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
East										
Primary	7,430	30.9%	6,029	27.3%	7,302	30.0%	3,995	25.2%	4,159	25.0%
Secondary	3,085	12.8%	2,949	13.3%	3,126	12.9%	2,096	13.2%	2,179	13.1%
Local	1,105	4.6%	939	4.2%	1,027	4.2%	258	1.6%	214	1.3%
All	11,620	48.3%	9,917	44.8%	11,455	47.1%	6,349	40.0%	6,552	39.4%
West										
Primary	1,737	7.2%	2,476	11.2%	3,455	14.2%	5,658	35.7%	6,018	36.2%
Secondary	9,539	39.7%	8,576	38.8%	8,369	34.4%	3,671	23.1%	3,943	23.7%
Local	1,146	4.8%	1,150	5.2%	1,031	4.2%	181	1.1%	109	0.7%
All	12,422	51.7%	12,202	55.2%	12,855	52.9%	9,510	60.0%	10,070	60.6%
Total	24,042	100.0%	22,119	100.0%	24,310	100.0%	15,859	100.0%	16,622	100.0%

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 reselections in 2017 and 2022. 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.

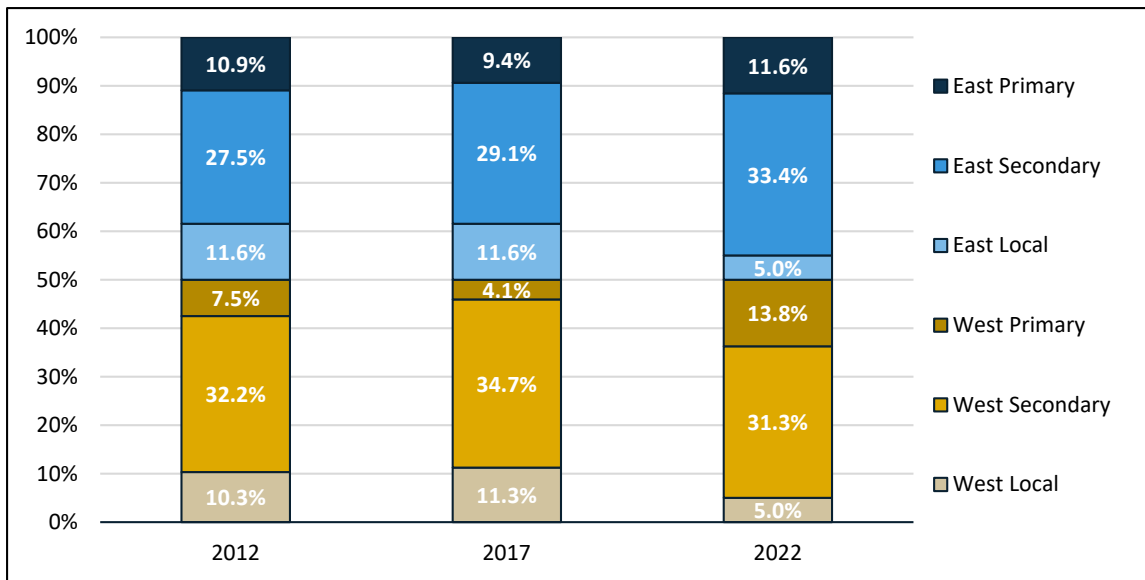


Figure 17: Percent of 320 Survey Sites by Road Type, 2012, 2017, 2022

Figure 18 shows vehicle occupants traveling primary roadways in 2023 were belted at a higher rate (83.2%) than occupants on local (81.1%) and secondary roads (77.5%). Primary roadway occupants used seat belts at rates from this year's low of 83.2% to 90.8% within the five-year time frame. Local road occupants brought rates closer to the five-year high of 82.2% set in 2019 from last year's 76.3% use rate. Belt use by occupants on secondary roads had been trending up, from 74.8% in 2020 to 85.0% in 2022, but demonstrated the least restraint use among road types in 2023.

