2005 South Dakota

Statewide Seatbelt Survey

Final Report

Prepared for and funded by the

South Dakota Office of Highway Safety

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July 2005

2005 South Dakota Statewide Seatbelt Survey

Summary

A statewide observational survey of seatbelt use on South Dakota (SD) roads was conducted in June of 2005. Seatbelt use and other demographic data were recorded from 11,371 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 68.8% 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 69.4% obtained in 2004 and 69.9% obtained in the summer of 2003. The 2005 weighted statewide estimates for seatbelt use by road type were 62.4% for urban highways (compared to 67.4% for 2004), 61.8% for rural highways (compared to 62.7% in 2004), 69.6% for urban interstates (compared to 78.0% in 2004), and 82.4% for rural interstates (compared to 78.7%in 2004).

An unexpected but necessary change in the complete staff of Observers and subsequent changes in schedules and uneven training opportunities may have contributed to the change in estimated seatbelt rates observed between 2004 and 2005

Unweighted Estimates

Results showed that for direct or unweighted observations, 64% of all observed occupants were wearing a seatbelt or child restraint. This unweighted percentage was slightly lower than the 2004 unweighted rate of 65.1%. Based on unweighted seatbelt rates, the highest use rates were found in the counties of Union (76.3%) and Minnehaha (72.6%) followed by Pennington (69.7%), Lawrence (69.3%) and Davison (68.9%) counties. Intermediate rates were observed in the counties of Beadle (67.5%), Fall River (60.3%), Brown (58.3%), and Hughes (55.4%). Small rural counties tended to have the lowest rates: Grant (55.3%), Charles Mix (47.8%), Kingsbury (55.2%), and Tripp (50.5%). However two of these rural counties (Kingsbury and Tripp) experienced dramatic increases in seatbelt use relative to previous surveys.

The 2005 unweighted seatbelt use rates showed positive improvements for young riders. Of a small sample of 162 children who appeared to be under age 5, 77.1% were in a safety restraint. This rate was substantially higher than the 2004 rate of 72.3% for this age group. The 2005 restraint usage rate for 135 children judged to be 5 to 13 years old was 57.1%. This rate was similar to the 2004 rate of 56.2% for children 5 to 13. The rate for 572 teens judged to be between 14 and 17 years old

was 48.1%, representing an increase from the rate of 44.9% observed in the 2004 survey. The seatbelt use rate for occupants judged to be 18 years and older was 64.7%, slightly lower than the 2004 rate of 65.6%.

More right front seat passengers (66.4%) than drivers (62.8%) were wearing safety restraints. Seatbelt use also varied by vehicle type. Occupants of sport utility vehicles (68%) and cars (67.1%) were more likely to wear safety restraints than were occupants of vans and pickups (58.9%). Finally, it was found that a higher percentage of occupants of out-of-state vehicles (76.2%) wore safety restraints than did occupants of vehicles with South Dakota license plates (60.9%).

Introduction

Automobile crashes remain a leading cause of death and injury in the United States (Burayidi, 2003; CDC, 2004; Williams & Shabanova, 2003). There were approximately 6.3 million police-reported vehicle crashes in the United States in 2003. Approximately one-third of these crashes resulted in personal injury and in the year 2003 alone, motor vehicle crashes resulted in over 42,000 fatalities (FARS, 2003). Wearing a seatbelt 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). However, despite the fact that seatbelts are available in nearly all passenger vehicles, a national average of 20% of the U.S. population chooses not to use them (Williams & Wells, 2004)

State laws play a critical role in seat belt usage (NHTSA, 2004c). Primary seatbelt enforcement laws now exist in the District of Columbia (DC), 20 states and 3 U.S. territories (CDC, 2004) and by 1996 all but one state had some type of statewide legislation in place mandating safety restraint usage (Derrig, Segui-Gomez, Abtahi, & Liu, 2002). 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 addition to state enforcement laws, campaigns conducted to increase use also affect seatbelt usage rates (NHTSA, 2004c). The largest scale effort to date has been the Click it or Ticket campaign initiated in May 2003 (NHTSA, 2003). NHTSA has credited this campaign, in part, for the nationwide 4% increase in seatbelt usage (from 75% in 2002 to 79% in 2003) estimated in the most recent National Occupant Protection Use Survey (NOPUS) (NHTSA, 2003). The most recent nationwide usage rate of 79% is the highest recorded since NOPUS began. However, despite the continued upward trend in usage rates, a substantial portion of motorists remain unrestrained.

