

# Statewide Use of Occupant Restraints

AN OBSERVATIONAL SURVEY OF SAFETY RESTRAINT USE IN GEORGIA

2009

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Report Prepared for the

**GOVERNOR'S OFFICE OF HIGHWAY SAFETY**

by

*James J. Bason, Ph.D.*

**SURVEY RESEARCH CENTER  
OFFICE OF RESEARCH SERVICES  
University of Georgia**

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## ACKNOWLEDGEMENT OF ASSISTANCE

The Survey Research Center, University of Georgia, on behalf of the Governor's Office of Highway Safety and the University of Georgia Department of Health Promotion and Behavior, conducted an observational survey of safety belt use during June 2009, and an observational survey of child safety seat use during September 2009. The findings from this study are presented in this volume.\*

All manuscripts utilizing data made available through the University of Georgia Survey Research Center should acknowledge that fact as well as identify the original collector of the data. Neither the Survey Research Center nor the University of Georgia bears any responsibility for the analyses or interpretations derived from those secondary data.

Many people were instrumental in assisting with the planning and implementation of this project: Mr. Bob Dallas, Director of the Governor's Office of Highway Safety who has recognized the necessity for this study and who has given the project his full support; Dr. Stuart Fors and Dr. Carol Cotton, Department of Health Promotion and Behavior, who serve as Evaluators for the Governor's Office of Highway Safety, and Mr. David Gregory who managed the data collection field effort. Finally, the observers who conducted on-site observations must be acknowledged, for without their efforts the study would not have been possible. Observation data were collected by the Survey Research Center at the University of Georgia.

\* For Further Information contact:

Director  
Georgia Governor's Office of Highway Safety  
1 Park Tower  
34 Peachtree Street, Suite 800  
Atlanta, Georgia 30303  
Telephone: (404) 656-6996  
[www.gohs.state.ga.us](http://www.gohs.state.ga.us)

For information on occupant safety educational programs contact:

Statewide Coordinator  
Georgia Traffic Injury Prevention Institute  
1070 Culpepper Dr., Suite 300  
Conyers, Georgia 30094  
Telephone: (800) 342-9819  
[www.ridesafegeorgia.org](http://www.ridesafegeorgia.org)

For information on this study's design contact:

Dr. James J. Bason, Director and Associate Research Scientist  
University of Georgia Survey Research Center  
303A Coliseum  
Athens, Georgia 30602  
Telephone: (706) 542-9082  
[www.src.uga.edu](http://www.src.uga.edu)

## **Executive Summary**

### **STATEWIDE USE OF OCCUPANT RESTRAINTS**

The findings presented in this Executive Summary are the result of an observational study of Safety Belt usage conducted from May 31<sup>th</sup> to June 12<sup>th</sup>, 2009, and are based on 60,085 observations.

#### **Safety Belt Usage in 2009:**

- Statewide safety belt usage in 2009 for drivers and passengers of passenger cars, trucks, and vans was 88.9%, a slight decrease of 0.7% from 2008.
- Safety belts usage was 93.3% in passenger cars, 90.5% in vans, and only 73.2% in trucks.
- Women front seat occupants use safety belts (93.7%) more than men front seat occupants (84.2%).
- Non-white front seat occupants' use of safety belts in 2009 was slightly higher than that of white front seat occupants (88.6% non-white versus 87.9% white).
- Observed safety belt use for front seat occupants was highest in the Atlanta Metropolitan Statistical area in 2009 (91.8%), followed by other Metropolitan Statistical Areas (84.7%), and non-MSA areas (81.6%).
- Observed motorcycle helmet usage in 2009 in Georgia was 100.0%.

#### **Child Safety Seat Usage in 2009:**

- Child safety seat usage in 2009 was 88.0%, an increase of 2.1% from the 2008 usage rate.
- Child safety seat usage was highest in rural areas of the state (96.4%), followed by non-Atlanta MSAs (89.7%), and the Atlanta MSA (85.1%).
- Child safety usage was higher in vehicles driven by whites (93.0%) than in vehicles driven by non-whites (84.3%).
- Child safety seat usage was higher in vehicles driven by women (89.5%) than in vehicles driven by men (84.0%).

