

# **SEAT BELT USE ON NORTH DAKOTA RURAL ROADS: 2012**

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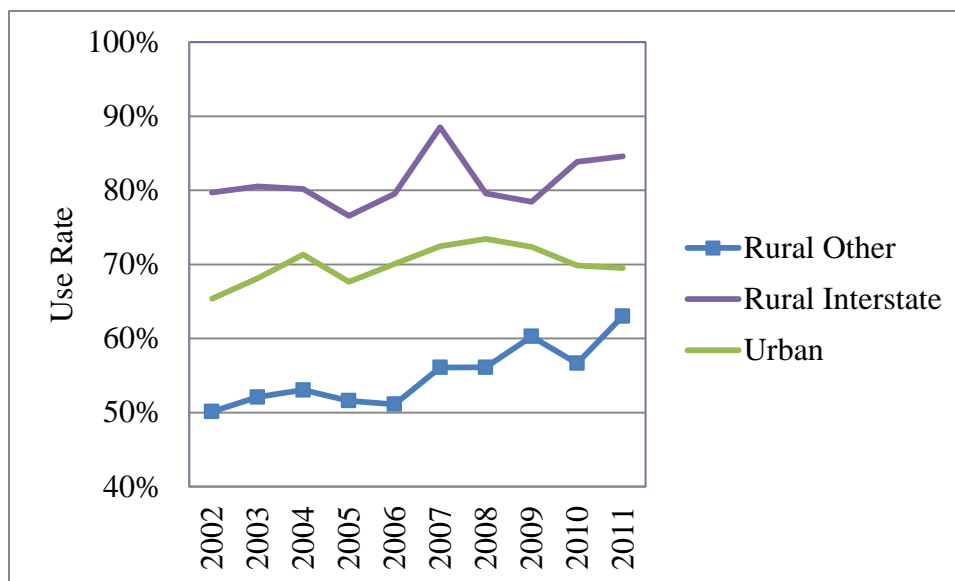
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# 1. INTRODUCTION

North Dakota’s rural roads provide vital social and commercial links for a widely dispersed population. The safety of these roadways is paramount in managing traffic assets to enhance the state’s livability. Approximately 67% of the state’s travel, in vehicle-miles, takes place on rural roads that interconnect small communities and join the rural geography to interstates, principal state corridors, and urban centers (NDDOT 2012). This level of rural driving is relatively high considering only about 33% of the nation’s travel occurs on rural roads (U.S. DOT 2012). From a safety perspective, this poses an inherent challenge because the risk for serious injury and death on rural roads is relatively high compared to the risk on urban roads (U.S. DOT 2005, U.S. DOT 2009a). In North Dakota, crash reports from 2007 to 2011 show that nearly 89% of fatal crashes and 71% of serious injury crashes – which includes fatal and disabling injuries – occurred on rural roads (NDDOT 2012).

With the understanding that seat belts are a relatively low-cost safety device, and are an easy primary protection for occupants in passenger vehicles, North Dakota has chosen to continue to measure seat belt use on non-interstate rural roads. In 2001, 88% of fatal crashes occurred on rural roads. During the past five years, 9 of every 10 fatal crashes occurred on non-interstate rural roads (NDDOT 2012). Understanding tendencies and trends in seat belt use on these rural roads is essential to wise decisions regarding efforts to encourage seat belt use in the state. The U.S. Department of Transportation does work with states to measure seat belt use through the long-standing annual National Occupant Passenger Use Survey (NOPUS).

**Figure 1.1 Seat Belt Use in Injury Crashes (include Fatal Injuries), by Road Type**

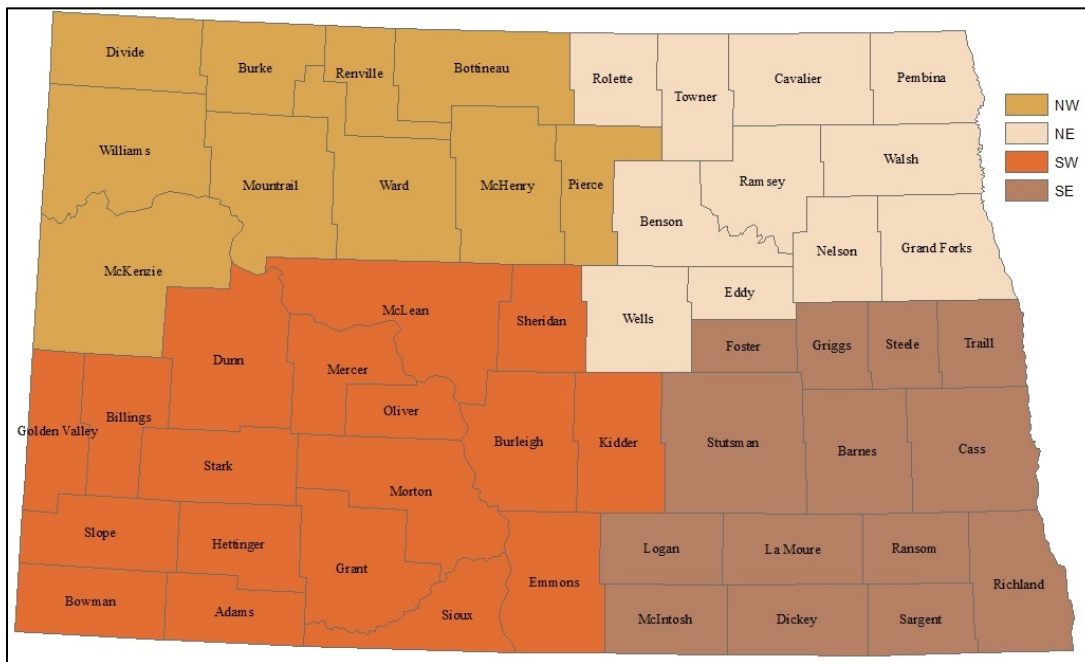


Results in this effort are a supplement to the NOPUS statewide estimate which also includes urban and interstate travel, which are heavily weighted in the final seat belt use estimate. Figure 1.1 provides some insight into seat belt use based on occupant reports for crashes by road type. Although not a perfect reflection of use on the road types, trends do offer some insight for the larger occupant population. The observation study here of the larger occupant population is a continuation of efforts to measure seat belt usage for all occupants on rural roads North Dakota.

## 2. METHODOLOGY

The method used in the 2012 survey is a continuation of the initial survey in 2009. As with the previous surveys, a direct observation method was used. A first step in administering the survey was to define a representative and realistic survey sample. The sampling was based on rural county populations and geographic representation of counties across four quadrants of the state. Counties were used as the boundaries for the initial selection stratum in the sample because population and other demographic information for counties are readily available. The quadrants were defined based on the North Dakota Health Department administration regions (Figure 2.1). Typically, stratified random sampling was conducted of the rural counties where observations are not conducted as part of the NOPUS survey. Because changes that occurred with the NOPUS method for the 2012 survey, some overlap occurred this year. This overlap will be rectified with the 2013 survey because the NOPUS revised method has been established and fully implemented as the standard for future NOPUS surveys.