In particular, teenagers continue to have relatively low rates of seatbelt use (McCartt & Northrup, 2004). The usage rate among teens is well below the national average and when riding with their peers, teens are even less likely to use a seatbelt (Williams, McCartt, & Geary, 2003). This is particularly problematic because teens also tend to engage in a number of high risk driving behaviors (i.e., excessive speed, driving under the influence of alcohol). Taken together these risk factors place teenagers at greater risk of being fatally injured when a crash occurs (McCartt & Northrup, 2004).

Other groups at risk are those from lower socioeconomic status populations (Maupin et al., 2004) and travelers in rural areas (Zwerling et al., 2001). Nationwide, belt use is lower for motorists traveling in pickup trucks (Glassbrenner et al., 2004; NHTSA, 2004b). A recent focus group study (NHTSA, 2004b) reported that although seatbelt use for pickup truck occupants increased from 59% to 70% from 1998 to 2003, this rate was far below the increase from 71% to 81% shown for passenger cars. Male pickup drivers

reported that they found seatbelts as uncomfortable and a hassle. These factors contribute to the challenge of increasing seatbelt use rates in South Dakota which has many rural, lower SES populations and a relatively high percentage of pickup ownership.

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, the summers of 2002, 2003, 2004, and currently in the summer of 2005. 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 2005 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

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 to16 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 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 2005 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). This represents a change from previous survey years when Observers were primarily members of a retired senior citizens group with a background in driver education. The change was unexpected and occurred right before the survey period. Difficulties were encountered for recruiting, training, and scheduling of Observers, although all parties made a good effort for data collection.

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 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 Observers safety vests, clipboards, and additional coding sheets. Observers received training through a series of telephone calls with the HFL investigator Cindy Struckman-Johnson. Observers were instructed to read the manual and engage in a practice period using local traffic. After the practice period, Observers received a final call from the investigator to review procedures.

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 problems, they were instructed to call the HFL investigator for reassignment of that site. 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 – 2005 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 received University funding to review 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. Review of data revealed a significant number of Observer errors and the subsequent deletion of over 300 observations.

Results

A total of 11,365 observations from the 13 selected counties were included in the analyses for this 2005 survey. A small percentage of observations could not be included in individual analyses due to missing data. Of the 11,365 motorists, 7268 or 64% were wearing shoulder safety restraints or were placed in a child restraint, while 4097 or 34% were not wearing safety restraints. This unweighted seatbelt use rate was slightly lower than the unweighted rate of 65.1% observed in the 2004 survey but slightly higher than the unweighted rate of 63.2% observed in the 2003 survey.

