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Statewide Seatbelt Survey

Final Report

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Investigators:

Carryl L. Baldwin, Ph.D.

Human Factors Laboratory
University of South Dakota
Vermillion, SD

and

Old Dominion University
Norfolk, VA

Cindy Struckman-Johnson, Ph.D.

Human Factors Laboratory
University of South Dakota,
Vermillion, SD

and

Dave Struckman-Johnson, Ph.D.

Computer Science Department
University of South Dakota,
Vermillion, SD

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2006 South Dakota Statewide Seatbelt Survey

Summary

A statewide observational survey of seatbelt use on South Dakota (SD) roads was conducted in June of 2006. Seatbelt use and other demographic data were recorded from 11,608 motorists traveling along a selected sample of SD roadways, which included rural and urban highways and interstates in 13 South Dakota counties. Data were recorded from all drivers, right front passengers of any age, and additional children under age 5 in the front or back seat.

Weighted Estimates

A statewide estimate of 71.3% restraint use was observed for drivers and right front passengers, weighted for road type and vehicle miles traveled at observation sites. This number compares to the weighted statewide estimate of 68.8% obtained in 2005 and 69.4% obtained in the summer of 2004. The 2006 weighted statewide estimates for seatbelt use by road type were 64.2% for urban highways (compared to 62.4% for 2005), 66.1% for rural highways (compared to 61.8% in 2005), 73.6% for urban interstates (compared to 69.6% in 2005), and 82.5% for rural interstates (compared to 82.4% in 2005).

Unweighted Estimates

Results showed that for direct or unweighted observations, 67.7% of all observed occupants were wearing a seatbelt or child restraint. This unweighted percentage is higher than the last two years unweighted rates of 64% in 2005 and 65.1% in 2004. Based on unweighted seatbelt rates, the highest use rate in the state was again found in Union county where 86.9% (relative to 76.3% in 2005) of motorists were observed in a safety restraint. Grant county exhibited a dramatic increase in restraint usage raising to a 2006 rate of 77.5% relative to the 55.3% rate observed in 2005 and making it the SD county with the second highest usage rate. High rates were also observed in the counties of Pennington (76.5%), Davison (76.3%), Fall River (72.0%), and Minnehaha (72.7%). Relatively high rates were observed in Beadle (66.9%), Lawrence (65.4%) and Tripp (66.0%) counties. Intermediate rates were observed in the counties of Brown (61.3%), Charles Mix (58.5%) and Kingsbury (57.1%). Hughes county had the lowest usage rate (54.1%) observed in this 2006 survey. Nine of the 13 counties included in this probabilistic sample showed increased seatbelt usage rates relative to the 2005 survey.

The 2006 unweighted seatbelt use rates showed positive improvements for young riders. Of a small sample of 179 children who appeared to be under age 5, 88.3% were in a safety restraint (with 78.8% in a child safety seat). This rate was substantially higher than the 2005 rate of 77.2% and the 2004 rate of 72.3% for this age group. The 2006 restraint usage rate for 109 children judged to be 5 to 13 years of age was 68.8%, a rate substantially higher than the rate of 57% observed in 2005.

The rate for 832 teens judged to be between 14 and 17 years old was 56.5%, a substantial increase relative to the 2005 rate of 48.1% for this age group. The seatbelt use rate for occupants judged to be 18 years and older was 68.2% compared to a rate of 64.7% observed in the 2005 survey.

Similar to previous years, more right front seat passengers (69.7%) than drivers (66.4%) were wearing safety restraints. Seatbelt use also varied by vehicle type. Occupants of sport utility vehicles and cars exhibited higher usage rates, 72.4% and 71.4%, respectively, relative to motorists in vans and pickups (60.6%). Finally, it was found that a higher percentage of occupants of out-of-state vehicles (80.6%) wore safety restraints than did occupants of vehicles with South Dakota license plates (65.2%).

Introduction

This year marks the 50th anniversary of the first implementation of seatbelts in U.S. automobiles (McKay, 2006). Originally an optional safety device first initiated in 1956, seatbelts have become part of a set of standard issue safety equipment features with all but one U.S. state having mandatory usage legislation for adult front seat passengers.

Despite advances in safety equipment, motor vehicle crashes remain a leading and persistent cause of death and injury in the United States (Burayidi, 2003; CDC, 2004; NHTSA, 2005c; Williams & Shabanova, 2003). According to a recent National Highway Traffic Safety Administration (NHTSA, 2005b) report, people living in rural areas are particularly at risk. People living in rural areas represent approximately 21% of the population; but, in the year 2003, according to NHTSA records, crashes in rural areas accounted for 60% of the total nationwide motor-vehicle fatalities (NHTSA, 2005b).

There were approximately 6.2 million police-reported vehicle crashes in the United States in 2004 (NHTSA, 2004d). Approximately one-third of these crashes resulted in personal injury and roughly 38,000 resulted in a motor vehicle-related fatality. However, crash and fatality rates in rural areas tend to be 35% higher than in urban areas (Burgess, 2005). Low seat belt usage rates are a contributing factor in the higher motor-vehicle fatality rates observed in rural areas.

Wearing a seat belt or child safety restraint is the single most effect means of preventing injury and death stemming from motor vehicle crashes (Glassbrenner, Carra, & Nichols, 2004; Williams & Wells, 2004). Nationwide seatbelt usage rates have been increasing in recent years to a record high of 82% in the most recent 2005 National Occupant Protection Use Survey (NOPUS) data. However, seatbelt usage rates lag behind nationwide estimates in rural states. For example, in two rural states near South Dakota – North Dakota and Kansas, 2005 seatbelt usage rates were 76.3% and 69.0%, respectively.

State seatbelt laws are associated with higher seatbelt use rates (Houston & Richardson, 2005; NHTSA, 2004c). Houston and Richardson (2005) analyzed usage data for the decade spanning 1991 to 2001 among states with primary and secondary seatbelt enforcement laws. Their results indicated that usage rates were on average just over 9% higher in states with primary enforcement laws relative to states with secondary laws.

Primary seatbelt enforcement laws now exist in the District of Columbia (DC), 20 states and 3 U.S. territories (CDC, 2004) and by 1996 every state (with the exception of New Hampshire) had some type of statewide legislation in place mandating safety restraint usage among adults (Derrig, Segui-Gomez, Abtahi, & Liu, 2002; Houston & Richardson, 2005). In 17 states and DC seatbelts are required of all adult occupants in the vehicle while the other states require restraint use only among children and front seat passengers. In conjunction with nationwide efforts, the State of South Dakota mandated restraint usage by front seat motor vehicle occupants on January 1, 1995 (DOT, 2002).

On July 1, 2001, the State mandated primary enforcement of seatbelt use for all passengers under the age of 18 years. Since 1984, South Dakota has also mandated that child passengers under age 5 or weighing less than 40 pounds must be in a safety restraint.

In response to a national initiative by the NHTSA, the South Dakota Office of Highway Safety commissioned associates of the Human Factors Laboratory (HFL) at the University of South Dakota to conduct a probability-based survey of seatbelt use in the state in the fall of 1998. The annual survey was repeated in the fall of 2000 and 2001, and each summer from 2002 to 2005 until the present summer of 2006 survey. The purpose of these studies has been to document the level of seatbelt use in a sample of drivers and front seat passengers traveling in noncommercial vehicles on South Dakota roads. This report presents the methods, procedures and results of the 2006 Statewide Seatbelt Survey.

Methods

The methods used in this study were designed and conducted according to federal guidelines established by NHTSA and as implemented in the previous 1998 Statewide Seatbelt Survey. The methods and procedures described below are in compliance with the “Uniform Criteria for State Observational Surveys of Seat Belt Use”, published in the Federal Register on September 1, 1998 (63 F.R. 463389). The design was modified in the 2000 survey in an effort to increase the observational rate for children under the age of 5 years.

Survey Design: Stage 1

This study utilized the geographic sampling techniques and road segment sites established in the 1998 survey. The first step was to select geographic areas for sampling of traffic. South Dakota is a state with less than 800,000 citizens residing in 66 counties. The population is not evenly distributed throughout the state, as 50% of the citizens live in eight counties with urban centers. Many of the remaining 58 counties have low populations residing in largely rural areas.

Because it is difficult to sample traffic in all areas of a state with a low population, a “multi-stage cluster approach” was utilized. In this plan recommended by NHTSA guidelines, sampling can be restricted to the counties that account for 85% of the state’s population. Therefore, the sampling pool was comprised of the 33 largest counties in South Dakota that account for 85% of South Dakota’s population. Table 1 shows the eligible counties in ascending order according to population size.