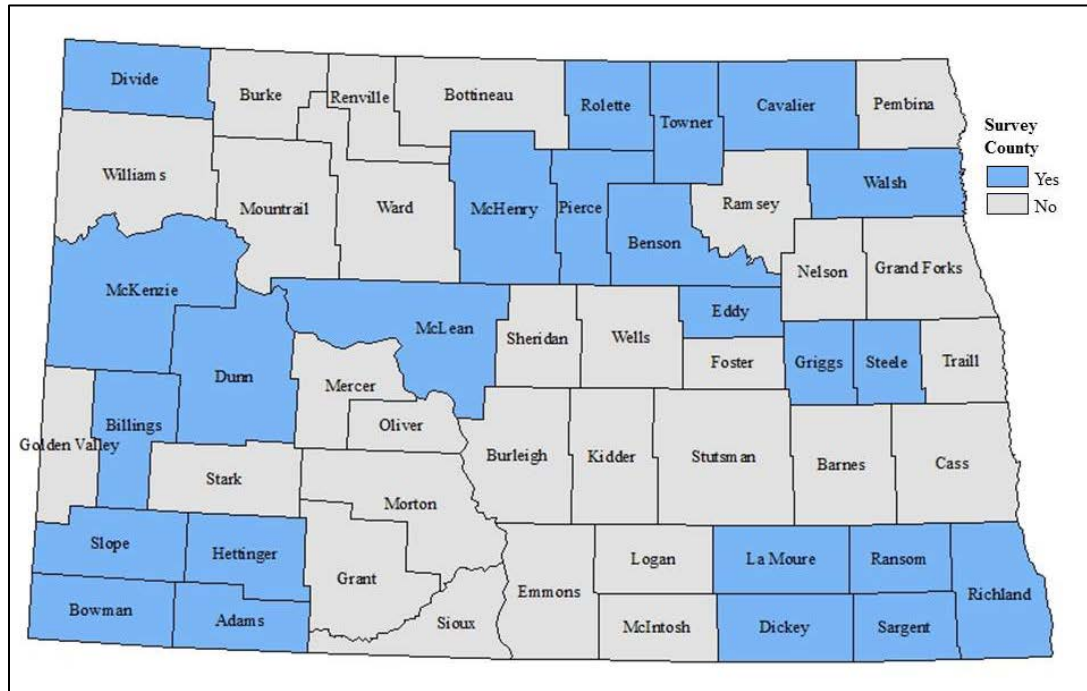
**Figure 2.1 Rural Seat Belt Regions**



The counties excluded from the annual statewide seat belt survey normally comprise the state’s rural-county geography for this project. The three highest population counties in the statewide seat belt survey have approximately 46 people per square mile, compared to only 10 people per square mile for the three highest in the rural county sample. Although some counties with lower population densities are included in the statewide seat belt survey sample, the counties selected for that survey include the most populated – thus most urban – counties in the state. Twenty-four of the 37 counties not surveyed in the NOPUS survey were surveyed in this project (Figure 2.2).



**Figure 2.2. Rural Seat Belt Counties**



Within the sample counties, sites selected for observation were based on local traffic knowledge, due to the fact that annual vehicle miles traveled, or traffic density, is not available for local roads.

Observations were conducted in July and August 2012. The seat belt observations were performed by experienced seat belt survey observers. All seat belt observers have completed classroom and field training in accordance with standards set to fulfill the statewide NOPUS project. Prior to conducting county observations, observers were required to complete Institutional Review Board (IRB) training as required by North Dakota State University. In addition, each observer was asked to become familiar with the “Rural Seat Belt Observation Training Guide” which outlined specific procedures recommended for conducting rural seat belt observations in North Dakota, including the data collection tool (Appendix A).

The following outlines general site selection and timeline guidance provided to observers:

1. One site per town, up to two towns per county,
2. Three to four “non-town” sites to cover higher traffic intersections on non-interstate/non-urban roads in the county,
3. Sites chosen had to be a minimum of 20 miles away from the interstate (to avoid bias associated with urban commuter traffic),

4. Each site had to be observed for a minimum of 30 minutes, up to one hour if extra time was needed to meet the 30 observation minimum for a site. After the additional 30 minutes, the site was considered “complete” regardless if the 30 observation minimum was met or not,
5. Hours for collection were from 7 a.m. to 7 p.m.

### 3. RESULTS

A total of 4,981 observations of driver seat belt use were collected during surveys conducted at 140 sites across the state (Table 3.1). This includes 82 instances where driver seat belt use could not be determined. These observations are not included when calculating driver seat belt use in this report. Passenger seat belt use was also collected when possible. The limited information on passenger use, which includes 1,331 observations, will be used primarily to assess correlation with driver use. This includes 37 instances where passenger seat belt use could not be determined. These observations are not included when calculating passenger seat belt use in this report. The non-response rates – defined by the number of cases where use could not be determined – was low for both driver and occupant at 1.6% and 2.7% respectively. In addition to the observation distribution by county, the following table also includes the county populations used for weighted results highlighted in the following sections (Table 3.1).

**Table 3.1. Observation Counts and Observation Site Counts by County: 2012**

County	Observations		Observation Sites Per County	Population (2011)	
	Count	% of TOTAL		Population	% of TOTAL
Adams	265	5.3%	6	2,307	2.1%
Benson	124	2.5%	6	6,723	6.2%
Billings	91	1.8%	2	816	0.8%
Bowman	258	5.2%	6	3,134	2.9%
Cavalier	96	1.9%	6	3,939	3.6%
Dickey	258	5.2%	6	5,317	4.9%
Divide	171	3.4%	6	2,125	2.0%
Dunn	335	6.7%	6	3,720	3.4%
Eddy	158	3.2%	6	2,380	2.2%
Foster	246	4.9%	6	3,341	3.1%
Griggs	240	4.8%	6	2,372	2.2%
Hettinger	202	4.1%	6	2,515	2.3%
La Moure	207	4.2%	6	4,105	3.8%
McHenry	277	5.6%	6	5,505	5.1%
McKenzie	275	5.5%	6	7,019	6.5%
McLean	231	4.6%	6	9,068	8.4%
Pierce	112	2.2%	6	4,375	4.0%
Ransom	283	5.7%	6	5,403	5.0%
Rolette	183	3.7%	6	14,206	13.1%
Sargent	197	4.0%	6	3,798	3.5%
Slope	255	5.1%	6	718	0.7%
Steele	209	4.2%	6	1,950	1.8%
Towner	166	3.3%	6	2,264	2.1%
Walsh	142	2.9%	6	11,032	10.2%
<b>TOTAL</b>	<b>4,981</b>	<b>100.0%</b>	<b>140</b>	<b>108,132</b>	<b>100.0%</b>

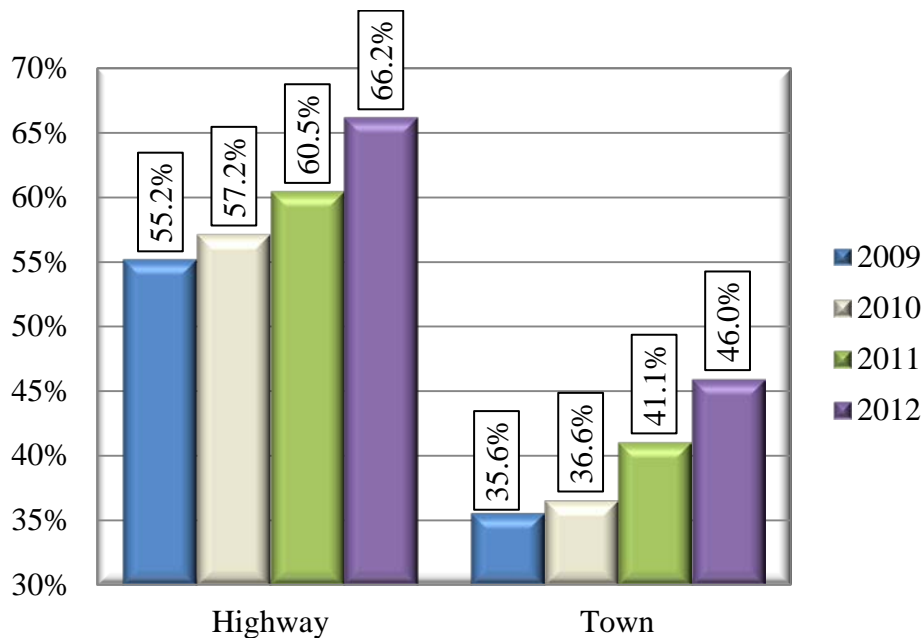
### 3.1 Driver Rural Seat Belt Use

#### 3.1.1 Road Type

Because the overall rural seat belt use rate may be skewed by the mix of rural highway and rural town seat belt observations – which may not truly reflect crash exposure risk – it may be more appropriate to consider the different driving environments separately. The more relevant numbers are seat belt use by road type, used here as the driving environment, due to relative injury risk between the rural town and rural highway roads. The greater risk associated with travel beyond town is evident in state crash data, which shows only 2% of fatal crashes on rural roads occur in town (NDDOT 2012). Therefore, rural highways are given special attention.

The observed seat belt use rate for drivers on rural highways was 66.2%. This use rate is significantly different than the use rate in rural towns at 46.0% ( $\chi^2=218.29$ ,  $p<0.0001$ ,  $n=4,899$ ).<sup>1</sup> Both use rates fall well below the NOPUS estimate of about 80%. Rural highway and town seat belt use rates have increased in each of the past three years (Figure 3.1). From 2009 to 2012 highway use increased from 55.2% to 66.2%, while town use increased from 35.6% to 46.0%. The percentage point increase of 11.0 for highway use is a 20% increase and the 10.4 percentage point increase translates to a 29% rise in town use. The increase in driver use is significant comparing 2012 to 2011 for rural highway and town roads, respectively ( $\chi^2=30.34$ ,  $p<0.0001$ ,  $n=5,552$ ;  $\chi^2=19.18$ ,  $p<0.0001$ ,  $n=3,905$ ).