Estimate of Statewide Seatbelt Use

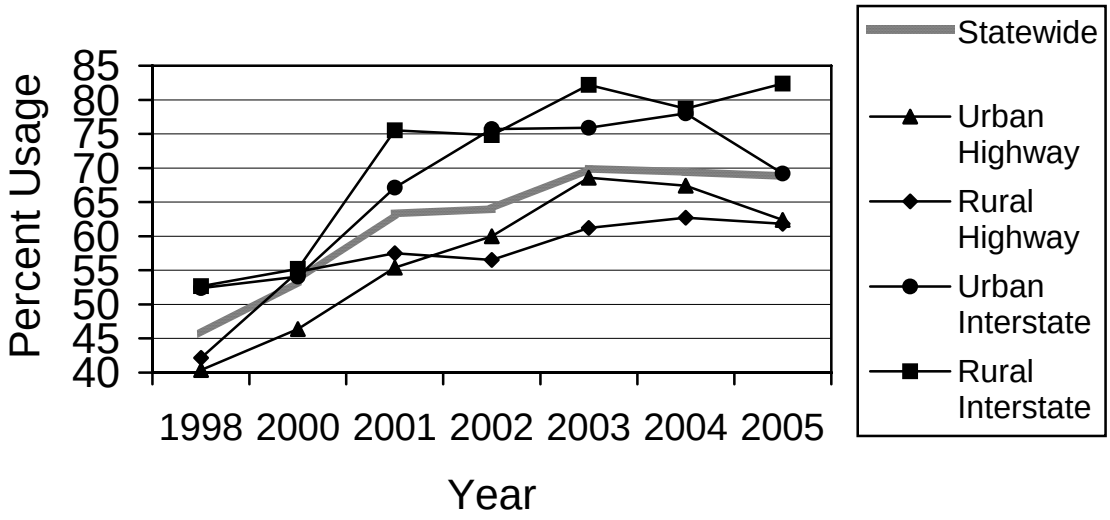
The statewide estimate of seatbelt use was obtained by finding the percentage of seatbelt use for each of the 205 sites, and then computing a weighted mean for each road type for each county. Then, a weighted average for each road type across counties was found where the weights were the VMT (vehicle 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 68.8% with a standard error of 0.419.*** Thus, it can be said that there is a 95% probability that the true rate of seatbelt use for South Dakota roads ranges between 67.95% and 69.59%. The formulas and weights for calculating the statewide estimate and standard deviation are in Appendix C.

The 2005 statewide estimate was approximately 0.6% lower than the 2004 rate. This difference is statistically significant, $t(60) = 8.03$, $p < .001$. The practical significance of this decline, however, may be minimal. By comparison, the statewide estimate increased a solid 6% points between 2002 and 2003 and declined .5% point from 2003 to 2004. The relatively steady rates for 2003, 2004, and 2005 may reflect a plateau in seatbelt use in South Dakota. This pattern is shown in Table 3 and Figure 1.

Table 3: Weighted Restraint Use by Year and Road Type

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

Figure 1: Restraint Use by Year and Roadtype



Estimate of Statewide Seatbelt Use by Road Type

The 2005 weighted statewide estimates for seatbelt use by road type were 62.4% for urban highways, 61.8% for rural highways, 69.6% for urban interstates, and 82.4% for rural interstates. Compared to 2004 rates (see Table 3), seatbelt use decreased on urban highways by 5.0%, decreased .9% on rural highways, decreased 8.4% on urban interstates, and increased 3.7% points on rural interstates. Given the confidence bounds on these rates of +/- less than 1%, the differences can be considered statistically significant.

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 National Occupant Protection Use Survey in 2002 (NHTSA, 2002) was 75%. The observed rate for Union County in South Dakota (76.3%) was slightly higher than the national average. Minnehaha County had a rate of 72.6% which approached the national average. All other South Dakota counties had rates slightly or substantially lower than the national average.

The highest 2005 usage rate for South Dakota was observed in Union County where 848 of the 1111 (76.3%) motorists observed were wearing safety restraints. This rate was lower than the rate of 78.5% observed in the 2004 Survey. The next highest usage rate was observed in Minnehaha County with 72.6% or 979 of the 1348 motorists wearing a

restraint. Again, this use rate represented a decrease from the 81.8% rate found in the 2004 survey. Pennington and Lawrence Counties had the next highest rates was observed. In Pennington County 69.7% or 945 of 1356 motorists were restrained as compared to a rate of 69.3% or 946 or 1366 in Lawrence County. The next highest rates were observed in Davison County with 68.9% (392 of 569) and Beadle County with 67.5% (368 of 545) motorists restrained.

Several South Dakota counties showed increased rates of seatbelt use relative to prior survey years. In particular, restraint use has risen substantially in both Grant and Beadle Counties over the last two years. Grant County had a 2005 usage rate of 55.3% or 590 out of 1066 motorists. The observed rate in the 2004 survey was 52.8%, up substantially from the 2003 rate of 45.0%. The restraint usage rate in Beadle County was 67.5% (368/545) this 2005 survey period relative to a rate of 62.6% in 2004 and 55.4% in 2003.

