

2010 State of Colorado CHILD SAFETY RESTRAINT SYSTEM AND JUVENILE SEAT BELT SURVEY

**Colorado Department of
Transportation**

**SEAT BELT
STUDY**



**Colorado
State
University**

INSTITUTE OF TRANSPORTATION MANAGEMENT

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PREFACE

The purpose of this project was to conduct a comprehensive survey of child safety restraint systems and juvenile seat belt usage for the State of Colorado in 2010. Specifically, the objective of the study was to obtain an estimate of car seat usage for children (newborn - 4 years), seat belt usage for juveniles (5 - 15 years), and seat belt usage for drivers. Observations for child car seat and juvenile seat belt usage were conducted over a two-week period from June 20 through July 3, 2010 immediately following the 2010 Statewide Survey.

The study was conducted by the Institute of Transportation Management, College of Business, Colorado State University, under the sponsorship of the Colorado Department of Transportation (CDOT), Office of Transportation Safety. Observational data were collected and analyzed by the Institute of Transportation Management and the Franklin A. Graybill Statistical Laboratory of the College of Natural Sciences. It is hoped that the results of this study will assist the Office of Transportation Safety in making future transportation safety program decisions.

EXECUTIVE SUMMARY

The Institute of Transportation Management (ITM) at Colorado State University conducted a comprehensive study of child safety restraint systems (child car seats) and juvenile seat belt usage from June 20 through July 3, 2010. The survey was designed to observe and collect data on car seat and seat belt usage for children (newborn - 4 years), juveniles (5 - 15 years), and drivers. Vehicles included in the survey were passenger cars, pickup trucks, vans, and SUVs. Commercial vehicles were not included in the study. Trained observers monitored 50 sites in 20 counties across the State.

Observers and supervisors received training emphasizing the need for consistency and accuracy in data collection and the survey process. Dr. Mike Gould and Brenda Ogden were responsible for conducting the one-day training program. The observers were provided information on how to properly collect and report the data. In addition, each observer was supplied with data collection sheets, maps, site locations, and the supervisor's telephone numbers to facilitate completion of the seat belt usage survey.

As in previous seat belt usage surveys conducted by the Institute of Transportation Management, retired Colorado State Highway Patrol Officers were used as observers whenever possible. The troopers' familiarity with interstate and state highways, as well as local and county roads, and safety procedures helps to minimize potential location issues and safety problems. The patrol officers have proven to be very conscientious and reliable and have helped strengthen the validity of the results.

The Franklin A. Graybill Statistical Laboratory of the College of Natural Sciences also played a significant role in this study. Besides contributing to the reliability and validity of usage estimates with statistical analyses, the Statistical Laboratory also gives the analyses independence from the survey process.

By using these two groups of independent contractors, the Institute has taken measures to ensure the integrity of the survey and analyses while involving individuals in the study who have the most relevant skills. Overall, the project objectives were accomplished within the time horizon and budget agreed to by CDOT and ITM.

Although there was a slight decline in the combined front and rear seat usage rate for the child safety restraint system in 2010 (85.0 – down from 87.15 in 2009), the same measurement for juveniles shows an improvement moving from 73.7 to 75.5. A detailed analysis of the results is presented within the “Summary of Findings” of this report.

The Institute of Transportation Management is pleased to have participated in the 2010 Colorado seat belt usage surveys. The design of this study is representative of the population movements and trends within the State of Colorado and thus provides a useful projection of actual child safety restraint system and juvenile seat belt usage. The data and the analyses submitted to CDOT/OTS are, to the best of my knowledge, accurate and complete.

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SUMMARY OF FINDINGS

Survey

This study was conducted using observational sites selected previously by the CDOT Office of Transportation Safety and modified by the Institute of Transportation Management, Colorado State University, to reflect population growth and shifts within the State. During the study, a total of 7,058 vehicles were observed. The tables contained in this report detail the results of observations made at the 50 observational sites across 20 counties. Each of the 50 sites was observed twice (one time during each week). A summary of key findings is provided below.

Estimates of Child Restraint and Juvenile Seat Belt Usage Statistics

Children (newborn - 4 years)

- In 2010, the children's (newborn - 4 years) combined front seat and rear seat restraint usage for all vehicles was 85.0. While this decline from 87.15 in 2009 is of concern, even more disconcerting is the combined front seat and rear seat restraint usage for children (newborn - 4 years) in cars of only 76.4.
- The decline of usage in cars from 81.3 to 76.4 is the primary reason for the lowest overall usage rate.
- The combined front and rear seat restraint usage for SUVs was 91.6, down from the 93.2 usage rate of 2009.
- The combined front and rear seat restraint usage for vans remained essentially the same at 95.4 for 2010 compared to 95.9 in 2009.