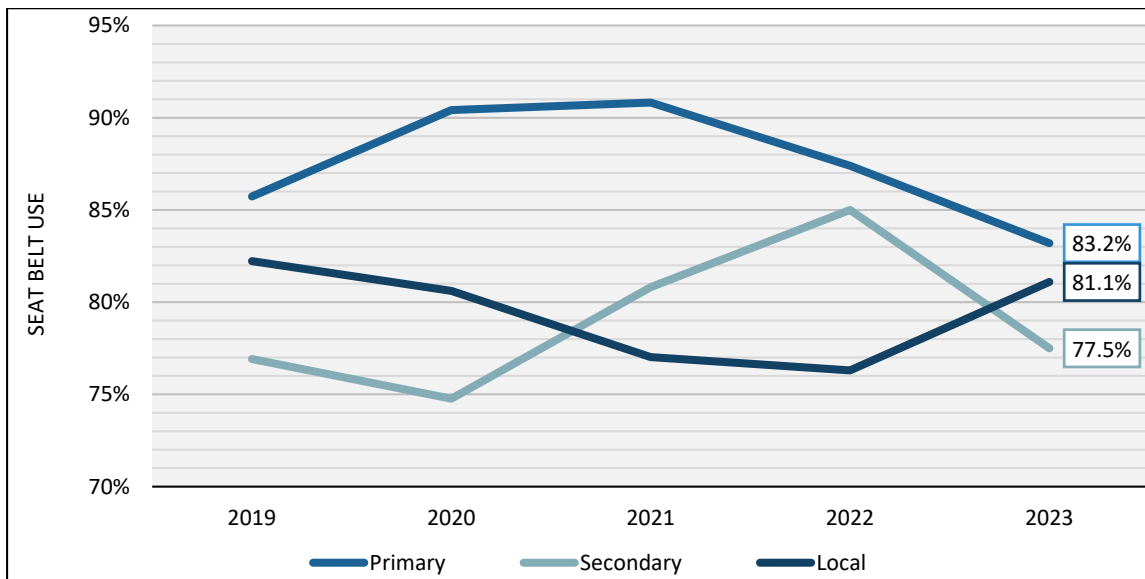


Figure 18: Percent Belted by Road Type, Annual, Unweighted

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 83.5% to 89.9%, while corresponding roads in the west region range from 83.0% to 92.7%. Use on secondary roads ranges from 75.7% to 80.5% in the east and 74.0% to 87.6% in the west. Occupants traveling local roads were belted at rates from 80.4% to 86.0% and 66.3% to 79.0% the east and west regions, respectively. Generally, higher rates

of use have been observed on primary and secondary roads in the west compared with the east. Local roads in the east tend to have higher rates of use than those in the west.

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

	2019	2020	2021	2022	2023
East					
Primary	86.2%	89.7%	89.9%	84.1%	83.5%
Secondary	75.7%	77.0%	77.7%	80.5%	77.6%
Local	86.0%	82.6%	80.4%	83.3%	85.0%
West					
Primary	83.6%	92.2%	92.7%	89.8%	83.0%
Secondary	77.3%	74.0%	82.0%	87.6%	77.4%
Local	78.6%	79.0%	73.6%	66.3%	73.4%
Total					
Primary	85.7%	90.4%	90.8%	87.4%	83.2%
Secondary	76.9%	74.8%	80.8%	85.0%	77.5%
Local	82.2%	80.6%	77.0%	76.3%	81.1%

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. The most notable change came from secondary roads in the west, increasing 7 percentage points over the two time periods. Conversely, local roads in the west saw a decrease of 7 percentage points. The most disparity between regions is seen on local roads as well, with a difference of nearly 12 percentage points in the most recent three-year period. The difference of less than 4 percentage points was seen between regions for both primary and secondary roads.