## **INTRODUCTION**

### **Statement of the Problem**

During 2007, 28,933 occupants of passenger vehicles were killed nationally in motor vehicle crashes (“Traffic Safety Facts, 2007 Data, Occupant Protection”, National Center for Statistics and Analysis 2009), and 317 of those killed were children under age 4 (“Traffic Safety Facts, 2007 Data, Children”, National Center for Statistics and Analysis, 2009). In Georgia in 2007, 1,244 people of all ages were killed in motor vehicle crashes. Motor vehicle crash injuries are the leading cause of death nationally and in Georgia among person of every age from 3 to 33 years old “Traffic Safety Facts, 2007 Data, Occupant Protection”, National Center for Statistics and Analysis 2009). The national safety belt use rate in 2007 was 83 percent, the highest usage ever recorded by NHTSA based on observational surveys conducted in all 50 states. Research conducted by NHTSA has shown that during 2007, 15,147 lives over four years old were saved and 382 lives under five years old were saved through the use of safety belts and child safety seats.

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An Observational Study of Safety Restraint  
Use in Georgia**

**2009**

Since 1986, the University of Georgia Survey Research Center, first in cooperation with the University of Georgia Cooperative Extension Service Occupant Safety Education Program, and now in cooperation with the Department of Health Promotion and Behavior at the University of Georgia, has conducted comprehensive observational surveys of safety belt and child safety seat usage in Georgia. The year 2009 marks the twenty-third year these data have been collected. The primary goal of these Observational Surveys is to compile statewide safety belt and child safety seat use data for Georgia.

Specific objectives of the study are:

1. To establish an observed rate of safety belt and child safety seat use.
2. To compare rates of safety belt and child safety seat use over the eighteen years data have been collected in Georgia.
3. To investigate the association between demographic factors (e.g., gender, ethnicity, county of residence) and the use of safety belts and child safety seats.
4. To examine safety belt use rates in three geographic strata in Georgia: the Atlanta Metropolitan Statistical Area (MSA); other Metropolitan Statistical Areas (MSA) in the state; and rural counties in Georgia.

The National Highway Traffic Safety Administration (NHTSA) has reported economic costs of motor vehicle crashes were over 230.6 billion dollars in 2000 and over 7 billion dollars in Georgia alone. Mortality statistics for the United States show that motor vehicle crashes are the leading cause of accidental death for Americans of all ages. Only heart disease and cancer claim more victims. Though modern technology has provided us with effective occupant protection devices that can greatly reduce the number of deaths and injuries that result from vehicle crashes, accident reports from the Georgia Department of Public Safety reveal that only a small percentage of the vehicle occupants who were injured or killed in a traffic crash were using restraints. Yet, the most commonly available restraint device -- safety belts -- has been determined to be particularly effective in preventing injury and death.

Clearly, increasing safety belt use in Georgia is of vital importance. One of the most effective ways to attack the problem of non-use is to collect data on current use rates, on demographics of user and non-user populations, and on when use or non-use is most likely to occur. It is essential to have accurate and current use data so that the impact of Georgia's 1988 safety belt law (and revisions) can be determined and the use of belts by population subgroups can be estimated.

The following tables summarize results of a Safety Belt Observational Survey conducted in Georgia in May and June 2009. A detailed description of methodology for the study may be examined in Appendix A. Tables 1 – 6 present use data relative to safety belts in 2009, including results of Motorcycle Helmet observation data.

Table 1 presents descriptive statistics for the overall unweighted safety belt sample. Examination of the data demonstrate that a higher proportion of observed drivers were white (70.0%) than non-white (30.0%) and male (57.1%) than female (42.9). Passenger cars represented 72.7% of observed vehicles while trucks comprised 21.8% and vans 5.5%.

Table 2 presents weighted safety belt usage in 2009 overall, and by vehicle type. The overall usage rate in 2009 was 88.9, a slight decrease of 0.7% from the 89.6% of vehicle occupants belted in 2008. Table 3 presents safety belt usage in 2009 by gender and ethnicity, and Table 4 presents safety usage in 2009 by MSA and non-MSA status. Table 5 displays historical data concerning safety belt usage since 1997 in the State of Georgia, while Table 6 displays the proportion of observed Georgia motorcyclists wearing helmets in 2009.