Juveniles (5 - 15 years)

- In 2010, the juveniles' (5 - 15 years) combined front seat and rear seat belt usage was 75.5 – an improvement over the 2009 usage rate of 73.7.
- The combined front seat and rear seat belt usage for juveniles (5 - 15 years) in cars improved from 67.2 in 2009 to 69.9.
- Pickup trucks still have the lowest usage rate at 70.9 for juveniles; however, this is a statistically significant improvement over last year's 60.1.

See Table 1 for Comparative Analyses: 2009 and 2010 Estimates of Child Restraint and Juvenile Seat Belt Usage Statistics

TABLE 1: 2009 and 2010 Estimates of Combined Front and Rear Child Restraint and Juvenile Seat Belt Usage

Child Estimate	No. Obs	2009 Estimate	Std Err	Child Estimate	No. Obs	2010 Estimate	Std Err
Car	1202	81.3		Car	956	76.4	
Truck	30	68.5		Truck	44	70.9	
Ex-cab	135	78.3		Ex-cab	66	89.2	
Van	495	95.9		Van	385	95.4	
SUV	736	93.2		SUV	693	91.6	
Total	2598	87.15	.0074	Total	2144	85.0	0.0077
Juvenile Estimate	No. Obs	2009 Estimate	Std Err	Juvenile Estimate	No. Obs	2010 Estimate	Std Err
Car	1958	67.2		Car	1615	69.9	
Truck	169	60.1		Truck	225	70.9	
Ex-cab	445	72.1		Ex-cab	270	66.3	
Van	940	83.2		Van	810	85.0	
SUV	1480	78.3		SUV	1556	78.7	
Total	4992	73.70	.0065	Total	4476	75.5	0.0064

2009

Restraint Usage	95% Confidence Intervals		
		Lower	Upper
87.15 Child		85.7	88.6
73.70 Juvenile		72.4	75.0

2010

Restraint Usage	95% Confidence Intervals		
		Lower	Upper
85.0 Child		83.5	86.5
75.5 Juvenile		74.3	76.8

Usage Rates by Vehicle Speed (Table 2)

Children (newborn - 4 years)

- When considering the speed, the usage rate for the child safety restraint system was 84.2 for speeds of 0-30 mph and 82.1 for speeds 31-50 mph. These results are contrary to most findings in previous studies as all seat belt usage rates generally go up at higher speeds.

Juveniles (5 - 15 years)

- When considering the speed variable of vehicles for juvenile seat belt usage, the usage rate was 77.6 for speeds of 0-30 mph and 74.0 for speeds 31-50 mph. Just as with the children’s results, the lower seat belt usage at higher speeds is somewhat of an anomaly although it is consistent with the 2009 data.

TABLE 2: 2010 Combined Front and Rear Usage Rates by Vehicle Speed

**TABLE 2a: 2010 Child Restraint Usage by Vehicle Speed
Child (0 - 4)**

Speed	
0 – 30 MPH	31 – 50 MPH
Estimated Seat Belt Use: 84.2	Estimated Seat Belt Use: 82.1
Std Error: 4.7	Std Error: 4.2

**TABLE 2b: 2010 Juvenile Seat Belt Usage by Vehicle Speed
Juvenile (5 - 15)**

Speed	
0 – 30 MPH	31 – 50 MPH
Estimated Seat Belt Use: 77.6	Estimated Seat Belt Use: 74.0
Std Error: 3.2	Std Error: 1.3

TABLE 3: 2009 Combined Front and Rear Usage Rates by Vehicle Speed

**TABLE 3a: 2009 Child Restraint Usage by Vehicle Speed
Child (0 - 4)**

Speed	
0 – 30 MPH	31 – 50 MPH
Estimated Seat Belt Use: 84.6	Estimated Seat Belt Use: 85.6
Std Error: 2.3	Std Error: 1.6

**TABLE 3b: 2009 Juvenile Seat Belt Usage by Vehicle Speed
Juvenile (5 - 15)**

Speed	
0 – 30 MPH	31 – 50 MPH
Estimated Seat Belt Use: 73.1	Estimated Seat Belt Use: 71.8
Std Error: 1.8	Std Error: 1.4

Driver Seat Belt Usage Statistics (Table 4)

- Weekday drivers used seat belts at a slightly higher rate than weekend drivers (84.3 vs. 82.1).
- Of the 7,058 total vehicle observations, drivers of vans had the highest seat belt usage rate of 93.8. Extended cab pickups were the lowest at 71.5 with standard pickups almost 2 points higher at 73.4.