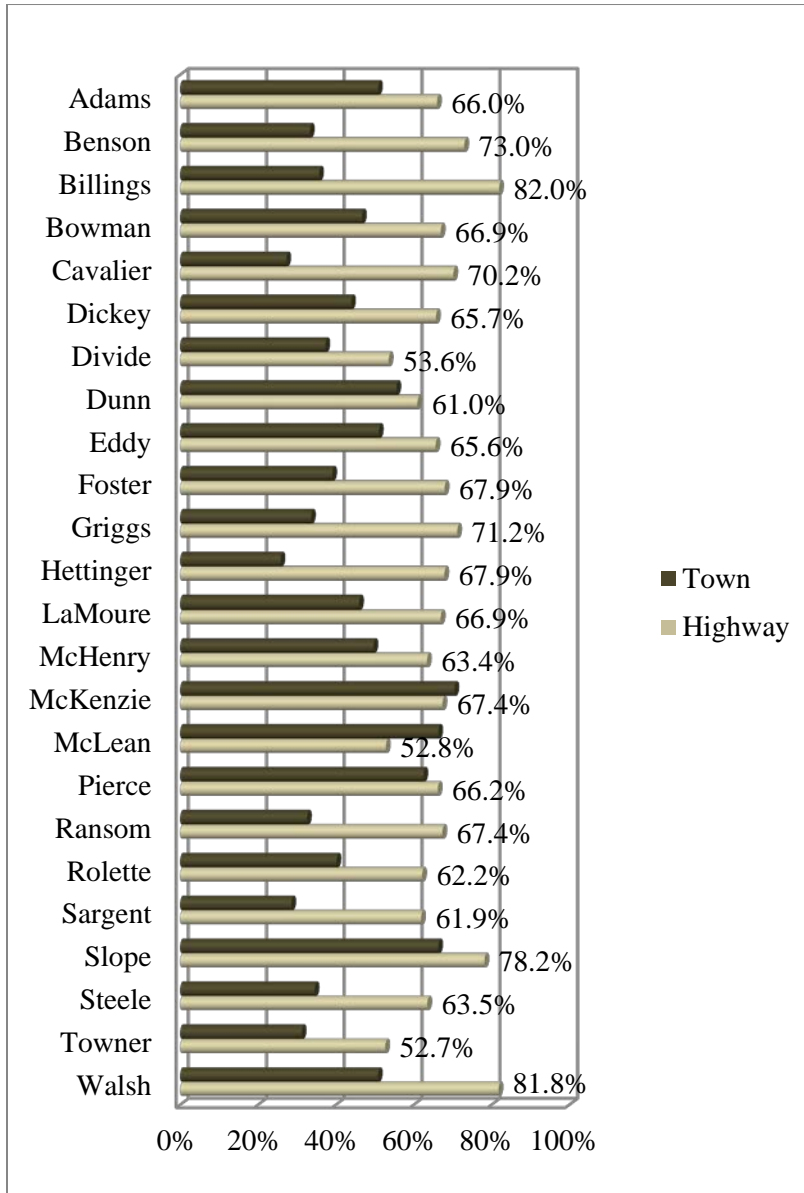
**Figure 3.1. Driver Seat Belt Use by Road Type, 2009-2012**



<sup>1</sup>Figures reported for the seat belt use rates are observed rates weighted by county population. For regional and statewide figures, only weighted seat belt use rates are reported unless otherwise specified.

The range of highway seat belt use rates by county was large, considering a high of 82.0% in Billings County and a low of 52.7% in Towner County (Figure 3.2). The range in seat belt use suggests some potential to investigate the environment and practices in the more successful counties to determine if best practices can be transferred to other areas or if there are unique cultural or travel situations surrounding the higher rates. Seat belt use in rural towns ranges from a high of 70.5% in McKenzie County to a low of 25.8% in Hettinger County.

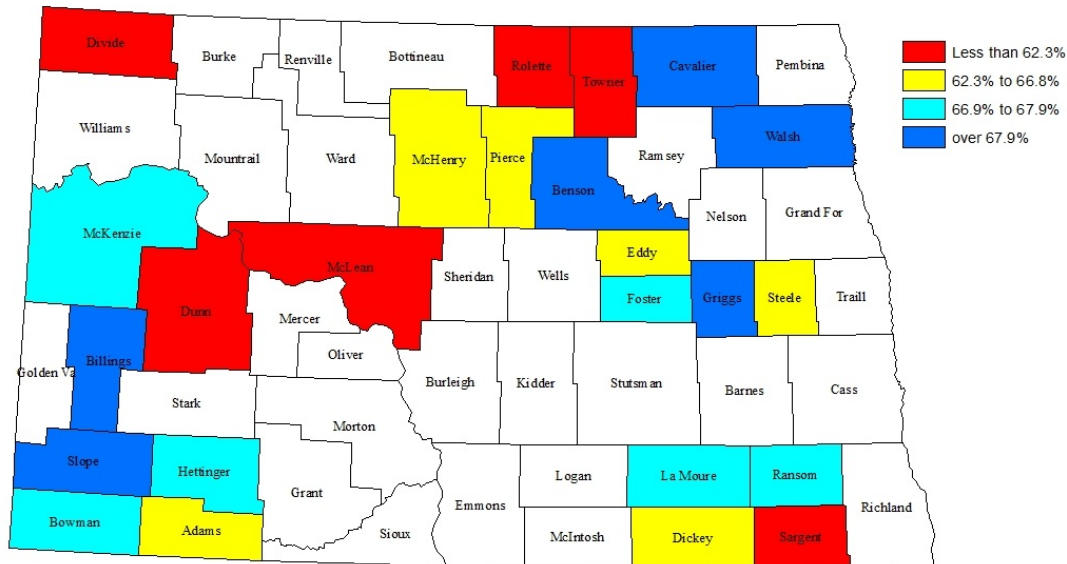
**Figure 3.2 Driver Seat Belt Use by Road Type and County, 2012**



*\*Rural town observations were not completed in McKenzie County; Percent shown for highway use only.*

Clusters of counties can be identified in the map of seat belt use by using quartile distribution of counties by seat belt use. In the western region, Billings and Slope counties were in the upper quartile. This may be related to their proximity to an interstate highway. Cavalier, Walsh, Benson, and Griggs counties are in close proximity as a cluster in the northeast. Again, two of these counties are in close proximity to an interstate highway. Although attempts are made to minimize interstate traffic influences, it is likely that for some counties still have affects from commuter traffic where use rates tend to be higher. Counties with the lowest highway seat belt use rates have been grouped in the south central part of the state in the past, but changes in observation counties and increased seat belt use in some counties had generated a more dispersed location – including Divide, Dunn, and McLean counties in the west and Rolette and Towner counties in the east (Figure 3.3).

**Figure 3.3 Highway Seat Belt Use by County, 2012**



Of the counties that have been observed for multiple years, Benson, Dickey, and Pierce counties had the largest increases in highway seat belt use compared to previous observations (Table 3.2). Counties with the largest declines in highway seat belt use were Steele, McKenzie, and McLean counties. Once again, it is possible that the fluctuations in seat belt use identified here are attributable to driver behavior, but changes in driver characteristics or environmental factors also may be influential.