Table 1: Largest South Dakota Counties Accounting for 85% of the State Population

	County	Population	% of State	Cumulative %
1-33				14.44%
34	Dewey	5668	0.77%	15.21%
35	McCook	5686	0.77%	15.98%
36	Kingsbury	5830	0.79%	16.77%
37	Day	6421	0.87%	17.64%
38	Moody	6538	0.89%	18.53%
39	Tripp	6883	0.93%	19.46%
40	Custer	6966	0.94%	20.40%
41	Fall River	7123	0.97%	21.37%
42	Bon Homme	7677	1.04%	22.41%
43	Spink	7700	1.04%	23.45%
44	Grant	8048	1.09%	24.54%
45	Hutchinson	8102	1.10%	25.64%
46	Turner	8633	1.17%	26.81%
47	Butte	8926	1.21%	28.02%
48	Todd	9296	1.26%	29.28%
49	Charles Mix	9493	1.29%	30.57%
50	Roberts	9973	1.35%	31.92%
51	Lake	10,647	1.44%	33.36%
52	Union	11,959	1.62%	34.98%
53	Shannon	12,010	1.63%	36.61%
54	Clay	15,370	2.08%	38.69%
55	Hughes	15,404	2.09%	40.78%
56	Beadle	17,976	2.44%	43.22%
57	Davison	18,807	2.55%	45.77%
58	Lincoln	20,152	2.73%	48.50%
59	Yankton	21,013	2.85%	51.35%
60	Meade	21,999	2.98%	54.33%
61	Lawrence	22,131	3.00%	57.33%
62	Codington	25,452	3.45%	60.78%
63	Brookings	26,186	3.55%	64.33%
64	Brown	35,701	4.84%	69.17%
65	Pennington	87,190	11.81%	80.98%
66	Minnehaha	140,518	19.04%	100.00%
	TOTAL	7,379,733		

Table 2: Selected Counties and Their Populations

	County	Population
1.	Minnehaha	140,518
2.	Pennington	87,190
3.	Brown	35,701
4.	Lawrence	22,131
5.	Davison	18,807
6.	Beadle	17,976
7.	Hughes	15,404
8.	Union	11,959
9.	Charles Mix	9493
10.	Grant	8048
11.	Fall River	7123
12.	Tripp	6883
13.	Kingsbury	5830

Following NHTSA guidelines, a sample of 13 counties could be drawn for a state with at least 85% of the population residing in 30 – 39 counties. The two largest counties in the state were selected and the remaining 11 counties were randomly drawn. Table 2 lists the counties that were selected and their corresponding populations.

Although Hutchinson County was initially drawn for the sample, it was learned that the county would be undergoing a local seatbelt survey in the fall of 1998. Therefore, Tripp County was substituted.

Survey Design: Stage 2

The second stage of the study was to select the sample of road segments to be surveyed within the thirteen counties. According to NHTSA guidelines, road segments must be drawn from roads that have an adequate level of traffic based upon Vehicle Miles Traveled (VMT) estimates. Initially, it was estimated that there were an average number of 50 road segments available for sampling in the South Dakota counties. According to the NHTSA guidelines, 19 road segments can be sampled from a base of 50 road segments per county.

However, assessment of 1998 VMT estimates for South Dakota roadways revealed that only an average number of 27 road segments were available for sampling in the 13 counties. (Relative to other states, South Dakota has a limited number of roadways for which VMT

estimates are recorded.) Therefore, permission was received from the regional survey design advisor to sample 17 or fewer road segments per county.

In order to select the road segments, maps of roadways and VMT estimates per roadway segments for the 13 counties were obtained from the South Dakota Department of Transportation, Division of Planning and Engineering. Roadways were divided into four classifications:

Urban Interstate

Urban Highway -- principal and minor highways within designated urban areas
(5,000 + population)

Rural Interstate

Rural Highways -- principal and minor highways outside of urban areas.

Following recommendations from the regional survey design advisor, road segments for urban interstate and urban highways were measured in one mile units, whereas road segments for rural interstate and rural highways were measured in ten mile units. VMT estimates were calculated for each road segment chosen. Road segments with unacceptably low VMT estimates were excluded. Once all of the roadways in a county were divided into eligible segments, a random numbers program was used to select 17 segments for sampling.

The random selection procedure was restricted by the roadway classification of a segment so that the number of segments chosen would be proportionate to the total VMT traveled on a roadway type for that county. For example, in Minnehaha County, the proportions of total vehicle miles traveled by roadway type were:

23% for Urban Interstate
43% for Urban Highways
25% for Rural Interstate
10% for Rural Highways.

Therefore, the drawing of selected road segments was restricted to:

4 Urban Interstate sites (about 23% of 17 sites)
7 Urban Highway sites (about 43% of 17 sites)
4 Rural Interstate sites (about 25% of 17 sites)
2 Rural Highway sites (about 10% of 17 sites).

The procedure described above was applied individually to the 13 counties for final selection of the 17 road segments. Five counties (Brown, Davison, Grant, Kingsbury, and Tripp) had only 13 to 16 road segments chosen because of a limited number of roadways with VMT data available.

The last step in the road segment selection process was to designate a seatbelt observation site within each of the 205 selected road segments. Whenever possible, the observation site was placed at an intersection in which vehicles slowed or stopped for a traffic signal or sign.

This allowed for accurate and safe viewing of seatbelt use by the Observers. See Appendix A for a list of the observation sites by mile marker and probability of selection in counties by the four roadway types.

Sampling Time Periods

Six 90-minute blocks of daylight time were scheduled for seatbelt observations. One observation time period was 40 minutes. Including travel time, six sites could be observed in a single day. A county could therefore be surveyed in a four-day period. To minimize travel time and distance required to conduct the survey, sample sites were grouped into geographic clusters. A day of the week to begin data collection was assigned to a cluster. Within a cluster, each road segment was randomly assigned to the available time slots. The time blocks were:

- 1) 7:30AM - 9:00AM
- 2) 9:00AM - 10:30AM
- 3) 10:30AM - 12 noon
- 4) 12 noon - 1:30PM
- 5) 1:30PM - 3:00 PM
- 6) 3:00PM - 4:30PM

Sample time periods were scheduled for two week days and for Saturday and Sunday.

Sample Size

Based on previous observational surveys in South Dakota, it was estimated that approximately 10,000 vehicle observations would be collected from the 205 sites. This sample size allows one to be 95% confident that the numbers reported would be within 1% of the actual values -- an acceptable margin of error according to NHTSA guidelines.

Data Collection

For the 2000 survey, the 1998 data collection form was modified to reflect the inclusion of additional child passengers between 0-4 years of age. This modification was implemented in all subsequent surveys including the current 2006 survey. A copy of this modified form is included on the last page of the Observer Manual in Appendix B. The data collection form was designed for recording seatbelt use (yes or no) by front seat drivers and right-side passengers of each vehicle observed in the survey. The modified form also included instructions for recording additional front seat passengers and back seat passengers who appeared to be under the age of five years.

The form allowed collection of other information of interest to the South Dakota Office of Highway Safety, including child restraint use for all passengers who appeared to be under age five, estimated age of drivers and passengers, vehicle type, and in- or out-of-state license plate of the vehicle. Demographic data were also collected for each vehicular observation period including county, site number, time of day, date, observer initials, and roadway type.

Data were collected for all passenger cars, pickups, vans, and sport utility vehicles observed. Commercial trucks and motor homes were excluded.

Observers, Observation Procedures, and Observer Training

Two Observers were assigned to a county. Nearly all of the Observers were emergency medical technicians (EMT's). Prior to the 2005 survey year, Observers were primarily members of a retired senior citizens group with a background in driver education. Beginning with the 2005 survey and continuing in the current 2006 survey, EMT's were recruited. A majority of the 2006 EMT Observers had participated in the 2005 survey and thus had prior experience and training.

Observers received: 1) a list of observation sites and a description and maps of the site locations for their respective counties, 2) a four-day schedule during the first week of June for completing a 40-minute observation period of each site in their county, 3) an instruction manual explaining how to conduct roadside observations, and 4) coding sheets for recording data. In addition, the Office of Highway Safety issued additional coding sheets. Observers were instructed to read the manual and engage in a practice period with local traffic. Then they participated in a training conference call with researcher Cindy Struckman-Johnson arranged by the Office of Highway Safety.

Observers were instructed to follow their observation schedules as closely as possible. In the event that Observers could not complete a scheduled site due to weather or other issues, they were instructed to use alternative times presented on their observation schedule. Observers were asked to stand or park in a safe viewing place when they reached an observation site. They were to station themselves so that they could view traffic traveling in a pre-designated direction on the pre-designated roadway. Observers were instructed to monitor every vehicle if the traffic flow was regular or light, and every other vehicle if the traffic flow was heavy. Observers monitored traffic for 40 minutes of the 90 minute observation period, and used the remaining minutes for travel time and location of a safe observation point.

The data collection procedures are explained in detail in the "Observer Manual – 2006 South Dakota Seatbelt Survey" in Appendix B.

Review of Data

Data screening was implemented using methods similar to previous years. Two graduate students in the Human Factors program at USD reviewed over 11,000 lines of raw data for unreadable writing, obvious errors, and logical inconsistencies in the coding (e.g., two drivers in a vehicle with the same ID number; a driver with an infant age). When possible, the coding was corrected. If there remained a question as to the validity of the coding, the line was discarded. Once data were encoded, investigator Carryl Baldwin used computer analyses to review the data again for logical errors in coding. Unfortunately, a number of observers mistakenly recorded data for back seat passengers over 5 years of age resulting in the need to eliminate approximately 450 recorded observations.