Tripp and Kingsbury Counties witnessed substantially increased rates compared to last year. In Tripp County, 50.5% (194 of 384) motorists were restrained in 2005, relative to a rate of 32.8% observed in 2004. Kingsbury's 2005 rate was 55.2 (232/420) relative to a 2004 rate of 42.6%.

One county showed a surprising large decrease in seatbelt use. This was Hughes County with a rate of 55.4% (709 of 1280) in the 2005 survey compared to a rate of 76.9% in the 2004 survey. Seatbelt use remained relatively stable or slightly lower from 2004 to 2005 in the remaining counties. Brown County had a rate of 58.3% (531 of 911); Fall River had a rate of 60.3% (249 of 413), and Charles Mix County had a rate of 47.8% (285 of 596).

Table 4: Restraint Use by County

County	Restraint Used		Total
	Yes	No	
Minnehaha	979 72.6%	369 27.4%	1348
Pennington	945 69.7%	411 30.3%	1356
Brown	531 58.3%	380 41.7%	911
Lawrence	946 69.3%	420 30.7%	1366
Davison	392 68.9%	177 31.1%	569
Beadle	368 67.5%	177 32.5%	545
Hughes	709 55.4%	571 44.6%	1280
Union	848 76.3%	263 23.7%	1111
Charles Mix	285 47.8%	311 52.2%	596
Grant	590 55.3%	476 44.7%	1066
Fall River	249 60.3%	164 39.7%	413
Tripp	194 50.5%	190 49.5%	384
Kingsbury	232 55.2%	188 44.8%	420
Total	7268	4097	11365
% of Total	64.0%	36.0%	

In summary, 3 out of 13 counties showed an increase in seatbelt use rates from the 2004 to the 2005 survey periods. These counties, Beadle, Tripp and Kingsbury, showing a substantial increase were primarily rural counties that tended to have seatbelt use well below the national average in prior survey years. This steadily rising rate in rural counties is promising.

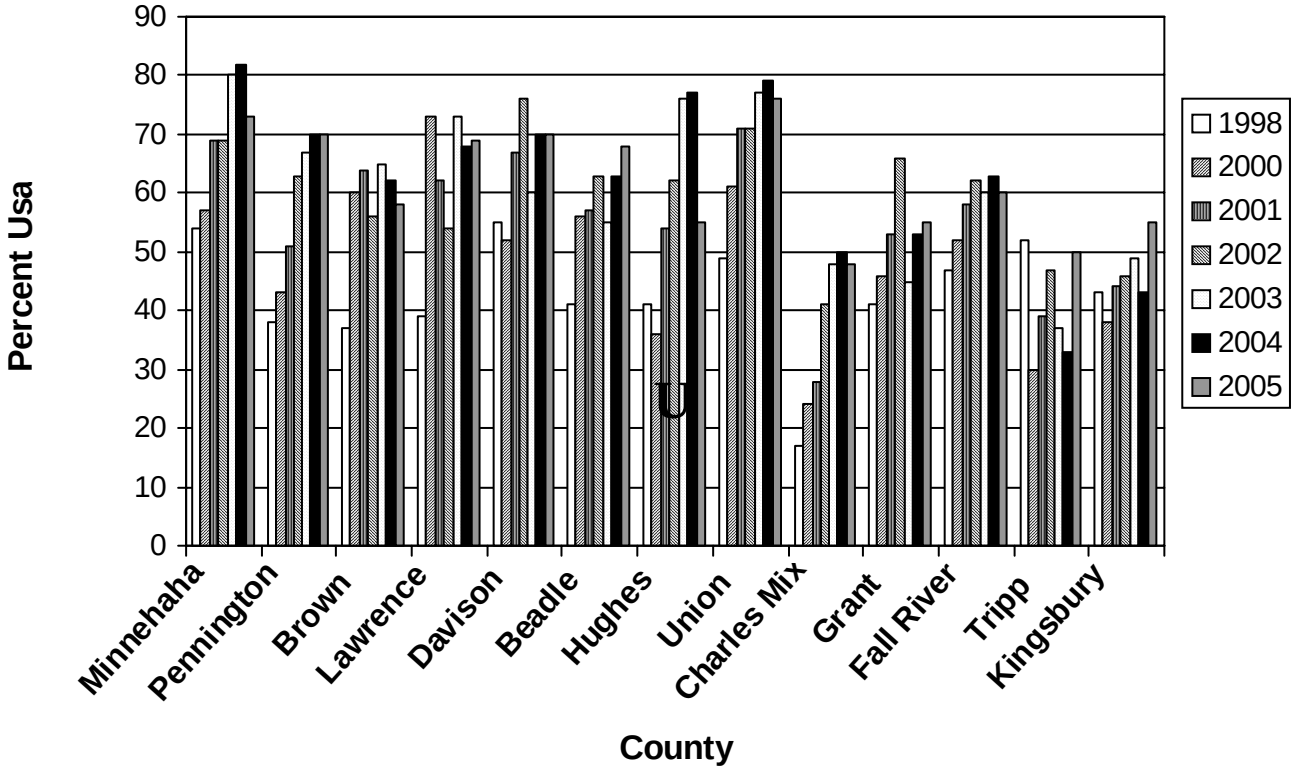
A summary of seatbelt use rates in the 13 South Dakota counties over the past seven survey periods can be seen in Table 5 and Figure 2. The data show overall upward trends of increasing seatbelt use in many of the counties. Until 2005, consistently improving seatbelt use over the past seven years is demonstrated in Pennington Counties and in