**Table 3.2 Annual Observation of Highway Seat Belt Use by County, 2009 to 2012**

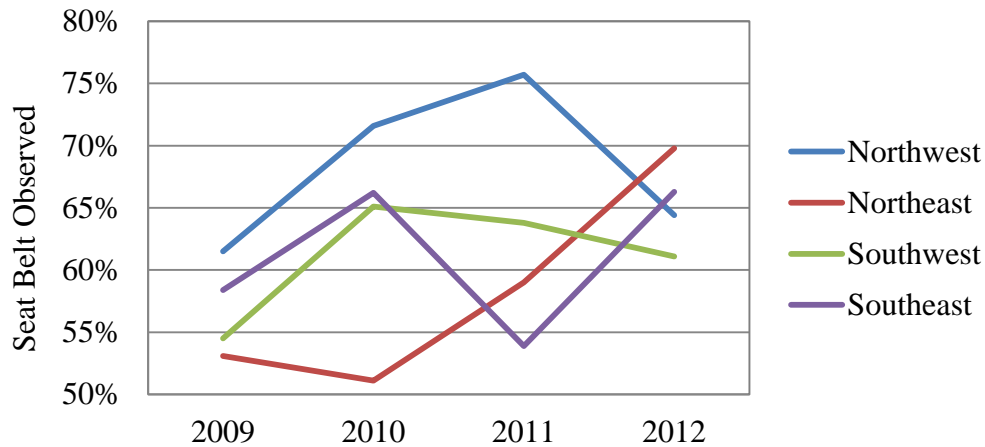
<b>County</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>Percentage Point Change v. Previous Observation</b>
Adams	53.3%	67.8%		66.0%	-1.8%
Benson	49.8%	61.1%	46.0%	73.0%	27.0%
Billings	64.6%	63.0%	62.0%	82.0%	20.0%
Bowman	29.6%	54.8%		66.9%	12.1%
Burke			66.7%		N/A
Cavalier	55.4%	53.5%	49.2%	70.2%	21.0%
Dickey	60.1%	68.6%	41.9%	65.7%	23.8%
Divide	74.0%	70.7%	51.6%	53.6%	2.0%
Dunn	56.3%	53.7%		61.0%	7.3%
Eddy	54.2%	44.8%		65.6%	20.8%
Emmons			57.8%		N/A
Foster			65.8%	67.9%	2.1%
Golden Valley			54.8%		N/A
Grant			62.0%		N/A
Griggs	55.2%	57.8%	58.7%	71.2%	12.5%
Hettinger	51.5%	55.4%	62.8%	67.9%	5.1%
Kidder			66.7%		N/A
LaMoure	48.2%	63.7%		66.9%	3.2%
Logan			50.0%		N/A
McHenry	58.0%	68.9%		63.4%	-5.5%
McIntosh			44.9%		N/A
McKenzie	65.5%	72.3%	75.5%	67.4%	-8.1%
McLean	55.8%	60.7%		52.8%	-7.9%
Oliver			75.6%		N/A
Pierce	56.2%	43.8%		66.2%	22.4%
Ransom	58.4%	62.9%	59.5%	67.4%	7.9%
Renville			83.5%		N/A
Rolette	50.9%	40.6%		62.2%	21.6%
Sargent	58.9%	67.8%	64.9%	61.9%	-3.0%
Sheridan			70.3%		N/A
Sioux			62.2%		N/A
Slope	61.7%	56.4%		78.2%	21.8%
Steele		61.1%	72.9%	63.5%	-9.4%
Towner	50.5%	67.9%	45.7%	52.7%	7.0%
Walsh	57.9%	68.5%	77.0%	81.8%	4.8%



### 3.1.2 Region

Based on the regions defined in the methodology section, a shift is found in use by region. Drivers in the northwest region have slipped from highest to third among the four quadrants in highway seat belt use – 64.4%. The highest use among regions was reported for the northeast region at 69.8%, followed by the southeast at 66.3%. The lowest seat belt use was found in the southwest at 61.1% (Figure 3.4). Both eastern regions saw increases in highway seatbelt use from 2011 to 2012, while the western regions both experienced declines.

**Figure 3.4. Highway Driver Seat Belt Use by Region: 2009-2012**



### 3.1.3 Driver Gender

Males were present at a ratio of about 1.5 to 1 in the driver population for the rural roads seat belt observations. Of the 4,956 drivers observed where gender could be determined, 3,546 were male. Females made up a smaller share of the driver population both on highways and in towns, with the share higher in town at 30.8% compared to 26.3% on the highways. Male share in both road types increased compared to 2011. Gender is a common topic in seat belt use research because of the relatively low-cost and ease with which the information can be collected. The lower propensity for males to use seat belts found in this study, is consistent with other research (Strinea et. al, 2010, U.S. DOT 2008, Gross et al. 2007, Vivida et al 2007, McCartt and Northrup 2004).

With regard to driver use rates by gender for road type, the female use on rural highways was at 83.2% compared to 59.8% for males (Figure 3.5). In rural towns, the use rates are 60.3% for female drivers and only 38.4% for males. While seat belt use did increase for both groups, the female drivers' seat belt use increase was more substantial than male drivers for each road type.

**Figure 3.5. Driver Seat Belt Use by Gender and Road Type: 2009-2012**

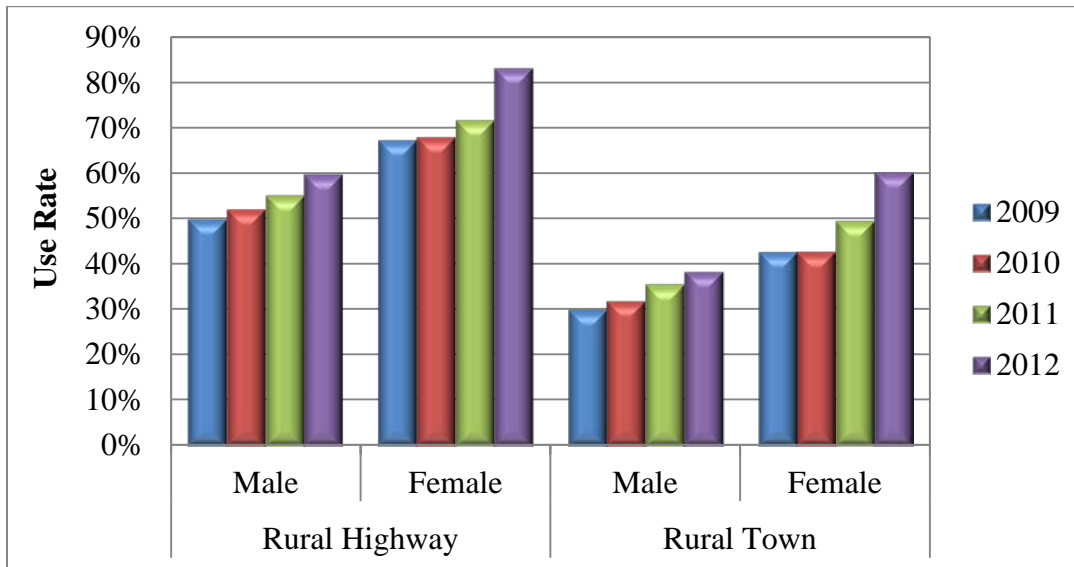


Table 3.3 shows county-level seat belt use rates on rural highways and in rural towns by gender. The county information shows the highest female use rates for 2012 on rural highways are in Billings, Walsh, McKenzie, Cavalier, Dickey, and Benson counties, which all had use rates at 90% or greater. The lowest rates seen among female drivers, with rates under 70%, were in McLean, Towner, and Dunn counties. Walsh, Slope, and Billings counties had the highest use rates among male drivers on rural highways, with rates of 77%, 76%, and 75%, respectively. Use in other counties was under 70%. The lowest seat belt use rates among male drivers, with rates under 50%, were in Divide, McLean, and Rolette counties.

Male driver seat belt use in towns was above 60% in McKenzie, Slope, and McLean counties. The use within this driver group was lowest – under 30% in Steele, Sargent, Cavalier, Hettinger, Griggs, and Ransom counties. Among female drivers, use was under 40% in Divide, Cavalier, Foster, Hettinger, and Ransom counties. The highest rates for females, over 80%, were reported for Pierce, McLean, and McKenzie Counties.

County-level seat belt use figures should be used with caution due to factors which may affect the figures relative to other counties and in year-to-year changes. These factors may include commuter traffic, observation site proximity to highways, community events, and observation counts. The information is offered as additional insight, but should be used sparingly as the sole factor in resource decisions. Used in conjunction with expanded information from this survey or other seat belt use studies, the additional information may be useful in targeting education and enforcement activities.