Results

A total of 11,608 observations from the 13 selected counties were included in the analyses for this 2006 survey. A small percentage of observations could not be included in individual analyses due to missing data. Of the 11,608 motorists, 7860 or 67.7% were wearing shoulder safety restraints or were placed in a child restraint, while 3748 or 32.3% were not wearing safety restraints. This 2006 unweighted seatbelt use rate was higher than the unweighted rate of 64% and 65.1% observed in the 2005 and 2004 surveys, respectively.

Estimate of Statewide Seatbelt Use

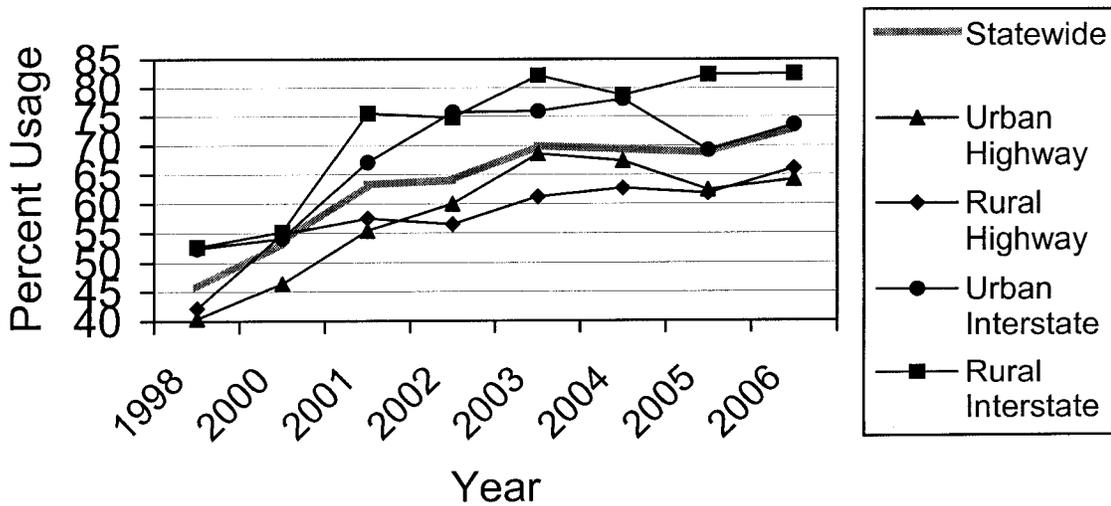
The statewide estimate of seatbelt use was obtained by finding the percentage of seatbelt use for each of the 205 sites, and then computing a weighted mean for each road type for each county. Then, a weighted average for each road type across counties was found where the weights were the VMT (vehicle miles traveled) for that county on that road type and the sampling weight for the county based on the probability of its selection to be included in the survey. Finally, the estimates for the four road type averages were weighted by the VMT for each road type for the entire state. ***The resulting estimate for seatbelt use on all South Dakota roads was 71.3% with a standard error of 0.398.*** Thus, it can be said that there is a 95% probability that the true rate of seatbelt use for South Dakota roads ranges between 70.51% and 72.07%. The formulas and weights for calculating the statewide estimate and standard deviation are in Appendix C.

The 2006 statewide estimate was approximately 2.5 percentage points higher than the 2005 rate. This difference is statistically significant, $t(60) = -33.87$, $p < .001$. Thus, the the statewide estimate for seatbelt use in South Dakota in 2006 showed a clear climb upward, breaking a pattern of relatively little change shown in the three past survey periods. This outcome is shown in Table 3 and Figure 1.

Table 3: Weighted Restraint Use by Year and Road Type

Road Type	Year							
	1998	2000	2001	2002	2003	2004	2005	2006
Statewide	45.7	53.4	63.3	64.0	69.9	69.4	68.8	71.3
Urban Highway	40.4	46.4	55.4	60.0	68.6	67.4	62.4	64.2
Rural Highway	42.2	54.8	57.5	56.5	61.2	62.7	61.8	66.1
Urban Interstate	52.4	54.1	75.7	75.7	75.9	78.0	69.6	73.6
Rural Interstate	52.7	55.2	74.8	74.8	82.2	78.7	82.4	82.5

Figure 1: Restraint Use by Year and Roadtype



Estimate of Statewide Seatbelt Use by Road Type

The 2006 weighted statewide estimates for seatbelt use by road type were 64.2% for urban highways, 66.1% for rural highways, 73.6% for urban interstates, and 82.5% for rural interstates. Compared to 2005 rates (see Table 3), seatbelt use increased on urban highways by 1.8%, increased 4.3% on rural highways, and increased 4.0% on urban interstates. Given the confidence bounds on these rates of +/- less than 1%, the differences can be considered statistically significant. The 2006 seatbelt use rate of 82.5% for rural interstates did not differ from the rate of 82.4% observed in 2005.

Seatbelt Restraint Use by County

Table 4 presents a summary of unweighted data regarding overall seatbelt restraint use in each county, as well as the total number of observations per county. The national average for seatbelt use observed in the 2005 NOPUS was 82% (Glassbrenner, 2006). One South Dakota county had a rate higher than this national average. The observed rate for Union County was 86.9% in this 2006 survey. Several South Dakota counties usage rates approached the national average, Grant County with a rate of 77.5%, Pennington at 76.5%, and Davison with a rate of 76.3%. All other South Dakota counties had rates slightly or substantially lower than the national average.

Several South Dakota counties experienced substantial increases in restraint usage rates, thus contributing to the higher overall statewide average rate observed in the 2006 Survey. The highest 2006 usage rate for South Dakota was observed in Union County where 721 of the 830 (86.9%) motorists observed were wearing safety restraints. This rate is up just over 10% relative to the rate of 76.3% observed in Union County in the 2005 Survey. The next highest usage rate was observed in Grant County with 77.5% or 351 of 453 motorists wearing a restraint. This rate also represents a substantial increase relative to the rate of 55.3% observed in Grant County in the 2005 Survey.

Pennington and Davison Counties both experienced substantial increases in usage rates and they had the next highest rates observed in the state in this 2006 Survey. In Pennington County 76.5% or 1208 of 1579 motorists were restrained as compared to a rate of 69.7% in 2005. In Davison County the usage rate in 2006 was 76.3% or 386 of 506 motorists wearing a restraint, again a substantial increase from the rate of 68.9% observed in the 2005 Survey.

The next highest rates were observed in the counties of Minnehaha with a rate of 72.7% (952 of 1309) and Fall River with a rate of 72.0% (324 of 450). While Minnehaha's 2006 rate was virtually unchanged relative to the rate of 72.6% observed in 2005, Fall River's rate of 72.0% represented a sizable increase from the rate of 60.3% observed in 2005. Additional counties exhibited sizable increases. In Tripp County, 66.0% (128 of 194) motorists were restrained in 2006, relative to rates of 50.5% and 32.8% observed in the 2005 and 2004 Surveys, respectively. Charles Mix had a rate of 58.5% (317 of 542) up substantially from the rate of 47.8% observed in the 2005 Survey.

Seatbelt use rates in two counties were slightly higher than rates observed in 2005. Kingsbury's 2006 rate was 57.0% (338 of 592) relative to the 2005 rate of 55.2%. Brown County had a rate of 61.3% (763 of 1245) relative to a 2005 rate of 58.3%. Rates for three counties were slightly lower. In Lawrence County, the 2006 rate was 65.4% (1056 of 1615) relative to the 2005 rate of 69.3%. Restraint use in Beadle County was 66.9% (395 of 590) relative to a rate of 67.5% observed in the 2005 Survey. Finally, the 2006 rate in Hughes County was 54.1% (921 of 1703 observed motorists) relative to a 2005 rate of 55.4%.

Table 4: Restraint Use by County

County	Restraint Used		Total
	Yes	No	
Minnehaha	952 72.7%	357 27.3%	1309
Pennington	1208 76.5%	371 23.5%	1579
Brown	763 61.3%	482 38.7%	1245
Lawrence	1056 65.4%	559 34.6%	1615
Davison	386 76.3%	120 23.7%	506
Beadle	395 66.9%	195 33.1%	590
Hughes	921 54.1%	782 45.9%	1703
Union	721 86.9%	109 13.1%	830
Charles Mix	317 58.5%	225 41.5%	542
Grant	351 77.5%	102 22.5%	453
Fall River	324 72.0%	126 28.0%	450
Tripp	128 66.0%	66 34.0%	194
Kingsbury	338 57.1%	254 42.9%	592
Total	7860	3748	11608
% of Total	67.7%	32.3%	

In summary, nine of the 13 counties showed an increase in seatbelt use rates from the 2005 to the 2006 survey periods. These increases were substantial in seven counties: Grant, Pennington, Davison, Union, Charles Mix, Fall River, and Tripp. More modest increases were observed in Brown and Kingsbury counties. The increases in the rural counties of Fall River, Tripp, and Kingsbury are particularly encouraging considering that rural counties typically have usage rates that lag considerably behind the national average (NHTSA, 2005b).