TABLE 4: 2010 Driver Seat Belt Usage Statistics

TABLE 4a: Driver Seat Belt Usage by Weekday and Weekend

	Seat Belt Usage	Std Error	Lower Confidence Limit	Upper Confidence Limit
Weekday	84.3	1.3	81.7	86.9
Weekend	82.1	1.3	79.6	84.7

TABLE 4b: Driver Seat Belt Usage by Vehicle Type

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	80.7	1.4	77.9	83.4
Truck	73.4	2.4	68.5	78.2
Ex-cab	71.5	2.4	66.6	76.3
Van	93.8	1.2	91.4	96.2
SUV	86.7	1.4	83.9	89.6

TABLE 5: 2009 Driver Seat Belt Usage Statistics

TABLE 5a: Driver Seat Belt Usage by Weekday and Weekend

	Seat Belt Usage	Std Error	Lower Confidence Limit	Upper Confidence Limit
Weekday	80.2	1.2	77.9	82.5
Weekend	81.3	2.0	77.4	85.3

TABLE 4b: Driver Seat Belt Usage by Vehicle Type

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	76.5	1.2	74.2	78.9
Truck	72.0	3.9	64.2	79.9
Ex-cab	75.9	2.1	71.7	80.1
Van	90.8	1.2	88.4	93.1
SUV	86.7	0.9	84.8	88.6

Child Restraint Usage by Vehicle Type (Table 6)

- The unusually low restraint usage for children (newborn - 4 years) in the front seat in all vehicle types is tempered by the fact that there are very few who are actually in the front seat. Of the 2,144 total observations, only 188 were in the front seat. The high standard error for front seat restraint usage is evidence of the smaller numbers of children being placed in front seats.
- The rear seat restraint usage for children continued to be quite good with vans the highest at 97.4 and cars the lowest at 79.6. The usage rates in ex-cabs and vans were higher this year with SUVs essentially the same as last year. The usage rate in cars was the only appreciable decline.

TABLE 6: 2010 Child Restraint Usage by Vehicle Type

TABLE 6a: Front Seat Child Restraint Usage by Vehicle Type

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	21.4	5.9	9.33	33.4
Truck	54.5	7.5	39.3	69.8
Ex-cab	75.9	10.9	53.1	98.6
Van	35.7	16.3	0	72.0
SUV	50.0	10.0	29.8	70.2

TABLE 6b: Rear Seat Child Restraint Usage by Vehicle Type

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	79.6	4.6	70.6	88.7
Truck	No rear seat			
Ex-cab	92.2	4.5	83.0	99.9
Van	97.4	1.0	95.4	99.4
SUV	94.1	1.6	90.9	97.3

TABLE 7: 2009 Child Restraint Usage by Vehicle Type

TABLE 7a: Front Seat Child Restraint Usage by Vehicle Type

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	36.3	6.7	22.7	49.8
Truck	69.2	10.6	47.8	90.7
Ex-cab	44.2	8.5	26.7	61.6
Van	60.0	10.2	38.4	81.6
SUV	62.1	5.9	50.2	74.1

TABLE 7b: Rear Seat Child Restraint Usage by Vehicle Type

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	83.2	1.7	79.7	86.6
Truck	No Rear Seat			
Ex-cab	90.0	3.3	83.4	96.6
Van	96.3	1.3	93.7	98.8
SUV	94.8	1.2	92.4	97.2

Juvenile Seat Belt Usage by Vehicle Type

- The seat belt usage for juveniles (5 - 15 years) in the front seat of cars was 76.5, and the rear seat belt usage was 62.7. Although relatively low, the front seat usage rate is considerably higher than last year's rate of 72.7.
- Juvenile occupants of vans displayed the highest rate of seat belt usage with 87.7 for front seat passengers and 83.9 for rear seat passengers. Van drivers also have the highest seat belt usage rate among vehicle types (Table 4).
- Juveniles appear to use seat belts with greater frequency when seated in the front seat. Perhaps this is due to the proximity to parents or other adult drivers who obviously influence the decision to wear seat belts.