**Table 3.3 County Driver Seat Belt Use, by Road Type and Gender**

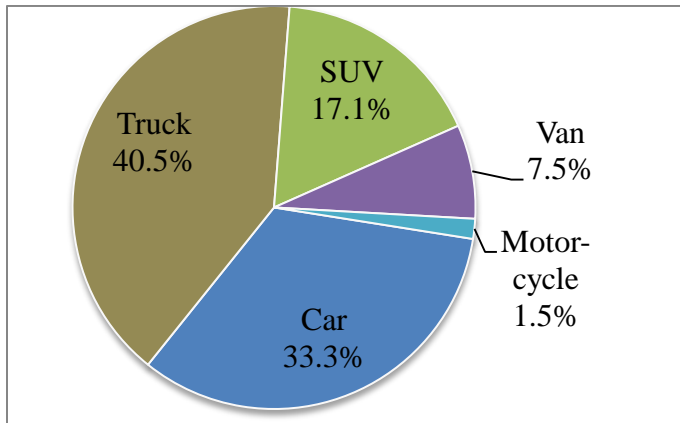
County	Average, Previous Observations				2012			
	Rural Highway		Rural Town		Rural Highway		Rural Town	
	Male	Female	Male	Female	Male	Female	Male	Female
Adams	58%	69%	40%	45%	60%	79%	40%	64%
Benson	49%	64%	23%	32%	67%	90%	31%	40%
Billings	61%	77%	47%	100%	75%	100%	35%	50%
Bowman	35%	57%	16%	24%	61%	87%	37%	74%
Burke	60%	78%	19%	50%				
Cavalier	48%	66%	25%	26%	65%	92%	21%	38%
Dickey	50%	74%	35%	51%	56%	90%	42%	47%
Divide	64%	79%			44%	88%	41%	18%
Dunn	49%	67%	43%	53%	62%	59%	55%	64%
Eddy	45%	60%	21%	24%	61%	80%	47%	59%
Emmons	52%	72%	17%	39%				
Foster	64%	73%	24%	45%	67%	71%	40%	38%
Golden Valley	47%	80%	34%	40%				
Grant	56%	73%	17%	43%				
Griggs	64%	66%	35%	49%	68%	79%	24%	50%
Hettinger	51%	67%	12%	4%	63%	86%	23%	39%
Kidder	53%	94%	31%	59%				
LaMoure	48%	72%	17%	34%	60%	89%	34%	70%
Logan	40%	90%	20%	44%				
McHenry	59%	72%	28%	37%	61%	75%	38%	63%
McIntosh	40%	67%	18%	22%				
McKenzie	69%	85%	59%	60%	64%	93%	70%	80%
McLean	65%	80%	33%	40%	47%	67%	61%	89%
Oliver	70%	90%	26%	71%				
Pierce	41%	69%	18%	45%	59%	86%	48%	100%
Ransom	60%	71%	36%	51%	60%	80%	29%	39%
Renville	74%	100%	37%	75%				
Rolette	41%	55%	30%	38%	48%	88%	32%	51%
Sargent	62%	81%	33%	53%	51%	83%	21%	43%
Sheridan	69%	77%	18%	80%				
Sioux	59%	69%	55%	65%				
Slope	56%	74%	52%	47%	76%	89%	66%	70%
Steele	76%	96%	40%	63%	60%	71%	20%	56%
Towner	52%	67%	22%	35%	50%	63%	56%	64%
Traill			31%	50%				
Walsh	60%	88%	42%	63%	77%	93%	31%	75%

### 3.1.4 Vehicle Type

As with gender, vehicle type is also commonly considered in seat belt surveys. Both offer potentially useful information for greater efficacy in directing enforcement and education outlays toward a driver group (U.S. DOT 2009b). For example, a nationwide study of fatal crashes showed that pickup truck occupants had the highest percent of unrestrained fatalities among all passenger vehicle types (U.S. DOT 2008). Similar use patterns for this vehicle type were found here, with male pickup truck drivers having the lowest use rates among the gender-fleet mix.

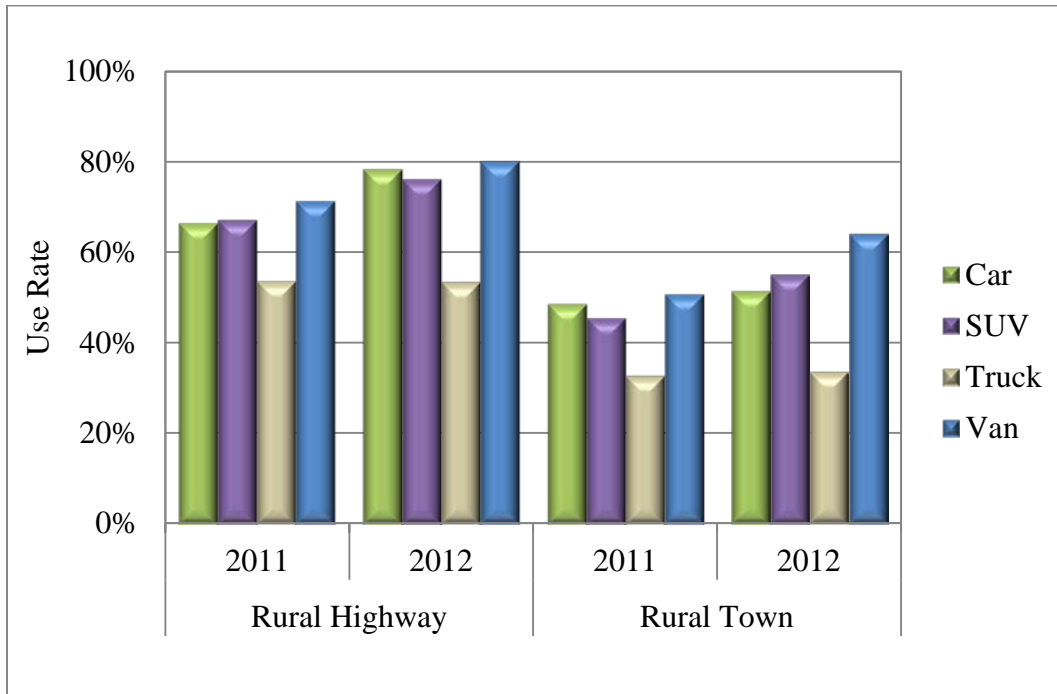
The rural seat belt observations included more pickup trucks than cars (2,345 and 1,287, respectively), along with 800 sport utility vehicles (SUVs), and 383 vans (Figure 3.6). The fleet composition for the seat belt observation, by vehicle type, is similar to 2011.

**Figure 3.6 Observed Rural Road Passenger Vehicle Fleet, by Vehicle Type**



A significant variation in seat belt use is found across passenger vehicle types on rural roads ( $\chi^2=122.48$ ,  $p<0.0001$ ,  $n=2,643$ ). In 2012, driver seat belt use in cars on rural highways was 78.5% compared to 53.5% for pickup truck drivers (Figure 3.7). Sport utility vehicle and van drivers also had higher observed use rates at 76.2% and 80.2%, respectively. Car and SUV vehicle types had statistically significant increases in seat belt use from 2011 to 2012 (cars:  $\chi^2=24.54$ ,  $p<0.0001$ ,  $n=1,690$ ; SUVs:  $\chi^2=5.85$ ,  $p=0.02$ ,  $n=960$ ). Use by pickup truck drivers decreased slightly on rural highways; the decrease was significant ( $\chi^2=13.12$ ,  $p=0.001$ ,  $n=2,499$ ). Seat belt use increased for all vehicle types when observations for towns were considered.

**Figure 3.7 Driver Seat Belt Use by Vehicle Type and Road: 2011 and 2012**



Further stratification for gender shows that female drivers have higher seat belt use rates among all vehicle classes, ranging from 66.0% for SUVs to 81.6% for vans (Table 3.4). Males, in comparison, used seat belts only 42.2% of the time in pickup trucks and 61.2% of the time in vans. A significant difference was not found in seat belt use between female and male drivers for SUVs or vans. The variance is significant for car ( $\chi^2=11.44$ ,  $p<0.001$ ,  $n=1,262$ ) and pickup truck drivers ( $\chi^2=25.24$ ,  $p<0.0001$ ,  $n=2,308$ ). Seat belt use increased among female drivers for all vehicle types. A statistically significant increase in seat belt usage between 2011 and 2012 was found for female drivers of cars ( $\chi^2=12.98$ ,  $p=0.001$ ,  $n=1,391$ ) and SUVs ( $\chi^2=5.70$ ,  $p=0.05$ ,  $n=877$ ). Males driving cars were significantly more likely to be using seat belts in 2012 than 2011 ( $\chi^2=13.68$ ,  $p=0.001$ ,  $n=1,401$ ). They were significantly less likely to be using seat belts when driving pickups ( $\chi^2=11.54$ ,  $p=0.001$ ,  $n=3,801$ ). Males were more likely to be belted in 2012 than in 2011 when driving other vehicle types.

**Table 3.4 Driver Seat Belt Use by Vehicle Type and Gender, 2009 to 2012**

	2009		2010		2011		2012	
	Male	Female	Male	Female	Male	Female	Male	Female
<b>Car</b>	44.9%	47.8%	44.0%	52.6%	52.6%	63.5%	59.6%	72.4%
<b>SUV</b>	42.0%	55.5%	51.8%	52.6%	60.0%	59.8%	63.4%	66.0%
<b>Pickup</b>	33.2%	41.5%	38.4%	51.7%	42.2%	60.2%	41.9%	68.5%
<b>Van</b>	62.6%	64.6%	58.2%	60.0%	61.2%	64.2%	66.3%	81.6%

When also considering the road environment, the highest use rate was among females driving vans on rural highways. Seat belts were in use for 87.2% of drivers observed in this group (Table 3.5). The lowest use rate, 29.9%, was found among males driving pickups in rural towns. Seat belt use increased across all gender and vehicle groups on the rural highways. Results were mixed in rural towns. Seat belt use in rural towns increased for female drivers in all vehicle types. Male driver use in town decreased among pickup and van drivers.