A summary of seatbelt use rates in the 13 South Dakota counties over the past eight survey periods can be seen in Table 5. The data show overall upward trends of increasing seatbelt use in many of the counties. In particular, consistently improving seatbelt rates have been observed over the past eight years in Pennington County. Similar increases were observed in Minnehaha Country up until 2005. These two counties represent the two largest population centers of the state including Rapid City and

Sioux Falls respectively. Between 1998 and 2006, seatbelt use climbed over 30 to 40 percentage points in the counties of Pennington, Union, Charles Mix, and Grant.

Table 5: Unweighted Percent Restraint Use by County by Year

County	Year							
	1998	2000	2001	2002	2003	2004	2005	2006
Minnehaha	54	57	69	69	80	82	73	73
Pennington	38	43	51	63	67	70	70	77
Brown	37	60	64	56	65	62	58	61
Lawrence	39	73	62	54	73	68	69	65
Davison	55	52	67	76	60	70	69	76
Beadle	41	56	57	63	55	63	68	67
Hughes	41	36	54	62	76	77	55	54
Union	49	61	71	71	77	79	76	87
Charles Mix	17	24	28	41	48	50	48	59
Grant	41	46	53	66	45	53	55	78
Fall River	47	52	58	62	60	63	60	72
Tripp	52	30	39	47	37	33	50	66
Kingsbury	43	38	44	46	49	43	55	57

Age of Motorist

Observers estimated the age of drivers and passengers to the best of their ability. If the Observer was unable to determine age, these few instances were excluded from the age by restraint use analyses. As in all previous surveys since 1998, Observers always recorded data for the driver and a right front passenger, irrespective of age. In subsequent survey years (2000 – 2006), data were also recorded for additional passengers between 0-4 years of age present in the front seat (e.g., on the right front passenger's lap or in the middle of the seat). Data were also recorded for any child between 0-4 years of age riding in the back seat. This new protocol was adopted in order to increase the sample size of child passengers aged 0-4 years for better estimates of child restraint use.

Child restraint use was defined as a passenger restrained by a child carrier. If children under the age of 5 years were observed riding in the front or back seat of a vehicle unrestrained, this was recorded as no restraint used. If a child under five years of age was observed riding in the front or back seat wearing a shoulder restraint but not seated in a child carrier, then restraint use was recorded as a "yes". Note however, that according to South Dakota law, all children under the age of 5 years should be restrained in an approved child safety restraint unless they weigh more than 40 pounds. Table 7 illustrates the total number of observations and restraint use by each age group including the use of child restraints.

Table 7: Unweighted Restraint Use by Age

Age	Restraint Use			Total
	Belt	Child Restraint	None	
0 - 4 years	17 9.5%	141 78.8%	21 11.7%	179
5 -13 years	73 67.0%	2 1.8%	34 31.2%	109
14 - 17 years	470 56.5%		362 43.5%	832
18 & over	7132 68.2%		3328 31.8%	10,460
Total	7692 66.4%	143 1.2%	3745 32.3%	11,580

The total number of children between 0-4 years of age observed in the 2006 survey was 179. Of these 179 children, 158 or 88.3% were observed in some type of safety restraint. In accordance with South Dakota law, 141 or 78.8% were buckled in a child restraint while another 17 (9.5%) were wearing a shoulder restraint, but were not seated in a child safety seat. Restraint use for this age group represents a steadily increasing rate relative to previous surveys and, in particular, an increase in the number of children buckled in a child restraint. The 88.3% rate observed in this 2006 survey compares with a 2005 survey rate of 77.1% for this age group, with 48.1% in a child restraint. In past years, the overall restraint use for children under five was 72.3% in 2004, 70.4% in 2003, 67.1% in 2002, 77.8% in 2001, and 58% in 2000.

There was a slight decrease in the number of children between 5 to 13 years of age observed in the 2006 Survey. A total of 109 children in this age group were observed in 2006 relative to a total of 135 in the 2005 Survey. Of the 109 children observed in the 2006 Survey, 75 or 68.8% were wearing some type of safety restraint, with 73 or 67.0% wearing a seatbelt and an additional 2 or 1.8% in a child safety seat. This represents a substantial increase over the usage rate of 57.1% observed in the 2005 survey. In past years, overall use rates for children age 5 – 13 were 56.2% in 2004, 62.5% in 2003, 53.4% in 2002, 64.5% in 2001, and 51.3% in 2000.

A total of 832 motorists were estimated to be in the teen-age category of 14 to 17 years, a substantial increase relative to the 572 teens observed in the 2005 Survey. Of the teens observed in the 2006 survey, 470 of 834 or 56.5% were wearing a seat belt. This compares to a rate of 48.1% observed in the 2005 survey. Results of the 2006 survey indicate that safety restraint use among teens in South Dakota has increased relative to past years. Teen restraint usage rates prior to 2005 were under 50% (44.9% in 2004, 41.1% in 2003, 48% in 2002, 45.6% in 2001, and 41.1% in 2000.)

As in previous years, the majority of observed motorists (a total of 10,460) were estimated to be in the age group of 18 years and older. Of these, 7132 (68.2%) were wearing a restraint. This adult rate represents an increase over the 64.7% and 65.5% rates observed in 2005 and 2004, respectively. These rates generally represent a trend towards steadily increasing usage rates over previous survey years. In past surveys, the adult use rates were 63.9% in 2003, 61.6% in 2002, 56.5% in 2001, and 53.2% in 2000.

Drivers versus Passengers

According to national guidelines, data were recorded for all drivers and right front seat passengers. Data for additional passengers were only recorded if the additional passenger was under the age of 5 years (0-4 years). Unweighted data for restraint use by occupant position in the vehicle are presented in Table 8. Restraint use was somewhat higher for passengers than for drivers. Of the 8195 drivers observed, 5442 or 66.4% (relative to a rate of 62.8% observed in 2005) were wearing a safety restraint. Of the 3,240 right front seat passengers observed, 2250 or 69.4% (relative to a 2005 rate of 66.1%) were wearing shoulder restraints, with an additional 9 or .3% in a child safety seat.

According to federal and state guidelines, children 0-4 years of age should be placed in a child safety restraint in the back seat, where possible. As indicated in Table 8, 90.3% or 130 of 144 of the 0-4 year age children seated in the back seat were in fact observed in a child safety restraint. An additional 10 (6.9%) children were secured in a seatbelt resulting in a record 97.2% of backseat child passengers in some kind of restraint. This compares to a rate of 80.3% observed in 2005.

Data were recorded for 15 additional child front seat passengers who were not sitting in the traditional right front seat area. Of these 15, only 5 or 33.3% were in a child safety restraint, with the remaining 10 not wearing any type of restraint. This overall restraint rate of 33.3% compares to a rate of 53.9% observed for this passenger group in the 2005 survey and rates of 60% and 62.5% observed in the 2004 and 2003 surveys, respectively. However, due to the low number of observations for children under 5 years observed in the additional front seat positions, the comparisons of seatbelt use rates between years may not be reliable. Alternatively, in view of the increased child restraint use for back seat passenger children, the low restraint usage rate for extra children in the front seat could be indicative of a special population riding at risk.

Table 8: Unweighted Restraint Use for Drivers versus Passengers.

Occupant Type	Restraint Use			Total
	Yes	Child Restraint	None	
Drivers	5442 66.4%		2753 33.6%	8195
Right-Front Passengers	2250 69.4%	9 .3%	981 30.3%	3240
Additional Child Front Passenger		10 66.7%	5 33.3%	15
Child Passenger Back Seat	10 6.9%	130 90.3%	4 90.3%	144
Total	7702 66.4%	144 1.2%	3748 32.3%	11594

Vehicle Type

Only non-commercial vehicles were observed. Vehicles were categorized into three classifications: 1) cars; 2) vans, mini-vans, pickups and station wagons; and, 3) Sport Utility Vehicles (SUVs). Table 9 presents a summary of data regarding restraint use in each vehicle category. Consistent with data collected in previous years, the ratio of restraints worn per motorist is considerably higher in the categories of cars (70.4%) and Sport Utility Vehicles (72.4%) relative to the rate of vans/pickups (60.6%). This pattern of rates is consistent with the rates observed in prior surveys dating back to 1998. For example, the rate in 2005 for cars was 67.1%, for Sport Utility Vehicles it was 68%, and for vans/pickups the rate was 58.9%.

Table 9: Unweighted Restraint Use by Vehicle Type

Vehicle Type	Restraint Use			Total
	Yes	Child Restraint	None	
Cars	3640 70.1%	69 1.3%	1486 28.6%	5195
Vans/Pickups	2520 59.7%	39 .9%	1660 39.3%	4219
SUVs	1538 70.8%	35 1.6%	599 27.6%	2172
Total	7698 66.4%	143 1.2%	3745 32.3%	11,586

In-State versus Out-of-State Vehicles

Observers recorded whether or not the vehicles included in the observation had in or out-of-state license plates. The overwhelming majority of observations were of vehicles with in-state license plates (83.8% or 9,666 out of 11,530). As illustrated in Table 10, vehicles with out-of-state license plates tended to have higher rates of seatbelt restraint use (80.6% for seatbelts and child safety restraints combined) than did motorists traveling in vehicles with in-state license plates (65.2%). This pattern of usage rates is consistent with previous years. For example, in 2005 the out-of-state rate was 76.2%, while the in-state rate was 60.9%.