**Table 1: 2009 Safety Belt Sample (%)\***

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<i>Stratum:</i>	<i>%</i>
Atlanta MSA	43.0
Other MSAs	31.5
Rural	25.5
<i>Driver's Ethnicity:</i>	
White	64.2
Nonwhite	35.8
<i>Driver's Gender:</i>	
Male	57.1
Female	42.9
<i>Passenger's Ethnicity:</i>	
White	70.0
Nonwhite	30.0
<i>Passenger's Gender:</i>	
Male	46.9
Female	53.1
<i>Vehicle Type:</i>	
Car	72.7
Van	21.8
Truck	5.5
<i>Weather:</i>	
Clear/Sunny	60.0
Cloudy	27.1
Light Rain	9.9
Clear but Wet	2.3
Fog	0.0
<i>Day:</i>	
Sunday	10.7
Monday	17.1
Tuesday	15.3
Wednesday	14.3
Thursday	24.9
Friday	12.3
Saturday	5.5
NUMBER OF OBSERVATIONS	60,085

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- Unweighted

**Table 2: Weighted 2009 Safety Belt Usage, Overall and by Vehicle Type**

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	Overall	Cars	Trucks	Vans
Overall Usage:	88.9	93.3	73.2	90.5
Baldwin	74.6	77.5	71.1	79.1
Bartow	91.7	96.8	79.4	94.3
Cherokee	93.2	96.2	82.3	97.5
Clarke	74.1	93.3	67.5	93.3
Columbia	76.4	75.6	76.7	79.2
Colquitt	72.1	83.2	50.9	76.3
DeKalb	91.9	94.6	74.8	90.4
Douglas	93.8	96.3	86.7	90.1
Floyd	86.7	86.3	84.7	94.7
Fulton	91.5	94.3	69.8	74.4
Glynn	84.3	91.8	57.9	91.1
Houston	85.5	92.7	59.5	90.6
Laurens	84.2	93.8	55.1	93.6
Lowndes	77.7	94.3	69.8	74.7
Muscogee	84.7	86.5	74.2	91.4
Spalding	93.3	95.6	87.8	89.7
Stephens	94.2	97.2	84.5	97.2
Troup	83.7	90.4	73.7	96.3
Upson	95.5	90.2	37.0	60.0
Ware	81.3	92.8	50.0	90.9

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**Table 3: Weighted 2009 Safety Belt Usage, by Stratum**

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Atlanta MSA	Non-Atlanta MSA	Non-MSA
91.8	84.7	81.6

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**Table 4: Weighted 2009 Safety Belt Usage, by Ethnicity and Gender**

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	White	Non-White	Male	Female
Overall:	87.9	88.6	84.2	93.7
Baldwin	73.1	77.1	60.4	83.2
Bartow	91.5	93.4	86.1	96.1
Cherokee	92.8	98.7	89.4	98.0
Clarke	87.2	88.1	82.3	93.7
Columbia	75.5	79.0	68.0	85.9
Colquitt	70.7	74.9	62.2	84.1
DeKalb	92.4	92.4	89.9	95.4
Douglas	94.6	92.4	94.6	92.4
Floyd	93.1	89.6	84.5	90.5
Fulton	87.1	87.9	83.6	93.6
Glynn	84.1	85.4	77.5	92.6
Houston	84.8	87.1	79.1	93.6
Laurens	83.1	86.7	77.0	93.8
Lowndes	93.1	89.7	88.0	95.8
Muscogee	87.0	81.8	80.4	89.6
Spalding	93.5	93.0	93.6	92.9
Stephens	93.5	95.2	90.8	97.4
Troup	87.1	86.5	82.1	92.3
Upson	74.3	85.1	65.3	90.2
Ware	80.3	85.2	70.0	93.4

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**Table 5: Safety Belt Use (%), 1997-2009**