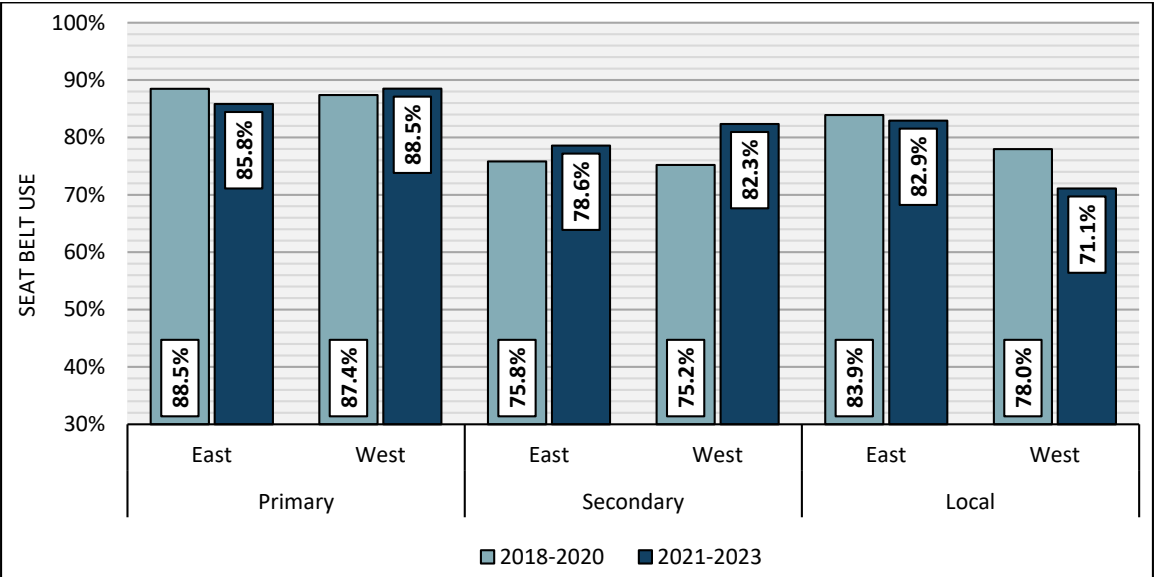


Figure 19: Seat Belt Use by Roadway Type, Three-Year Averages, Unweighted

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 primary roads (83.4%) evenly compared with the same road type in non-MSA counties (83.1%). Restraint use on secondary roads in MSA counties (78.4%) similarly compared with the same road type in non-MSA counties (77.2%). Occupants on local roads in MSA counties were restrained at 81.1%, and local road sites were outside the sampling frame in non-MSA counties, so a comparison of that road type is not available.