Table 10: Unweighted Restraint Usage Observed for In- and Out-of-State License Plates

License Plates	Restraint Use			Total
	Yes	Child Restraint	None	
In-State	6188 64.0%	117 1.2%	3361 34.8%	9,666
Out-of-State	1476 79.2%	27 1.4%	361 19.4%	1864
Total	7664 66.5%	144 1.2%	3722 32.3%	11,530

Discussion

Results of the current survey established that the weighted, statewide estimate of restraint use for South Dakota in year 2006 was 71.3%. This estimated rate was statistically higher than the rate of 68.8% observed in 2005. Over the past eight years, statewide estimates of seatbelt use in South Dakota have steadily risen from a rate as low as 46% to one approaching 72%. This trend mirrors the steadily increasing nationwide average seatbelt rate obtained from NOPUS observations.

Nationwide seatbelt use rates have been rising steadily from 68% in 1996, 68.9% in 1998, 71% in 2000, 73% in 2001, 75% in 2002, 79% in 2003, 80% in 2004 and a record 82% in 2005 according to NHTSA records (e.g., see Glassbrenner, 2005). Two areas of particular nationwide focus in the 2004-2005 time period were increasing seatbelt use rates in rural areas and among motorists in pickups (Glassbrenner, 2005). Nationwide, seat belt rates in rural areas have been consistently lower than in urban areas. However, nationwide rates increased by 3% during the period of 2004-2005, in both the rural category and among pickup truck motorists. South Dakota, a rural state with a large number of motorists in pickups, is reflecting these changes.

South Dakota seat belt usage rates are comparable to other states in the region. For example, the 2004 and 2005 safety belt usage rates observed in a Kansas survey were 68% and 69%, respectively, for all motorists over the age of 14 (Kansas-DOT, 2006).

The current 2006 South Dakota Survey demonstrates particularly positive upward trends in safety restraint use among children and teens. The number of children aged 0-4 years of age restrained in a child safety seat reached an all time statewide high of 78.8%. An overwhelming majority of these children (144 of 179) were passengers in the back seat as required by South Dakota law. Of those children traveling as back seat passengers a record 97% were restrained. These usage rates represent an important overall upward trend in this vulnerable group of South Dakota motorists.

Similar to previous surveys, the 2006 survey results indicate that older children (aged 5 to 13) were less likely to be properly restrained than younger children. However, the 2006 rate of seatbelt use for children in this age group (68.8%) was substantially higher than the rates from recent years, 57.1% in 2005 and 56.2% observed in the 2004 survey. Despite this positive upward trend, the overall usage rate for older children lags significantly behind the statewide and nationwide usage rates.

Results of the 2006 survey support the positive trend exhibited in recent years of increased seatbelt use among teenagers age 14 to 17 in South Dakota. Restraint use among teens in the current survey was 56.5%, up substantially from the rate of 48.1% observed in the 2005 survey. While this rate is still lower than the adult rate it represents a positive upward trend in comparison to the previous surveys.

In summary, results of the 2006 South Dakota Statewide Seatbelt Survey are generally positive. The weighted statewide seatbelt use estimate is 2 ½ points higher than the previous year. Seatbelt use rates have increased significantly on urban and rural highways and urban interstates. Direct, or unweighted usage rates indicate that 9 of the 13 counties included in the survey have experienced increased usage rates. Usage rates among infants, children and teens have increased. These results indicate that seatbelt usage on South Dakota roadways has substantially improved in the past year.

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Appendix A

List of Observation Sites by Roadway Type

Urban Interstate

County	Road	Mile	Site #	Probability of Selection for County
Minnehaha	29N	77	2	.31
Minnehaha	29N	98	3	.31
Minnehaha	229	3	4	.31
Minnehaha	229	5	5	.31
Minnehaha	229	7	6	.31
Pennington	90E	56	11	.18
Pennington	90E	60	12	.18
Lawrence	90	13	2	1.00
Davison	90	330	8	1.00
Davison	90	333	10	1.00
Union	29S	.98	1	1.00

Rural Interstate

Minnehaha	90	379	13	.19
Minnehaha	90	390	14	.19
Minnehaha	90	412	15	.19
Pennington	90E	66	13	.31
Pennington	90E	90	14	.31
Pennington	90E	98	15	.31
Pennington	90W	55	16	.31
Pennington	90W	62	17	.31
Lawrence	90	12	1	1.00
Lawrence	90E	15	3	1.00
Lawrence	90E	27	4	1.00
Lawrence	90W	12	5	1.00
Lawrence	90W	15	6	1.00
Lawrence	90W	24	7	1.00
Davison	90	319	6	1.00
Davison	90	325	7	1.00
Davison	90	332	9	1.00
Union	29N	1	2	1.00
Union	29N	18	3	1.00
Union	29N	27	4	1.00
Union	29S	42	5	1.00
Grant	29	201	16	1.00

Urban Highway

Minnehaha	115	84	7	.70
Minnehaha	115	87	8	.70
Minnehaha	115	88	9	.70
Minnehaha	11	79	10	.70
Minnehaha	42	363	11	.70
Minnehaha	42	367	12	.70
Minnehaha	38	365	17	.70
Pennington	16	69	2	.18
Pennington	16B	68	3	.18
Pennington	16B	70	4	.18
Pennington	79	80	6	.18
Pennington	44	40	7	.18
Pennington	44	49	8	.18
Brown	12	289	4	1.00
Brown	12	290	5	1.00
Brown	12	292	6	1.00
Brown	12E	289	8	1.00
Brown	281	193	9	1.00
Brown	281N	197	14	1.00
Lawrence	14A	9	14	.13
Lawrence	14A	10	15	.13
Davison	37	74	3	.60
Davison	37	76	4	.60
Davison	38	300	12	.60
Beadle	37	125	13	1.00
Beadle	37	127	14	1.00
Beadle	37	128	15	1.00
Hughes	14E	230	3	1.00
Hughes	14W	232	5	1.00
Hughes	14	229	6	1.00
Hughes	14	230	7	1.00
Hughes	14B	95	11	1.00
Hughes	14B	96	12	1.00
Hughes	34	209	13	1.00
Hughes	34	210	14	1.00

Rural Highway

Minnehaha	19	64	1	.07
Minnehaha	38	349	16	.07
Pennington	16	45	1	.10
Pennington	16A	59	5	.10
Pennington	44	87	9	.10
Pennington	44	107	10	.10
Lawrence	385	122	8	.66

Lawrence	85	28	9	.66
Lawrence	14A	29	10	.66
Lawrence	14A	35	11	.66
Lawrence	14A	37	12	.66
Lawrence	14A	41	13	.66
Lawrence	14A	41	16	.66
Lawrence	14A	50	17.	.66
Brown	10	279	1	.55
Brown	10	282	2	.55
Brown	10	297	3	.55
Brown	12	309	7	.55
Brown	281	214	10	.55
Brown	281	214	11	.55
Brown	281S	185	12	.55
Brown	281N	185	13	.55
Brown	37	207	15	.55
Brown	37	208	16	.55
Brown	37	208	17	.55
Hughes	83	138	1	.69
Hughes	1804	256	2	.69
Hughes	14	139	4	.69
Hughes	14	246	8	.69
Hughes	14	251	9	.69
Hughes	14	263	10	.69
Hughes	34	212	15	.69
Hughes	34	232	16	.69
Hughes	34	245	17	.69
Davison	37	62	1	.83
Davison	37	72	2	.83
Davison	37	76	5	.83
Davison	42	302	11	.83
Davison	38	302	13	.83
Beadle	14	333	1	.83
Beadle	14	354	2	.83
Beadle	14	354	3	.83
Beadle	14	363	4	.83
Beadle	14	316	5	.83
Beadle	14	326	6	.83
Beadle	14	326	7	.83
Beadle	14	331	8	.83
Beadle	28	269	9	.83
Beadle	28	283	10	.83
Beadle	28	298	11	.83
Beadle	281	117	12	.83
Beadle	37	133	16	.83
Beadle	37	145	17	.83
Union	46	365	6	.88

Union	46	366	7	.88
Union	46	380	8	.88
Union	46	371	9	.88
Union	11	9	10	.88
Union	11	23	11	.88
Union	11	35	12	.88
Union	11	35	13	.88
Union	50	423	14	.88
Charles Mix	50	337	1	.88
Charles Mix	50	329	2	.88
Charles Mix	50	314	3	.88
Charles Mix	50S	299	4	.88
Charles Mix	50N	299	5	.88
Charles Mix	50	273	6	.88
Charles Mix	1804	90	7	.88
Charles Mix	1804	120	8	.88
Charles Mix	44	298	9	.88
Charles Mix	44	305	10	.88
Charles Mix	44	306	11	.88
Charles Mix	45	27	12	.88
Charles Mix	46	277	13	.88
Charles Mix	46	288	14	.88
Charles Mix	46	290	15	.88
Grant	20	439	1	1.00
Grant	20	439	2	1.00
Grant	20	446	3	1.00
Grant	158	439	4	1.00
Grant	12	377	5	1.00
Grant	12	388	6	1.00
Grant	12	390	7	1.00
Grant	12	390	8	1.00
Grant	12	399	9	1.00
Grant	123	172	10	1.00
Grant	15	160	11	1.00
Grant	15	167	12	1.00
Grant	15	174	13	1.00
Grant	15	174	14	1.00
Grant	15	175	15	1.00
Fall River	18	62	1	.65
Fall River	18	11	2	.65
Fall River	18	12	3	.65
Fall River	18	24	4	.65
Fall River	471	7	5	.65
Fall River	471	21	6	.65
Fall River	471	27	7	.65
Fall River	89	29	8	.65
Fall River	71	1	9	.65