TABLE 8: 2010 Juvenile Seat Belt Usage by Vehicle Type**TABLE 8a: Front Seat Juvenile Seat Belt Usage by Vehicle Type**

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	76.5	1.8	73.0	80.0
Truck	71.3	3.4	64.5	78.1
Ex-cab	69.1	3.6	61.8	76.3
Van	87.7	2.3	83.1	92.2
SUV	86.6	1.3	84.1	89.1

TABLE 8b: Rear Seat Juvenile Seat Belt Usage by Vehicle Type

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	62.7	3.1	56.6	68.9
Truck	No Rear Seat			
Ex-cab	65.1	5.3	54.3	75.8
Van	83.9	2.8	78.3	89.5
SUV	72.6	2.6	67.3	77.8

TABLE 9: 2009 Juvenile Seat Belt Usage by Vehicle Type**TABLE 9a: Front Seat Juvenile Seat Belt Usage by Vehicle Type**

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	72.7	1.6	69.6	75.8
Truck	61.5	4.3	52.9	70.2
Ex-cab	72.9	2.8	67.4	78.4
Van	88.3	1.3	85.7	91.0
SUV	79.2	1.6	76.1	82.4

TABLE 9b: Rear Seat Juvenile Seat Belt Usage by Vehicle Type

Vehicle Type	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Car	63.7	2.5	58.8	68.7
Truck	No Rear Seat			
Ex-cab	70.1	4.7	60.8	79.5
Van	81.5	5.5	70.5	92.4
SUV	79.6	2.6	74.3	84.8

Colorado County Results for Drivers

- Drivers in Boulder (92.5), El Paso (92.2), Douglas (90.9), and Summit (90.2) Counties all exceeded the 90% seat belt usage level with Jefferson (89.7) and Larimer (89.2) being close to the 90% threshold (Table 10a).
- Moffat and Yuma counties were the lowest at 68.7 and 67.6, respectively, for driver seat belt usage with Mesa being third lowest at 72.2 (Table 10a).

Table 10. 2010 Colorado County Results (95% Confidence Intervals)

Table 10a. 2010 Drivers Wearing Seat Belts

Counties	Seat Belt Estimate	Std Error	Lower Confidence Level	Upper Confidence Level
Adams	77.1	4.4	68.1	86.1
Arapahoe	85.8	2.0	81.7	89.8
Boulder	92.5	1.6	89.2	95.8
Denver	86.4	1.4	83.7	89.2
Douglas	90.9	2.0	86.8	95.0
El Paso	92.2	1.0	90.2	94.3
Fremont	88.4	1.9	84.1	92.6
Jefferson	89.7	1.4	87.0	92.5
Kit Carson	79.6	7.3	63.4	95.8
La Plata	88.6	1.9	84.3	92.9
Larimer	89.2	2.4	84.2	94.2
Las Animas	77.9	3.8	69.2	86.5
Mesa	72.2	1.7	68.7	75.8
Moffat	68.7	4.9	57.6	79.9
Montrose	75.6	1.5	72.2	78.9
Pueblo	77.3	4.0	68.9	85.7
Rio Grande	77.3	4.7	66.3	88.2
Summit	90.2	3.0	83.2	97.3
Weld	84.6	1.1	82.2	87.0
Yuma	67.6	5.6	55.4	79.8

Table 10b. 2010 Front Seat and Rear Seat Combined (Child 0-4)

Counties	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Adams	76.3	10.9*	54.9	97.7
Arapahoe	57.9	8.1*	42.0	73.8
Boulder	98.2	1.1	96.0	99.9
Denver	85.1	3.3	78.6	91.6
Douglas	77.1	7.9*	61.6	92.6
El Paso	86.9	3.7	79.6	94.2
Fremont	94.4	5.8*	83.0	99.9
Jefferson	95.0	1.1	92.8	97.2
Kit Carson	100	0.0*	100	100
La Plata	90.8	2.6	85.7	95.9
Larimer	99.6	0.3	99.0	99.9
Las Animas	70.6	14.7*	41.8	99.4
Mesa	96.8	1.9	93.1	99.0
Moffat	88.1	7.4*	73.6	99.9
Montrose	100	0.0	100	100
Pueblo	67.4	15.3*	37.4	97.4
Rio Grande	88.1	7.1*	74.2	99.9
Summit	98.9	1.2	96.5	99.9
Weld	98.7	1.0	96.7	99.9
Yuma	80.3	6.0*	68.5	92.1

*Caution should be used when interpreting this data since the survey was designed to determine a state estimate and not county estimates of child seatbelt usage by county. Given the research design, the number of observational sites within certain counties was not sufficient to allow for a true statistical representation of usage within counties.