Minnehaha Country. These two counties represent the two largest population centers of the state including Rapid City and Sioux Falls respectively. Until 2005, overall progress is also evident in Hughes, Union, Charles Mix and Fall River Counties. Fluctuating rates in other counties (e.g., Grant and Davison) nonetheless tend to show overall progress.

Table 5: Unweighted Percent Restraint Use by County by Year

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

Figure 2: Restraint Use by County by Year



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 years (2000, 2001, 2002, 2003, 2004 and the 2005 surveys), 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 age 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

	Restraint Use			
Age	Belt	Child Restraint	None	Total
0 - 4 years	47 29.0%	78 48.1%	37 22.8%	162
5 -13 years	73 54.1%	4 3.0%	58 43.0%	135
14 - 17 years	275 48.1%		297 51.9%	572
18 & over	6791 64.7%		3705 35.3%	10,496
Total	7186 63.2%	82 .7%	4097 36.0%	11,365

The total number of children between 0-4 years of age observed in the 2005 survey was 162. Note this number represents a substantial increase from the 65 total passengers of this age range in 2004. In the 2005 survey 77.1% of children between 0-4 years of age were observed in some type of safety restraint: 48.1% (78 of 162) were buckled in a child safety restraint and 29.0% were wearing a shoulder restraint, but not seated in a child safety seat. Restraint use for this age group represents a steadily increasing rate relative to previous surveys. In the 2004 survey 72.3% of this age group were in some type of restraint with only 38.5% in a child safety seat. The overall restraint use was 70.4% in 2003 and 67.1% in 2002.

A total of 135 children between 5 to 13 years of age were observed. Of these, 73 or 54.1% were wearing a seatbelt and an additional 4 (3.0%) were in a child safety seat for a total of 57.1% rate of safety restraint usage. This rate is comparable to the 56.2% rate observed in 2004.

A total of 572 motorists were estimated to be the teen-age category of 14 to17 years. Of these, 275, or 48.1% were wearing a safety restraint. This rate represents a steady increase from previous years with a rate of 44.9% observed in 2004 and 41.1% observed in the 2003 survey.

As in previous years, the majority of observed motorists (a total of 10,496) were estimated to be in the age group of 18 years and older. Of these, 7186 (64.7%) were wearing a restraint. The adult rate was slightly higher in the 2004 survey (65.5%) but generally represents 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 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 8159 drivers observed, 5123 or 62.8% were wearing a safety restraint. This rate represents a modest decrease relative to the rate of 64.3% in the 2004 Survey. Of the 3,061 right front seat passengers observed, 2023 or 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, 80.3% (106/132) of the 0-4 year age children seated in the back seat were in fact observed in some type of safety restraint. However, the rate of children age 0-4 placed in a back seat child restraint is still low at 50.8% or 67 of 132.