Fall River	71	2	10	.65
Fall River	71	7	11	.65
Fall River	71	27	12	.65
Fall River	71	35	13	.65
Fall River	385	39	14	.65
Fall River	79	26	15	.65
Fall River	385	12	16	.65
Fall River	385	13	17	.65
Tripp	53	26	1	1.00
Tripp	183S	5	2	1.00
Tripp	183S	19	3	1.00
Tripp	183N	43	4	1.00
Tripp	183N	61	5	1.00
Tripp	49	18	6	1.00
Tripp	49	27	7	1.00
Tripp	49	42	8	1.00
Tripp	18	242	9	1.00
Tripp	18	252	10	1.00
Tripp	18	252	11	1.00
Tripp	18	273	12	1.00
Tripp	44	237	13	1.00
Tripp	44	270	14	1.00
Kingsbury	25	114	1	1.00
Kingsbury	25	120	2	1.00
Kingsbury	81	116	3	1.00
Kingsbury	81	119	4	1.00
Kingsbury	81	125	5	1.00
Kingsbury	14	363	6	1.00
Kingsbury	14	365	7	1.00
Kingsbury	14	378	8	1.00
Kingsbury	14	378	9	1.00
Kingsbury	14	383	10	1.00
Kingsbury	14	387	11	1.00
Kingsbury	14	390	12	1.00
Kingsbury	14	400	13	1.00
Kingsbury	25	113	14	1.00

Appendix B

Observer Manual – 2006 South Dakota Seatbelt Survey

Observer Manual

**2006 South Dakota
Seatbelt Survey**

INSTRUCTIONS FOR USING THE SOUTH DAKOTA SEATBELT SURVEY FORM

South Dakota Statewide Seatbelt Survey

June, 2006

OVERVIEW

The South Dakota Seatbelt Survey Form has been designed so that a large amount of information can be efficiently collected about seatbelt use on our state roads. The form allows for collection of seatbelt use data for all drivers and right front passengers in non-commercial vehicles, as well as children age four and under **anywhere** in the car. The form is constructed so that every person to be surveyed in a vehicle receives one full line of data -- 22 columns across the page.

The first four columns are used to record the occupant's vehicle identification number and the type of vehicle. The next three columns are for occupant information, including whether the person is a driver, a right front seat passenger (of any age), an additional child 0-4 years in the front, or a child 0-4 years in the back seat. The most important information is whether the occupant has on a seatbelt or is in a child restraint. Age of the occupant is guessed at to determine restraint use for children and teenagers. Finally, the vehicle license plate is recorded as being either in state or out of state.

The remaining 13 columns are used for recording "demographic" information about the observation such as county, site number, time of day, and road type. Whereas the vehicle and occupant information must be recorded immediately as the vehicle passes, the demographic information only has to be written once on the first line of the first coding form used for a 40-minute observation period. When the coding sheets are processed, the demographic information will be automatically duplicated for all persons recorded during that observation session.

Here are some common mistakes made in past surveys:

- **Remember to start with Vehicle ID Number "001" for every new observation period. In past surveys, some Observers started with the number from the previous survey period. For example, if they ended up with 45 vehicles during the first period, they started with number "046" for the second period and continued upwards for every new period.**
- **Remember to give an "extra" child passenger (0 – 4 years of age) who is sitting in the middle of the front seat or on the lap of a right front seat passenger the special Driver/Passenger/Extra code of "3". Remember to give any child 0 – 4 years sitting in the back seat the special Driver/Passenger/Extra code of "4".**

- Remember that we are only interested in “extra “ child passengers (those sitting in the middle of the front seat or in the back seat) who appear to be less than 5 years old. If an “extra”child appears older than are five, don’t record any data for this child.
- In past surveys, some vehicles were assigned two drivers – code “1”. We are not sure if the Observers coded a passenger as “1” instead of “2”, or if there were two vehicles with different drivers who were accidentally assigned the same vehicle ID number. Please check your work to correct for this.
- In the past surveys, there were some drivers who were assigned the age category of 1 (0 – 4 years) making them too young to be driving!
- Remember to use the Road Type code number for a site that appears in the description in the site list. These are the correct codes according to definitions used by the Department of Transportation. Even though a highway runs through an intersection in town, it is still considered a “rural highway” if the town has less than 5,000 people.
- Do not “double sample” any site by having two Observers recording data on two different streams of vehicles at or near the same site. It is acceptable for Observers to share recording duties or to take turns recording data on one stream of vehicles during a 40-minute period. But, do not split up and watch two streams of vehicles that are going different directions or are at slightly different locations at the same site.
- Remember to stop observing vehicles at the end of the 40 minute period, no matter if you have 0 vehicles or a 100!

1) Materials

Observers will be provided an Observer Site Schedule that will show the time and place to observe traffic over a 4-day period. A few extra days are listed as alternative dates. They will receive an Observation Site List that contains the numbers and descriptions of the observation sites. Maps of the observation sites will also be provided. Sites include road segments between mile markers that are located along urban and rural highways and interstates. Each site will be monitored for a 40-minute session during one of 6 time slots spread over the 4-day period. The observations are conducted according to the following steps.

2) Preparation for the Observation Session:

Observers should wear an orange safety vest issued by the SD Office of Highway Safety to increase their visibility to passing traffic. Observers should carry their observation sheets on a clipboard and use a number 2 pencil for recording information. Do not use ink or flair pens. It is very important that Observers write numbers clearly so that they can be entered correctly into the computer. Cross "7"s so that they can be distinguished from "1"s.

3) Arrival on Site and selection of an Observation Area:

Observers should reach their observation site a few minutes before they plan to begin the observation session. Note that scheduled time periods are 1½ hour periods and the observation session is only for 40 minutes. This will give Observers some leeway in start and stop times. Make sure you allow plenty of time to finish and get to the next site on time.

Before the observation session begins, the Observer should record the demographic information in columns 9 - 22 on the first row of the observation sheet. Most of the codes for the demographic information are on the top of the observation form. Information about "Road Type" is on the Site List. This information only has to be coded once for each 40-minute observation session.

Observers will then choose a position at the site that provides the best view of occupants in vehicles. For urban road sites, choose sites that allow observation of vehicles that have stopped for a red light or stop sign, or slowed for a yield sign. The best position is usually on the curb next to a right-hand turn lane on urban sites. For rural segments, intersections or junctions provide the best observation position.

Observers should stand at the safest possible position either on the curb or well to the side of the road which allows them a good view inside the front seat of cars/vans/trucks and sport utility vehicles which will be stopping or slowing at the site. Observers must be careful not to step into the roadway and endanger themselves as they attempt to look inside passing vehicles. It is better to be safe and guess about some information than it is to put oneself at risk for a close look. Do not observe in stormy weather with lightning.

4) Selection and Coding of the First Vehicle:

When the Observer is ready to record data, he/she will observe the first non-commercial car, mini-van, van, pickup-truck, or sport utility vehicle (SUV) to stop at the site. **IMPORTANT: Commercial vehicles of any type (cars, station wagons, mini-vans, vans, pickup trucks, and large trucks) will not be included in the survey.** Commercial vehicles are those with commercial license plates and/or commercial signing or lettering of any kind on the vehicle.

Information about the vehicle will then be coded. The first vehicle is assigned the sequence number "001" and marked as either a car, a truck/van/mini-van/station wagon or as an SUV. The next code indicates the position of the person in the vehicle (driver or a passenger). Then the drivers' seat belt use is coded. If there is a right front vehicle passenger, the next line of the form is used to code passenger information. This line also begins with a sequence number of "001" because it is the same vehicle. If there is a child 0-4 years of age in addition to the right seat passenger, (e.g., one who is sitting or standing on the right front seat passenger's lap or in the center front seat), record information about the child on the next line starting with the same vehicle number "001". If there are any children 0-4 years in the back seat, code information about each child on a separate line starting with the same vehicle number.

Observers may not always be able to record accurately all information about the vehicle. The best strategy is to record the most important information first: **drive/pass, seat belt use and age**. Then, move to other categories such as vehicle type (car versus van/pick-up versus SUV). Record the state of license plate last, skipping it if you must.

5) Selection of Vehicles Throughout the Observation Session:

If traffic flow is heavy (an average of more than 1 vehicle per minute), observe **every other** vehicle that stops or slows down. For example, after the first car or van/truck has been coded as Vehicle ID "001", the Observer should let one car or van/truck stop and leave and then code data on the next vehicle that stops as Vehicle ID Number "002". Repeat the pattern throughout the 40-minute period.