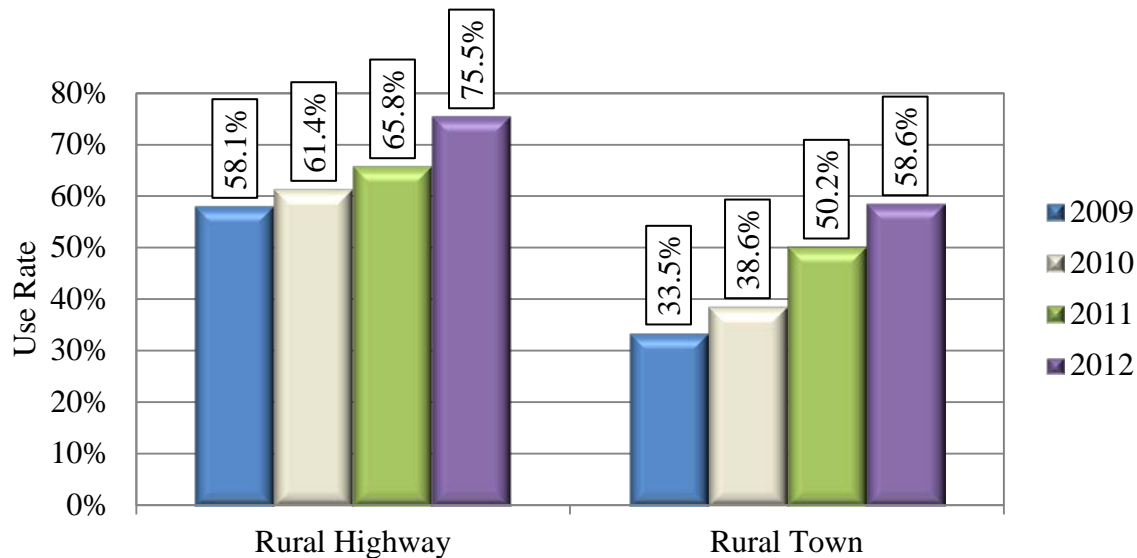
**Table 3.5 Driver Seat Belt Use by Vehicle Type, Gender, and Road Type, 2009 to 2012**

	Average, 2009-2011				2012			
	Rural Highway		Rural Town		Rural Highway		Rural Town	
	Male	Female	Male	Female	Male	Female	Male	Female
<b>Car</b>	55.8%	67.5%	36.3%	44.9%	72.3%	84.7%	45.0%	60.7%
<b>SUV</b>	63.1%	70.0%	37.7%	44.6%	73.9%	80.4%	50.3%	57.9%
<b>Pickup</b>	46.6%	63.4%	27.6%	38.6%	51.8%	79.2%	29.9%	55.6%
<b>Van</b>	69.7%	79.6%	47.8%	50.5%	78.3%	87.1%	51.2%	73.8%

### 3.2 Passenger Rural Seat Belt Use

As previously mentioned, the passenger observations were collected when traffic flow and field of vision allowed observers to collect information in addition to the driver seat belt use (Figure 3.8). Differences in seat belt use by road type were significant ( $\chi^2=26.503$ ,  $p<0.0001$ ,  $n=1,022$ ). Passenger seat belt use was 75.5% on rural highways and 58.6% in rural towns. Both rural highway and rural town passenger seat belt use increased from 2011 to 2012. Both increases are statistically significant. Unlike the driver population, a majority of passengers were female, comprising 55.9% of the group.

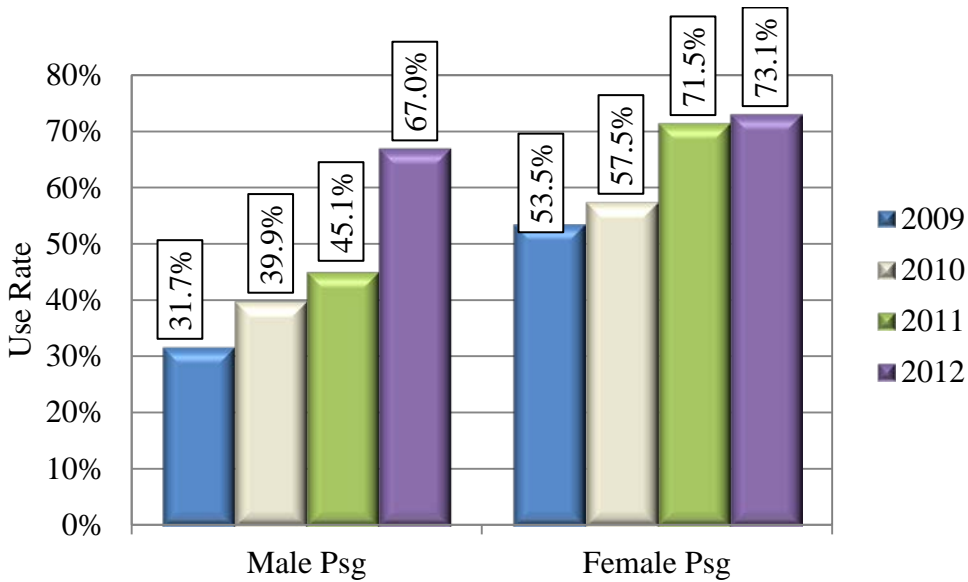
**Figure 3.8 Passenger Seat Belt Use by Road Type, 2009 to 2012**



As with driver observations, gender was a significant characteristic in seat belt use ( $\chi^2=101.61$ ,  $p<0.0001$ ,  $n=1,276$ ). Female passengers were using seat belts in 73.1% of the observations, compared to 67.0% for males (Figure 3.9). Both female and male passenger seat belt use increased significantly from 2011 to 2012. Female passenger use rose from 71.5% to 73.1% and male passenger belt use increased, more substantially, from 45.1% to 67.0%.

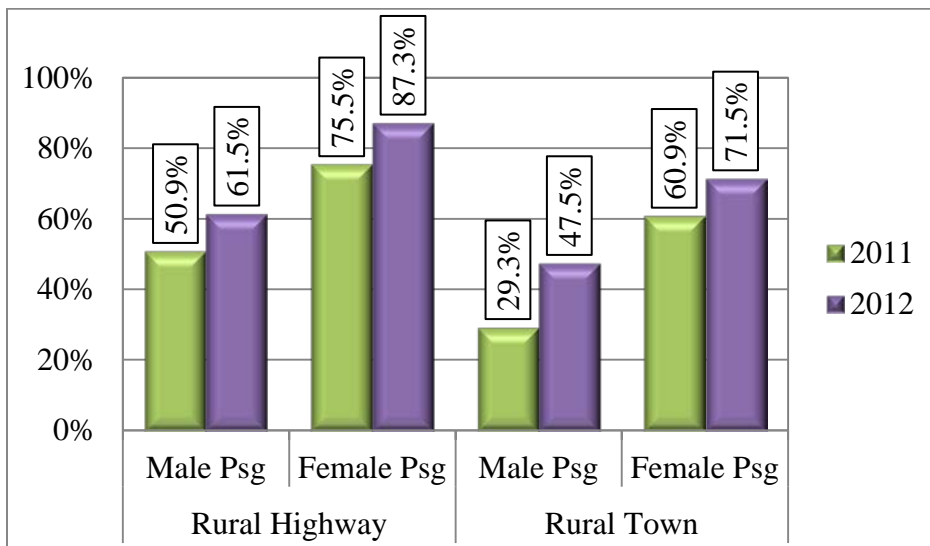


**Figure 3.9 Passenger Seat Belt Use by Gender: 2009 to 2012**



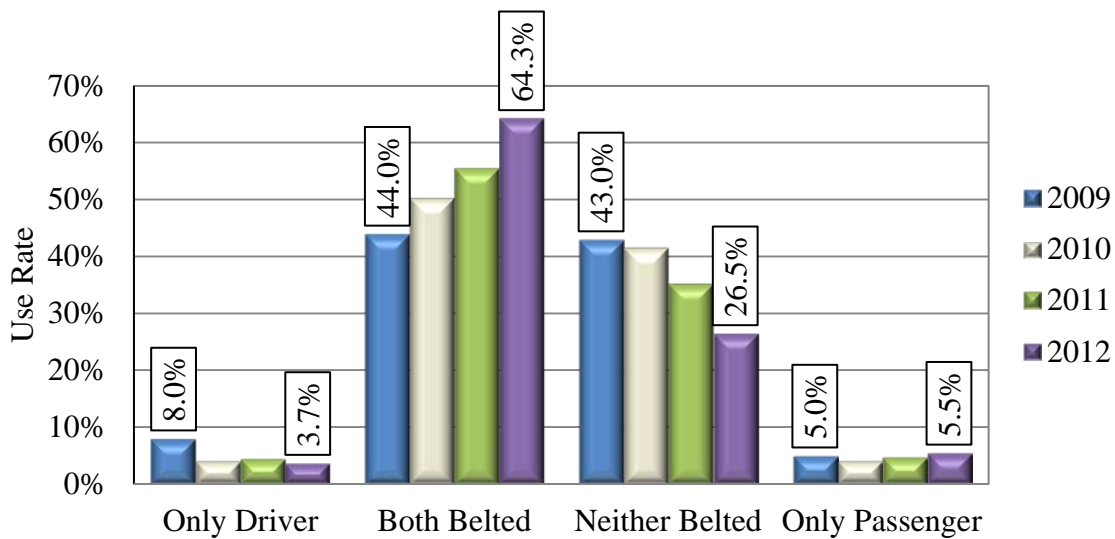
Recall that the effects of the road type mix in the passenger gender trends may skew these overall figures considering the stark difference between highway and town usage. Figures by gender and road type do, however, show increases across all strata (Figure 3.10).