Data from 13 additional child front seat passengers were recorded. Of these 13, 7 or 53.8% were wearing some type of safety restraint, with 6 (46.2%) observed to be in a child safety seat and the remaining 6 (46.2%) were not using any type of restraint. This overall restraint rate of 53.8% is down slightly from the rate of 60% and 62.5% observed in the2004 and 2003 surveys, respectively. However, due to the low number of observations for children under 5 years observed in the additional front seat and back seat positions, particularly in previous years, the comparisons of seatbelt use rates between years may not be reliable.

Table 8: Unweighted Restraint Use for Drivers versus Passengers.

Occupant Type	Restraint Use			Total
	Yes	Child Restraint	None	
Drivers	5123 62.8%		3036 37.2%	8159
Right–Front Passengers	2023 66.1%	9 .3%	1029 33.6%	3061
Additional Child Front Passenger	1 7.7%	6 46.2%	6 46.2%	13
Child Passenger Back Seat	39 29.5%	67 50.8%	26 19.7%	132
Total	7186 63.2%	82 .7%	4097 36.0%	11365

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 categories of cars (67.1%) and Sport Utility Vehicles (68%) than the rate observed for vans/pickups (58.9%). This pattern of rates is consistent with the rates observed in prior surveys dating back to 1998.

Table 9: Unweighted Restraint Use by Vehicle Type

Vehicle Type	Restraint Use			Total
	Yes	Child Restraint	None	
Cars	3236 66.5%	30 .6%	1598 32.9%	4864
Vans/Pickups	2674 58.2%	34 .7%	1887 41.1%	4595
SUVs	1276 67.1%	18 .9%	608 32.0%	1902
Total	7186 63.3%	82 .7%	4093 36.0%	11,361

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 (79.9% or 9,030 out of 11,296). As illustrated in Table 10, vehicles with out-of-state license plates tended to have higher rates of seatbelt restraint use (76.2% for seatbelts and child safety restraints combined) than did motorists traveling in vehicles with in-state license plates (60.9%).

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

License Plates	Restraint Use			Total
	Yes	Child Restraint	None	
In-State	5438 60.2%	65 .7%	3527 39.1%	9,030
Out-of-State	1710 75.5%	16 .7%	540 23.8%	2,266
Total	7148 63.3%	81 .7%	4067 36.0%	11,296

Discussion

Results of the current survey established that the weighted, statewide estimate of restraint use for South Dakota in year 2005 was 68.8%. This weighted, statewide estimate was statistically lower than the 2004 rate of 69.4%. However, the practical significance of this slight drop is limited in comparison to the robust 6% increase in the statewide estimate from 2002 to 2003. Over the past seven years, statewide estimates of seatbelt use in South Dakota have steadily risen from a rate as low as 46% to one approaching 70%. The 2005 statewide estimate of 68.8% may represent a plateau in seatbelt use in South Dakota. It may be that until there are more robust seatbelt use laws in the state, a rate approaching 70% may be where South Dakota remains. It is also possible that the change of Observer staff in 2005 and the resulting loss of consistency in observations in some way contributed to the generally lower rates found in 2005.

South Dakota seatbelt rates have demonstrated a positive upward trend over five of the past seven years. Until the last 2 years, South Dakota's overall trend of improvement in seatbelt use mirrors a general nationwide trend. 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, to 79% in 2003 according to NHTSA records. South Dakota's seat belt usage rate is comparable to other states in the region. The 2003 safety belt usage rate observed in a Kansas survey was 64% for all motorists and 79% for children 0-4 years of age (Kansas-DOT, 2004).

The 2005 survey included a significantly larger number of children aged 0-4 years of age relative to previous years. A bright point in the 2005 survey results is that safety restraint usage among this age group continues to increase. Of the 162 children under the age of 5, 77.1% were wearing some type of safety restraint, with 48.1% observed to be in a child safety seat. These figures compare to the 2004 overall restraint use rate of restraint use 72.3% and 2003 rate of 70.4% for the same age group.