If the traffic flow is lighter such that less than one vehicle stops every minute, Observers should record data on **every** car/van/truck/SUV that stops or slows down. If a vehicle containing several children takes a lot of time to code, skip the next one or two vehicles until you are ready to code again.

6) Completing the Observation Session:

At the end of the 40-minute observation session, Observers should go to the box in the lower right corner of the first survey form used for the session and check whether every car or every other car was observed. Then, Observers should record the total number of cars/vans/trucks and Sport Utility Vehicles observed for the session. **Note that the total number should match the highest Vehicle ID Number for the session - be careful not to count vehicles with passengers more than once.** Scan handwriting and correct unreadable numbers. The survey forms should be clipped together in correct order, and stored in a safe, dry place until they are mailed back to Cindy Struckman-Johnson.

7) Starting the Next Observation Session:

At the Observer's next 40 minute observation session, he/she should begin with a new survey form and the **Vehicle ID numbers should begin again with "001"**. Demographic information for this site should be recorded on the first line of the coding sheet.

DESCRIPTIONS OF CATEGORIES AND CODES

Observers should use the codes exactly as described. One common mistake is to forget to fill in "0"s for double or triple digit codes. For example, for the first vehicle observed, record "001" instead of a "1" followed by two blanks in the columns for vehicle ID number. See Appendix A for an explanation of some sample coding.

Vehicle ID Number

During each observation session, the Observer will assign a sequential "Vehicle ID number" to each vehicle that is sampled (selected for observation). The sequential ID's should start with "001" each session. ID numbers for an observation session in heavy traffic will probably run from 001 through 090. The same Vehicle ID Number is assigned to the driver of a vehicle and the passengers. In other words, if a vehicle has only a driver, only one line of the coding form will be used for the vehicle. If the vehicle has a driver and passengers, two or more lines of the coding form will be used for the vehicle and all will have the same Vehicle ID Number. Each child 0-4 years of age in addition to the right front passenger will be coded on a separate line with the same vehicle ID number.

Vehicle Type

Non-commercial passenger cars are coded as "1". All other non-commercial vehicles (mini-vans, station wagons, vans, pickup trucks, etc.) **except** sport utility vehicles are coded as "2". Sport Utility Vehicles of all types are coded as "3". **Remember, commercial vehicles of any type are not to be included in the survey.**

Driver/Passenger/Extra Children Age 0 - 4

Drivers are coded as "1". Passengers of any age, child or adult, in the right front seat are recorded as "2". **IMPORTANT: Extra children (0-4 years) in the front who are sitting or standing on the lap of the right front passenger or are sitting or standing in the center are recorded as "3". Children (0-4 years) anywhere in the back seat are recorded as "4".**

Seatbelt Use *** Most Important Information of the Survey ***

As soon as a vehicle stops or slows, Observers should immediately determine whether the driver and right front passenger or any children 0 – 4 years of age are wearing a safety restraint. A "1" means a seatbelt was present. A "2" means it was not present. A "3" is used for the special case when a child passenger is in a child restraint device or car seat.

Seatbelt use is determined by the shoulder strap of the seatbelt or by the use of a child restraint. Using a shoulder strap as an indicator is a procedure that the National Highway Traffic Safety Administration has standardized for seatbelt surveys across the country. It has been determined to be more accurate than trying to see inside of cars to check for lap belts.

For the driver, code "1" if a shoulder strap is in use. Code "2" if the shoulder strap is not in use.

If there is a right front passenger of any age, start a new line of code with the same vehicle sequence number used for the driver on the previous line. For the right front passenger code "1" if a shoulder strap is in use. Code "3" if a child restraint (car safety seat, infant carrier, special harness to supplement the standard lap/shoulder belt, etc.) is in use. Code "2" if NEITHER the shoulder strap nor a child restraint is in use.

If there is a child 0-4 years of age in the front seat **in addition** to the right front seat passenger (Driver/Passenger/Extra Child code "3"), give a Seatbelt Use code of "3" if a child restraint is in use. Code "2" if a child restraint is not in use. Code "1" in the event that the child 0-4 years of age is restrained by only a shoulder belt, but not a child restraint. Use the same Seatbelt Use codes for children 0-4 years of age in the backseat (Driver/Passenger/Extra Child code "4").

Age

Observers should pay special attention to judging the age of child occupants.

If the occupant is an "infant" to 4 years old, code "1".

If the occupant appears to be 5 to 13 years old, code "2".

If the occupant appears to be 14 to 17 years old, code "3".

If the occupant appears to be 18 years old or older, code "4".

If you are uncertain about the exact age of an occupant such as you are not sure if a child is 13 or 14 years old, make your best guess. If you cannot see the occupant well enough to even guess at their age, then code "5" for unknown. The unknown category is used only for cases when you can not determine age at all, e.g., large hat obscuring face of vehicle occupant.

Lic State

This column is used to indicate whether or not the license plate on the observed vehicle is from South Dakota of another state. Code "1" for a South Dakota plate (regardless of county of origin). Code "2" for any out of state plate. Code "3" if you absolutely cannot determine whether or not the plate is in-state or out of state.

THE REMAINING CODES ARE RECORDED ONLY ONCE ON THE FIRST LINE OF THE FIRST FORM USED AT A SITE.

County

Code the appropriate number for the thirteen counties listed on the Observer Form.

Site

Observers will be given an "Observation Site List" which will list all observation sites in the county and a two-digit Site Number for each site. Observers should code the appropriate Site Number for each 40-minute observation session.

Time

The Time category refers to the time of day that the observation session is scheduled.

- 1 = 7:30 to 9:00 A.M.
- 2 = 9:00 to 10:30 A.M.
- 3 = 10:30 to 12 noon
- 4 = 12 noon to 1:30 P.M.
- 5 = 1:30 to 3:00 P.M.
- 6 = 3:00 to 4:30 P.M.

Month/Day/Year

Record the full date of the observation day --including "0"s --in these six spaces. For example, June 9, 2006 would be recorded as "060906".

Observer

Each Observer will enter his or her first and last initial initials on the coding sheet for identification purposes.

Road Type

The Observation Site List provided to all observers will have a "Road Type" code for each site. **REMEMBER TO USE THE ROAD TYPE NUMBER ASSIGNED IN THE SITE LIST. The sites have been assigned the codes of 1 (Urban Highway), 2 (Rural Highway), 3 (Urban Interstate) and 4(Rural Interstate) based on Department of Transportation definitions.**

Returning Data

When you are finished observing all of your sites, put the completed survey forms in the return-addressed envelope in your supplies packet and mail it back to Cindy Struckman-Johnson. Use the enclosed money to send the package **PRIORITY** rate with a green **DELIVERY CONFIRMATION** sticker. Cindy will reimburse you if the cash is not enough! .

Please send the orange vests and any expense information to your group coordinator, not to Cindy.

If you have any questions about this manual or any of the survey procedures, call Cindy Struckman-Johnson in the Human Factors Lab at the University of South Dakota at (605) 677-5295 or (605) 677-5098 in the afternoon or 605-624-8858 in the mornings and evenings. Her cell phone number is 605-670-2657. If Cindy is not available, please leave a message with a number and a good time to call you and she will return your call. Cindy's e-mail is cindysj@usd.edu.

APPENDIX A

SEATBELT SURVEY FORM EXAMPLES

The last page of this appendix contains an example of a partially completed survey form. It contains coding for 5 vehicles at a hypothetical observation site in Brown County. What follows is an explanation of why the codes shown on the sample form have been used. These examples have been selected to demonstrate many of the things you will commonly encounter while observing as well as some things you need to be careful about.

Vehicle 001 – Driver Only

There is only a single line with the vehicle ID 001, so this vehicle did not have a passenger. Note that vehicle 1 is coded "001" not "1". The vehicle type is coded as "1" so this vehicle must have been a non-commercial car. The third thing that is coded is "1" for Drive/Pass/Extra. This line of entries describes a driver. The next column indicates the driver's belt use. Because this is coded as "1", a shoulder belt was in use. Age is coded "4" meaning that the driver is 18 years of age or older. The "1" in the Lic State column means the vehicle plate was from South Dakota.

The remaining columns of information apply to all the vehicles coded on this sheet, so only one line of data needs to be entered for the entire sheet. County is coded "03" because this example takes place in Brown County. Note that the 7 is crossed so the data entry person will have no difficulty telling the difference between 1's and sloppy 7's. The next 2 columns are the code for the particular site within Brown County. Each observer will be provided with a list of codes for all sites at which he/she will be observing. Time is coded as "2" meaning that the observation is taking place between 9:00 and 10:30 A.M. The next six columns code the month, day and year of the observation in that order. The next two columns are for the first and last initials of the observer. In this example, Donna Smith was observing so "D" and "S" are recorded in these two columns. The next column indicates the type of road on which the observation is taking place. Because the observation site is a highway that runs through a city, the correct road type is urban highway and code "1" is entered. Please do not guess at the road type. Instead, use the road type code that appears on the site list. The definitions of road type were determined by the Department of Transportation and may not fit our idea of an urban or rural highway.