**Figure 3.10 Passenger Seat Belt Use by Road Type and Gender, 2011 and 2012**



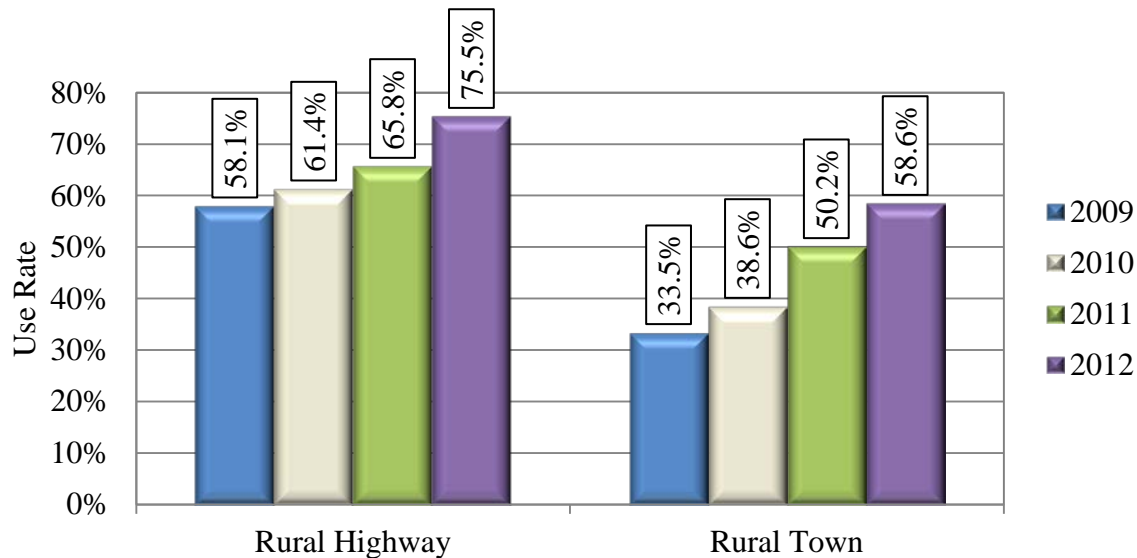
The driver and passenger seat belt use rates were strongly correlated in cases where passenger use could be recorded (Pearson's Corr.=0.78,  $p < .0001$ ,  $n = 1,280$ ). These findings are consistent with earlier research (Nambisan and Vasudevan 2007) and with the previous years of this study. In 64.3% of the cases both the driver and passenger were belted (Figure 3.11). Neither passenger nor driver was belted in 26.5% of the cases. The driver was belted and passenger unbelted in 3.7% of the cases, while the passenger was belted and the driver unbelted in 5.5% of the cases. Males were driving in a majority of the cases where passenger gender and belt use was recorded, representing 75.1% of the drivers. Passenger seat belt use was found to be significantly different considering driver gender ( $\chi^2 = 101.61$ ,  $p < 0.0001$ ,  $n = 1,276$ ).

**Figure 3.11 Seat Belt Use in Passenger Observation Cases: 2009-2011**



Stratifying the passenger seat belt cases by road type does show that the belted passenger and belted driver observations accounted for the greatest share of the vehicles observed for the rural highways at 61.5% (Table 3.6). The unbelted passenger and unbelted driver observations scenario was the most common in rural towns at 45.6%. Slightly less than one-third of the observations found neither occupant to be belted on rural highways. It was least likely to have a case where only the driver was belted – 3.9%. This is less than half than the share in 2009. The share of cases with only unbelted passengers has been relatively stable at about 5%.

**Table 3.6 Passenger Observation Cases by Road Type: 2009-2011**



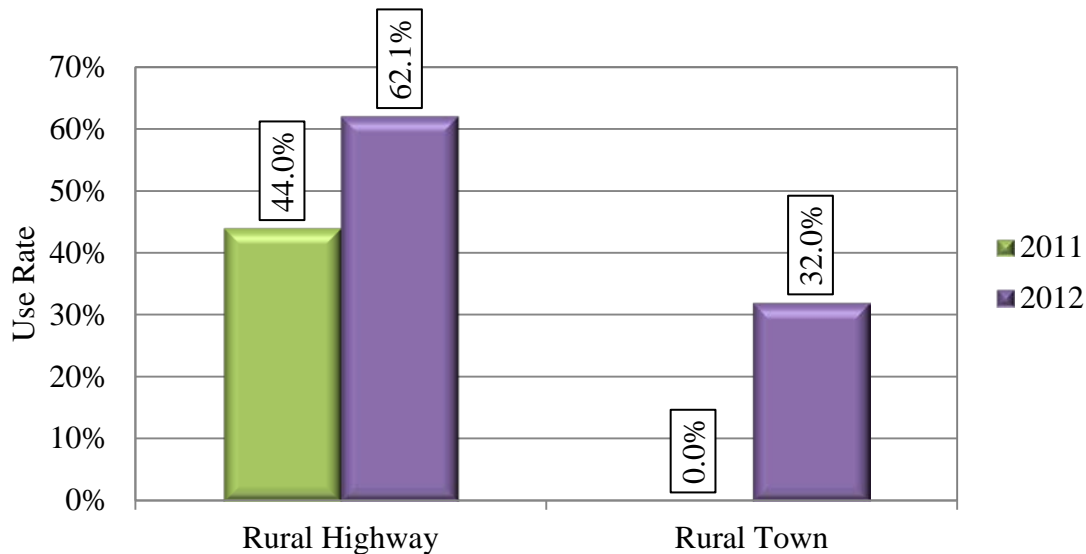
The continued high degree of correlation between the driver and passenger observations may dissuade future investment associated with increasing passenger data collection. An example would be using an observer team rather than an individual observer to collect both driver and passenger seat belt use. This cost may not be justified considering the limited benefit of the knowledge gained, because the passenger seat belt use rates continue to be consistent with the data already collected by observing the driver. Certainly, collection where possible by a single observer and special case studies may be justified with regard to the passenger seat belt observations. The data collected to date does show a strong correlation and that gains have been made with regard to diver seat belt use in passenger cases.

### 3.3 Motorcycle Helmet Use

Although the primary target for this occupant use survey is drivers of passenger vehicles, observers were also asked to collect information about motorcycle driver and passenger seat belt use when traffic and visibility allowed. During the 2012 survey, 76 motorcycle observations were collected. Males were drivers in 92% of these cases. The total number of observations is an increase over the 55 motorcycles observed in 2011. Passenger helmet use was collected in 14 cases, 93% of the passengers were females. For the 6 motorcycle passengers observed in 2001, all were females.

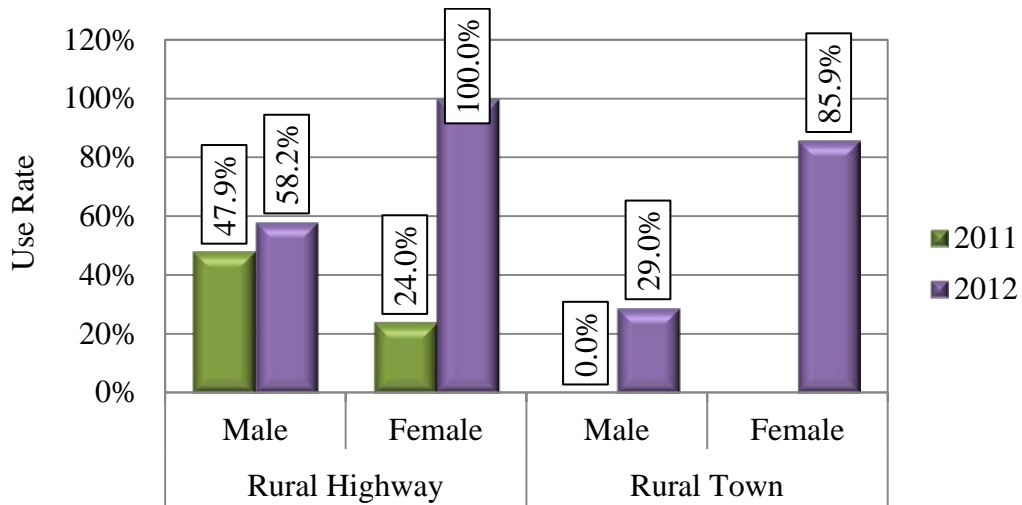
Helmet use on rural highways was estimated at 62.1% and 32.0% in rural towns (Figure 3.12). The increase in helmet use on highways was 18.1 percentage points greater in 2012 than in the previous observation. About 1 in 3 drivers in rural towns were wearing helmets in the 36 observations made during the 2012 survey. None of the 10 motorcycle drivers observed in rural towns during 2011 were wearing helmets.