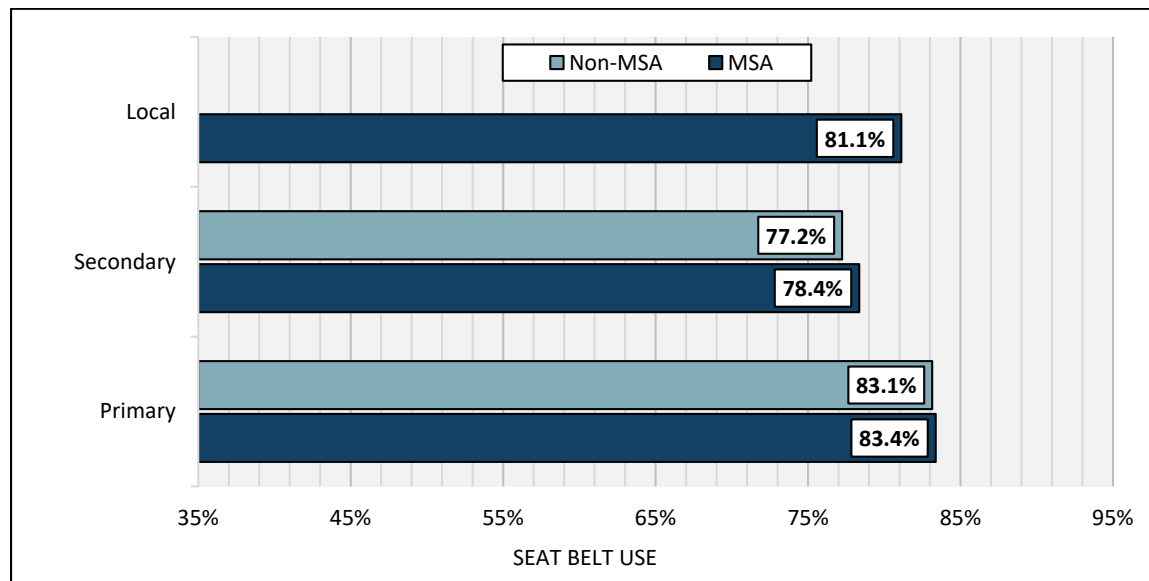


Figure 20: Percent Belted by Road Type & Metropolitan Statistical Areas, 2023, Unweighted

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 west (28.4%) compared with the east (20.2%). Survey data indicated the rate of belted occupants on primary road segments in non-MSA counties was 81.8% in the east and 84.1% in the west. Primary roads in MSA counties were observed to have rates of 90.5% and 79.0% in the east and west, respectively.

Secondary roads in non-MSA western counties represented 20.0% of the sample, compared with the east (8.3%). Noting the disparate size of the sample between regions, the rates were lower in the east at 74.5% than in the west at 78.4%. Vehicle occupants on secondary roads in MSA counties were observed to have rates of 82.9% in the east and 72.5% in the west.

As mentioned previously, observations were collected on local roads in MSA counties only per NHTSA protocol guidance. Regional sample sizes from local roads were 1.3% and 0.7% with use rates in the east and west at 85.0% and 73.4%, respectively.

Table 14: Seat Belt Use by Region & MSA Designations

Occupants Observed	<u>East</u>		<u>West</u>	
	<i>n</i>	%	<i>n</i>	%
<i>Primary</i>				
MSA	796	90.5%	1,297	79.0%
Non-MSA	3,363	81.8%	4,721	84.1%
<i>Secondary</i>				
MSA	806	82.9%	626	72.5%
Non-MSA	1,373	74.5%	3,317	78.4%
<i>Local</i>				
MSA	214	85.0%	109	73.4%
Non-MSA	-	-	-	-

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, Richland, Rolette, Stutsman, Walsh <u>West Region:</u> Burleigh, McKenzie, McLean, Morton, Mountrail, Stark, Ward, Williams
Number of Sites	320
Survey Period	June 4-10, 2023
Observation Duration Per Site	60 minutes
Sample Size	16,622 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 0.0002% 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 78.5% to 78.6% 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
16,622	78.5%	0.0002%	78.49%	78.57 %

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 2023 survey, 14,087 drivers and 2,535 passengers were observed for a total of 16,622 vehicle occupants. Seat belt use could not be determined for 776 vehicle occupants, resulting in a nonresponse rate of 4.46%. 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 2023 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 and follow-up phone calls or emails were made to first-time observers to ensure full understanding of observer duties and survey protocols.

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 2023 study adhere to the uniform criteria as outlined in the Federal Register.

Observations were conducted Sunday through Saturday. The initial observation site day of the week and time of day were randomly chosen within each county. The remaining sites within each county were arranged sequentially through the survey week based on the first site. Observation route sequencing was aimed to minimize travel time and costs among the sample site locations. 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 took place for 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

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 and again in 2022 without further modifications to the survey design.

For the 2023 statewide survey, observers recorded seat belt use for 14,087 drivers and 2,535 right front-seat passengers, for a total of 16,622 vehicle occupants. The unweighted estimates of seat belt use were 79.8% for drivers, 88.0% for passengers, and 81.0% overall. Adjusting the raw state rate for the survey design and weights resulted in an overall weighted state rate of 78.5%, 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 78.5% falls below the national estimate of 91.6% according to the most recent NHTSA report (January 2023). A noticeable gap remains evident when compared to states with similar seat belt laws (secondary) where NHTSA reports a restraint use rate of 89.5% (2022). In general, the findings in the 2023 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).