Vehicle 002 – Driver /Right front passenger (Child -0-4 years)

Vehicle 002 is a car and has two lines of code and a "3" in the Veh Type column indicating an SUV with a driver and passenger. The driver line indicates a shoulder belt was used (Seat belt use code = "1") and that driver was at least 18 years old. The car has South Dakota plates.

The passenger line for Vehicle 002 indicates that the passenger was a child 0-4 years of age in the right front seat (Drive/Pass/Extra = "2") in a child restraint (Seat belt use = "3"). It is extremely important to the survey that child restraint use be coded correctly. If a passenger is USING a child restraint, "3" is the correct code for the Belt use column. Do NOT code "1" (shoulder belt used) even if a shoulder belt is being used to hold the child restraint in place. Finally, do NOT use

code "3" if an empty child restraint is present in the front seat. The age is coded as "1" indicating that the passenger was between 0 and 4 years of age. The final column for the Vehicle 002 passenger line repeats the South Dakota license plate code "1".

Vehicle 003 – Driver /Right front passenger/ Child 0-4 in front/ Non-recorded older child

Vehicle 003 has three lines of code indicating a driver and more than one passenger. The Veh Type column for vehicle 003 is coded as "2" indicating that the vehicle was a pickup, van or station wagon. The driver line (code "1" in Drive/Pass/Extra) has an entry for Belt Use indicating that the driver was not wearing a seat belt (code = "2"). Note that the same code value is used to indicate a vehicle occupant is not wearing a shoulder harness or using a child restraint for all vehicle types. The remaining codes for the driver of vehicle 003 indicate that the driver is 18 years old or older and that the pickup, van, or station wagon had out-of-state license plates, coded "2".

The next line of information for the first passenger of vehicle 003 duplicates the Vehicle ID Number and Veh Type codes. The Drive/Pass column is coded "2" to indicate a right front seat passenger. The Belt Use column is coded "1" indicating that the passenger was wearing a seat belt. The next column of the passenger information records age. Code "5" is entered in this example. Code "5" stands for "Unknown". In this example, the age is unknown because the child on her lap blocked the passenger's face from view. This is one of the few situations in which code "5" is appropriate. Code "5" should not be used in cases when you are not sure whether a person is 4 or 5, 13 or 14, or 17 or 18. If you are not sure about age category, make your best guess. Use code "5" only in those cases when you can't tell age at all. The final column of the first passenger data duplicates the out of state license code from the previous line for this vehicle.

The third line of information for vehicle 003 again duplicates the Vehicle ID Number and the Veh Type codes. The Drive/Pass column is coded as "3" indicating that there was a child 0-4 years of age in the front seat in addition to the right front passenger coded on the previous line. (In this case the child 0-4 years of age had been seated on the right front passengers' lap.) The Belt Use column is coded as "2" indicating the child was not in a child restraint device. The Age column indicates that the child was 0-4 years of age. The Lic State code duplicates the "2" indicating an out of state license plate as recorded on the previous two lines for vehicle 003.

A fourth child was present in the center of the seat. However, no information was recorded for this child because the child was estimated to be in the age category of 5-13 years.

Vehicle 004 – Driver /Two backseat passengers (0-4 years)

Vehicle 004 is a car with three lines of code and a "1" in the Veh Type column indicating a car with a driver and at least two passengers. The driver line indicates a shoulder belt was used (code "1") and that driver was at least 18 years old. The car has South Dakota plates.

The second line for Vehicle 004 indicates that a child 0-4 years of age was seated in the back seat (passenger code 4) in a child restraint (code = "3"). The age is coded as "1" indicating that the

passenger was 0-4 years of age. The final column for the Vehicle 004 passenger line repeats the South Dakota license plate code "1".

The third line for Vehicle 004 indicates that a second child (0-4 years of age) was present in the back seat (Drive/Pass/Extra is coded as "4"). This child 0-4 years old was not in a child restraint as indicated by the Seat Belt Use code "2". Age is coded as "1" and the License plate information is repeated as "1" indicating a vehicle with SD license plates as recorded on the previous two lines.

Vehicle 005 – Driver /Backseat passenger (0-4 years)

Vehicle 005 has two lines of code. A "1" in the Vehicle Type column indicates this was a car. The driver was wearing a seat belt (Seat belt use code = "1") and was between 14 and 17 years of age (Age code = "3"). The vehicle had South Dakota license plates.

The second line of code for vehicle 005 repeats the vehicle type information. The Drive/Pass/Extra code of "4" indicates that there was a child 0-4 years of age in the back seat. The Seat belt use code is "1" for this passenger indicating that the child 0-4 years was wearing a shoulder belt but was not in a child restraint device.

Observation Session Summary Boxes

The observation session summary box in the lower right hand corner of the sample form would be completed if this were the first page of information collected at a site. Because this example starts with Vehicle ID Number 001, this is a first sheet.

The upper half of the box indicates whether every vehicle was observed (normal traffic conditions) or every other vehicle was observed (heavy traffic conditions). The "Every Car Observed" line is checked because traffic was obviously light enough for this strategy.

A lower box indicates the total number of vehicles observed during the 40-minute observation session. There were a total of 5 vehicles. At the end of an observation session, you will need to count vehicles on ALL forms used during that session, but you should only enter the totals on the first sheet.

The lowest box is used for recording a verbal description of the actual location used for observation. Terminology similar to that used on the site list is expected. For this example the Observer was located at the interchange of Hwy. 281 and Hwy. 12 observing all traffic turning onto Hwy. 281.

Remember: Use a number 2 pencil so that you may erase and clarify coding information written unclearly when the observation period is over.

STAY SAFE AND GOOD LUCK!

Appendix C

Computation of Mean Seat Belt Use for South Dakota

The computation of the mean seatbelt use for in South Dakota was a three-stage process. Stage 1 consisted of computing mean seat belt use for each road type in each county. For purposes of this calculation, only drivers and right front seat passengers were considered to retain compatibility to prior year values and Federal reporting requirements. In this computation, the vehicle miles traveled value (VMT) for a particular site was computed by averaging the VMT values for each of the subsegments in the road segment the selected site represented. These VMT values were then used to compute a weighted average for all sites for a particular road type in a particular county. This weighted mean seatbelt use rate for a particular road type in a particular county is designated

\hat{P}_{ij} where i denotes road type (from 1 to 4) and j denotes county (from 1 to 13).

The second stage of the computation consisted of computing weighted means for each road type across counties based on the vehicle miles traveled (VMT) on that road type in each county and on the sampling weight for the county based on probability of selection for surveying for that county. The mean seatbelt use for a road type is

$$\hat{P}_i = \frac{\sum_{j=1}^{13} W_{.j} V_{ij} \hat{P}_{ij}}{\sum_{j=1}^{13} W_{.j} V_{ij}}$$

Where \hat{P}_i = the seat belt use estimate for road type i

$W_{.j}$ is the county weight for county j (1 for Minnehaha and Pennington, 31/11 for the remaining 11 counties)

V_{ij} is the VMT for road type i in county j

\hat{P}_{ij} is the seatbelt use rate estimated for road type i and county j in stage 1.

The final stage of the estimate consisted of computing the weighted average of the across county road type estimates for a statewide estimate. Weights were based on the proportion of the state's VMT on each road type.

The formula for computing the statewide estimate is

$$\hat{P} = \frac{\sum_{i=1}^4 V_i \hat{P}_i}{\sum_{i=1}^4 V_i}$$

Where \hat{P} = the statewide seat belt use estimate

V_i is the proportion of VMT for road type i in the state

\hat{P}_i is the rate estimated for road type i in the state stage 2.

In the 2005 South Dakota Survey, the following values were obtained

Urban Highway:	$w_1 = 0.18324$	$\hat{P}_1 = 64.18$
Rural Highway:	$w_2 = 0.44819$	$\hat{P}_2 = 66.05$
Urban interstate:	$w_3 = 0.05521$	$\hat{P}_3 = 73.06$
Rural interstate:	$w_4 = 0.31336$	$\hat{P}_4 = 82.54$

Thus, statewide seat belt use is estimated as **68.77% for 2005**.

Computation of Variance and Confidence Bounds for Mean Seat Belt Use for South Dakota

Computational formula for the variance of \hat{P} , using the terms as defined in the computation of the weighted use estimate above, is

$$Var(\hat{P}) = \frac{\sum_{i=1}^4 \sum_{j=1}^{13} (W'_{ij})^2 * (\hat{P}_{ij} - \hat{P})^2}{n^* - 1}$$

where n^* = the number of county-road type groups

The W'_{ij} in the formula are weights applied to the deviations based on the formula below

$$W'_{ij} = \frac{W_{.j} * V_{ij}}{\sum_{i=1}^4 \sum_{j=1}^{13} W_{.j} W_{ij}}$$

where the W 's and V in the formula are as define previously in discussion of the second stage of the analysis.

Using these formulas, the variance of \hat{P} is 0.159. The sampling error is then 0.398%.

Now, the 95% confidence bounds can be computed as the:

$$(\text{statewide mean}) \pm (1.96)(0.398).$$

Thus, the 95% confidence bounds on our mean estimate are:

$$71.29\% \pm (1.96)(0.398) \text{ or } p(70.51\% < \text{Statewide Use} < 72.07) = .95$$