Of the 20 counties included in the study, ten counties were above 90% usage for child restraint systems with Kit Carson and Montrose being 100%. Arapahoe County with a low usage rate of 57.9 is clearly an outlier with Pueblo, the next lowest at 67.4.

Table 10c. 2010 Front Seat and Rear Seat Combined (Juvenile 5-15)

Counties	Seat Belt Estimate	Std Error	Lower Confidence Limit	Upper Confidence Limit
Adams	59.7	7.1	45.1	74.3
Arapahoe	70.9	3.0	64.9	76.9
Boulder	83.1	2.2	78.6	87.7
Denver	69.8	3.6	62.5	77.1
Douglas	81.6	2.4	76.5	86.7
El Paso	85.2	1.6	82.0	88.3
Fremont	82.7	2.5	77.1	88.4
Jefferson	85.6	2.7	80.2	91.1
Kit Carson	74.4	7.4	57.4	91.4
La Plata	84.0	2.4	78.7	89.4
Larimer	92.0	1.7	88.5	95.5
Las Animas	78.3	7.2	61.6	95.0
Mesa	69.2	2.2	64.6	73.9
Moffat	69.3	5.5	56.7	81.8
Montrose	69.4	4.5	59.3	79.5
Pueblo	63.8	6.3	50.6	77.1
Rio Grande	82.7	2.7	76.6	88.8
Summit	82.9	4.5	72.2	93.6
Weld	80.9	2.5	75.5	86.2
Yuma	50.5	11.5	24.8	76.2

Juvenile seat belt usage rates are the lowest of all age-related studies. Larimer County at 92 is the highest usage rate followed by Jefferson at 85.6 and El Paso at 85.2. Adams and Yuma Counties are the lowest at 59.7 and 50.5, respectively.

Again, it should be emphasized that this study is designed to determine a statewide usage rate and the county rates are considered incidental to the overall results as observational sites are not selected according to county information.

CONCLUSIONS

The 2010 child/juvenile study resulted in slightly lower usage rates overall for children and a higher usage rate for juveniles. However, the rear seat restraint system usage is higher or relatively the same for children this year for all vehicle types, except for cars. An important finding in the study is that the absolute number of children in the front seats of vehicles is continuing to decline. Small numbers contribute to an extremely high standard error, but there were only 188 children in front seats of the total 2,144 observations.

Similarly, low numbers of observations in some counties resulted in high standard errors in those counties. In these cases, if the standard error on any statistic (estimate of seat belt or child restraint usage) is greater than 5.0, the number of observations is probably too small to make an accurate usage estimate. There are some situations in this year's survey where this is a concern. For example, as mentioned above, children (newborn - 4 years) in the front seat of vehicles, as shown in Table 6a, the standard errors are so large that the estimate of seat belt usage is somewhat suspect.

Generally, the county data for drivers observed in the study is fairly consistent with the more urban counties having higher usage rates than rural counties. In a few instances, these correlations for drivers in the combined front and rear seat usage of child safety restraint systems were not as strong because some of the rural counties had very high usage rates (Examples: LaPlata - 88.6; Weld - 84.6).

For juveniles, small improvements can be seen in most parameters for the combined front and rear seat usage rates. It is important to note that the usage rates for every vehicle type except excabs showed improvements in 2010. The overall increase in combined front and rear seat usage rates was significant, moving from 73.7 to 75.5.

The results for juveniles (5 -15 years), however, are not as good or consistent as those for children (newborn - 4 years) or teens and lag well behind the overall statewide usage rates. While parents are acting responsibly by securing young children in car seats, they apparently are not taking similar precautions to ensure the safety of juveniles. While law enforcement can be expected to help improve seat belt usage rates, there is clearly a need to continue educational efforts focusing upon the safety of the juvenile occupants of vehicles.

Although the rates are still generally low for juveniles at 75.5, there were overall improvements. Educational efforts targeting juveniles will likely continue to have positive results, but more improvements will require long-term programs. As young people need to hear the same or similar message many times before internalizing them and changing behaviors, public service announcements and educational messages must continue making use of a multi-media approach.

While it has been posited that the statewide seat belt usage rate of 82.9 may be approaching a “ceiling” for a secondary law state, such is not the case for the juvenile usage rate. Maintaining the upward trend in usage rates for juveniles appears to be dependent upon the success of educating children, juveniles, and parents. In this regard, the efforts of the Office of Transportation Safety have contributed to the strong upward trend and will likely prove critical to future improvements.