**Figure 3.12 Driver Helmet Use by Road Type, 2011 and 2012**



Considering the limited data available, the strata by road type and gender show helmet use increased in both the rural highway categories (Figure 3.13). As with the passenger vehicle behaviors, female helmet use was higher than male for both road types. Female and rural town figures, however, should be used with caution because of the limited observations in both these groups.

**Figure 3.13 Driver Helmet Use by Road Type and Gender, 2011 and 2012**



## 4. DISCUSSION

North Dakota's roads provide vital economic and social connections for residents and visitors. These roads are a relatively high-risk travel environment. Rural roads account for 67% of annual travel and nearly 89% of fatal crashes and 71% of serious injury crashes. While there are many important aspects of road safety, interest here is in measuring seat belt use for managing it as a safety priority.

A total of 4,981 driver seat belt observations were collected at 140 sites across 24 rural counties. Highway seat belt use increased from 60.5% in 2011 to 66.2% in 2012. Since 2009, rural highway seat belt use has increased 10 percentage points. In addition to statewide media efforts, local programs focusing on education and high visibility seat belt enforcement (such as the *Click it Or Ticket* campaign), individual agency campaigns, and multi-agency enforcement efforts, have likely played a role in these increases.

Similar to previous findings, seat belt use was found to be significantly different on rural highways and in rural towns. Observed highway use rates for counties ranged from 82.0% in Renville County to less than 52.7% in Towner. This range is smaller than 2011 as the lowest use rate is 10 percentage points higher than last year. A significant increase occurred in use by both genders. Female driver seat belt use on highways, at 83.2%, remained higher than that of male drivers, at 59.8%. Seat belt use rates on highways were also found to vary significantly by vehicle type with pickup truck drivers having the lowest propensity to use seat belts at 53.7% and van drivers having the highest use rate at 71.4%. As with previous surveys, comparable town seat belt use rates were lower than highways across all gender and vehicle strata.

Results also continue to show a strong relationship between driver and passenger seat belt use. Where observations were collected in driver and passenger shared seat belt behavior, both were belted in 64.3% of cases, while neither was belted in 26.5% of cases. Both genders showed improvement in use rates as the "both belted" figure increased and the "neither belted" figure decreased.

Seat belt use on the state's rural roads was found to be significantly less than the commonly reported NOPUS use rate collected in the annual statewide seat belt survey. The relative risk and significant difference in use rates between rural highways and towns should continue to be considered in research related to rural seat belt use. In addition, the need for continued assessment of programs to increase local seat belt enforcement or awareness on rural roads is recognized.

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## **6. APPENDIX: SEAT BELT OBSERVATION TRAINING GUIDE**

# SEAT BELT OBSERVATION TRAINING GUIDE

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## Purpose

The purpose of this training guide is to outline procedures recommended for conducting rural seat belt observations in North Dakota.

## Site Selection

- Please observe at 1-2 sites WITHIN towns and 3-4 sites OUTSIDE of towns. This will result in 4-6 total observation sites.
- Select sites which are a minimum of 20 miles away from any interstate (I-29, I-94).

## Collection Form

Observers will document seat belt use of drivers and front seat **outboard** passengers on a seat belt survey form. A sample form is found in Appendix A. Helmet use is recorded for motorcycle drivers and passengers on the same form.

- On each form observers will record the date, county, observer name, page number, start time, end time, site location description, vehicle type, driver gender, driver protection, passenger gender, and passenger protection.
- Eligible vehicles include cars, pickup trucks, SUVs (including crossover vehicles), vans, and motorcycles.

**DO NOT** count large trucks (semi or large box trucks), commercial vehicles (taxi cabs, delivery vans, city vehicles), emergency vehicles (police/fire vehicles), or RVs/motor homes.

- Children riding in the front seat (NOT in a child car seat) are counted the same as other front seat passengers.
- Your observations should include all eligible vehicles regardless of state of origin, i.e. count both in-state and out-of-state vehicles.

### QUICK REFERENCE

- *Eligible vehicles include:*
  - *Cars*
  - *Pickups*
  - *SUVs (including crossover vehicles)*
  - *Vans*
  - *Motorcycles (helmet use)*

## Time

- Observers will observe between 7am and 7pm.

## Observation Methods

Observers will record seat belt use for eligible occupants in cars, pickups, SUVs, and vans, as well as helmet use for motorcycle occupants. Eligible occupants are the driver of the vehicle and the outboard front seat passenger. (Example: If there are three passengers in the front seat of the vehicle, only count the driver and outermost passenger.)

- Observers will be supplied with observation forms, and site descriptions from the previous year.
- There will be 1 observer per site. If traffic is too heavy to observe all vehicles, stop/catch up, and resume recording seat belt observations as soon as possible; waiting no longer than 1 minute to resume.
- Position vehicle so observations can be conducted safely and without distraction to other vehicle drivers. Where possible, observers should remain in their vehicles to record seat belt use. If it is not possible to observe from a vehicle vantage point, the observer may leave the vehicle but must remain off the roadside.
- **Each observer will observe for a minimum of 30 minutes. If a minimum of 30 observations cannot be recorded in 30 minutes, the observer will continue observing up to an hour. If 30 observations still cannot be recorded after an hour of observing, the observation should be considered complete.**
- Do not record observations of vehicles with windows that are excessively tinted because accuracy may be compromised.
- Only properly worn seat belts are recorded as using protection. Incorrect seat belt use is recorded as no seat belt (Example: shoulder strap under arm, behind the back, lap belt only).
- If observations at a site are terminated due to inclement weather or observer safety issues etc., record the time and reason that observations halted, and move to an alternate location.

### QUICK REFERENCE

- *Observers must attempt to record all vehicles they view. If observers cannot determine SB use, the vehicle must still be recorded on the observation survey form. If traffic is too busy to record all vehicles, observers should stop to catch up then resume as soon as possible, waiting no longer than 1 minute to continue. Once an observer's eyes are locked on a vehicle, a count of that vehicle must be recorded.*

## Safety

Safety of the observers and vehicle occupants is paramount in conducting the seat belt use survey.

- Observations can be made from the observer's vehicle. To ensure the safety of the observers and other vehicle occupants, observers' vehicles must not hinder traffic flow. Park off the road away from the pavement's edge.
- When observations from inside a vehicle are not possible, observers should ensure they do not stand on the roadway when recording seat belt use. Always practice safety when crossing roads.
- Observers must not distract drivers of vehicles they are observing.
- When in their vehicle, observers must always wear seat belts.
- Observers must stay alert at all times. Do not work while under the influence of alcohol, drugs, or prescription medications.
- Dress appropriately for the weather.
- Do not bring children or pets with you to the observation sites.

## Conclusion

Dress for the work. A hat, sunscreen and sun glasses are essential.

Be thoroughly familiar with all the procedures in this manual. Accurate information is of paramount importance.

Each observer is ultimately responsible for his/her work, as well as safety. Remember, observation requires that are within close proximity to traffic. Stay alert and be ready to react.

Any questions or concerns should be reported to Andrea Huseh: 701-231-6427.

# Seat Belt Survey Form

Page # \_\_\_\_\_ of \_\_\_\_\_

Start Time: \_\_\_\_\_ AM/PM

Date \_\_\_\_\_

End Time: \_\_\_\_\_ AM/PM

County: \_\_\_\_\_

Observer Name: \_\_\_\_\_

Site Location Description:  
\_\_\_\_\_

Obs	Vehicle Type					Driver					Passenger				
						Gender		Protection			Gender		Protection		
1	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
2	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
3	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
4	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
5	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
6	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
7	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
8	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
9	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
10	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
11	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
12	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
13	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
14	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
15	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
16	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
17	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
18	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
19	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
20	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
21	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
22	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
23	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
24	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
25	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
26	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK
27	Car	Trck	SUV	Van	Mcycl	M	F	Y	N	DK	M	F	Y	N	DK