Similar to previous surveys, the 2005 survey results indicate that older children (aged 5 to 13) were less likely to be protected than younger children. The 2005 rate of seatbelt use for children in this age group was 57%, which was similar to the rate of 56% observed in the 2004 survey.

An encouraging observation of the 2005 survey is that relative to previous years, seatbelt use among teenagers age 14 to 17 in South Dakota is steadily rising. Restraint use among teens was 48.1% in the 2005 survey. While this rate is still lower than the adult rate it represents a positive upward trend in comparison to the rate of 45% observed for this age group in 2004 and a rate of only 41% in 2003. Motor vehicle related fatalities are a leading cause of death for this age group and yet nationwide, seatbelt use among teenagers is disturbingly low (McCartt & Northrup, 2004; NHTSA, 2004a; Williams et al., 2003). In light of this, the steady increase in seatbelt use among teens in South Dakota represents a positive trend in community safety (O'Malley & Wagenaar, 2004).

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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 – 2005 South Dakota Seatbelt Survey

Observer Manual

2005 South Dakota Seatbelt Survey

INSTRUCTIONS FOR USING THE SOUTH DAKOTA SEATBELT SURVEY FORM

South Dakota Statewide Seatbelt Survey

June, 2005

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 <u>one</u> 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, 2005 would be recorded as "060905".

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!

South Dakota Seatbelt Survey Form

Vehicle Type
Car = 1
Pickup/Van = 2
Sport Utility = 3

Driver / Passenger/Extra
Driver = 1
Right Front Passenger = 2
Extra Child Front = 3
Child Rear = 4

Seatbelt Use
Used = 1
Not Used = 2
Child Restraint Used = 3

Age
Infant to 4 = 1
5 to 13 = 2
14 to 17 = 3
18 or over = 4
Unknown = 5

License State
South Dakota = 1
Other State = 2
Unknown = 3

County
Minnehaha = 01
Pennington = 02
Brown = 03
Lawrence = 04
Davison = 05
Beadle = 06
Hughes = 07
Union = 08
Charles Mix = 09
Grant = 10
Fall River = 11
Tripp = 12
Kingsbury = 13

Site Number
Check County Site List

Time
7:30 – 9:00 am = 1
9:00 – 10:30 am = 2
10:30 – noon = 3
noon – 1:30 pm = 4
1:30 – 3:00 pm = 5
3:00 – 4:30 pm = 6

Road Type
Urban Highway = 1
Rural Highway = 2
Urban Interstate = 3
RuralInterstate = 4
(Check County Site List)

Vehicle ID Number			Veh Type	Drive Pass or Extra	Seat Belt Use	Age	Lic State	County		Site Number		Time	Month		Day		Year		Observer		Road Type
0	0	1	1	1	1	4	1	0	3	0	3	2	0	6	0	9	0	5	D	S	1
0	0	2	3	1	1	4	1														
0	0	2	3	2	3	1	1														
0	0	3	2	1	2	4	2														
0	0	3	2	2	1	5	2														
0	0	3	2	3	2	1	2														
0	0	4	1	1	1	4	1														
0	0	4	1	4	3	1	1														
0	0	4	1	4	2	1	1														
0	0	5	1	1	1	3	1														
0	0	5	1	4	1	1	1														

Check One
- [x] Every vehicle observed
- [ ] Every other vehicle observed

Total vehicles observed in 40 minutes 5

Describe your observing location at this site:
Intersection of 281 & 12 -
Stood on the North corner by
Watched traffic
Stopsign - turning onto 281

Place holder for manual

Appendix C

Computatation 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:	$w_1 = 0.18324$	$\hat{P}_1 = 62.35$
Rural Highway:	$w_2 = 0.44819$	$\hat{P}_2 = 61.79$
Urban interstate:	$w_3 = 0.05521$	$\hat{P}_3 = 69.62$
Rural interstate:	$w_4 = 0.31336$	$\hat{P}_4 = 82.36$

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 0.175. The sampling error is then 0.419%.

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

(statewide mean) +/- (1.96)(0.419).

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

68.77% +/- (1.96)(0.419) or p**(67.95% < Statewide Use < 69.59%) = .95**