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	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
<b>Overall Safety Belt Use:</b>	65.1	73.6	74.2	73.6	79.0	77.0	84.5	86.7	89.9	90.0	88.9	89.6	88.9
<b>Use by:</b>													
<b><i>Location:</i></b>													
Atlanta MSA	64.6	74.5	76.2	71.5	78.5	77.1	87.8	92.3	91.6	94.0	91.7	90.5	91.8
Urban MSA	65.8	75.2	71.8	76.4	91.2	68.2	77.3	77.3	77.4	88.9	83.5	83.0	84.7
Rural	62.9	73.0	71.8	71.0	75.4	80.1	86.0	80.2	86.9	84.7	80.0	85.1	81.6
<b><i>Driver Ethnicity:</i></b>													
White	69.5	75.8	74.7	74.5	79.3	77.1	84.8	83.3	88.4	90.4	89.3	89.4	87.9
Non-white	56.6	68.0	73.4	70.3	76.7	76.9	84.1	89.7	87.8	89.2	88.2	88.8	88.6
<b><i>Driver Gender:</i></b>													
Male	58.9	67.3	66.5	60.5	74.6	71.8	80.8	80.6	84.8	84.0	87.6	86.3	84.2
Female	72.2	80.0	82.4	81.4	84.0	83.8	89.6	92.2	92.8	95.8	90.0	93.4	93.7
<b><i>Vehicle Type:</i></b>													
Car	67.1	76.5	77.4	78.9	83.5	81.7	88.5	89.6	90.4	96.0	91.0	92.5	93.3
Truck	54.6	57.0	60.8	59.0	62.5	63.0	66.1	75.4	79.6	69.0	73.8	74.3	73.2
Van	75.2	76.9	77.8	79.7	79.2	77.5	89.4	86.6	90.8	88.0	87.6	90.0	90.5

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**Table 6: 2009 Motorcycle Helmet Use: Overall and by Count**

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**NUMBER OF OBSERVATIONS:**

	<b>NUMBER OF RIDERS</b>		<b>PERCENT USE:</b>
	<u>Wearing Helmet</u>	<u>Not Wearing Helmet</u>	
<b><u>OVERALL:</u></b>	290	0	100.0
<b><u>COUNTY:</u></b>			
BALDWIN	26	0	100.0
BARTOW	17	0	100.0
CHEROKEE	38	0	100.0
CLARKE	1	0	100.0
COLUMBIA	19	0	100.0
COLQUITT	2	0	100.0
DEKALB	26	0	100.0
DOUGLAS	0	0	-----
FLOYD	28	0	100.0
FULTON	37	0	100.0
GLYNN	0	0	-----
HOUSTON	7	0	100.0
LAURENS	2	0	100.0
LOWNDES	0	0	-----
MUSCOGEE	41	0	100.0
SPALDING	2	0	100.0
STEPHENS	17	0	100.0
TROUP	24	0	100.0
UPSON	0	0	-----
WARE	3	0	100.0

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## **Discussion**

The safety belt usage rate observed during the June 2009 Georgia Statewide Use of Occupant Restraints Observational Study indicate that Georgia now seems to be in a steady state of safety belt usage. Since 2005, the safety belt usage rate has varied by less than 1% in any given year. This trend clearly indicates that safety belt usage is unlikely to rise much higher until the Georgia General Assembly amends the provision of the current safety belt law that exempts drivers and passengers in trucks from wearing belts. It should also be no surprise rural areas of the state, the very areas where one would expect more trucks, also exhibit lower levels of safety belt usage. The remaining gap in safety belt usage likely is a result of die hard individuals who refuse to buckle up no matter what.

## 2009 Child Safety Seat Usage

Tables 7 - 10 present results of observations of Child Safety Seat Usage at randomly selected daycare centers throughout the state. Descriptive statistics about the 2009 Child Safety Seat sample are displayed in Table 7. Forty-eight percent of child safety seat observations occurred in the Atlanta MSA, while 43.2% occurred in other MSAs, and 8.4% occurred in rural areas. Forty-three percent of drivers of vehicles observed for child safety seat usage were white, while 57.5% were non-white, and 73.3% of drivers observed were female as compared to 26.7% male. A majority (64.8%) of observations occurred in cars, while 19.9% of observed vehicles were trucks and 15.2% of observed vehicles were vans. Nearly eighty-four percent (83.6%) of child safety seats were observed in the rear seat of the vehicle, while 16.4% were in the front seat.

Table 8 displays Child Safety Seat Usage by major study variables. In the 2009 study, 88.0% of observed children were in child safety seats, an increase of 2.1% from the usage rate of 85.9% recorded in 2008. When the driver of a vehicle was using their safety belt, 93.2% of children were also in a child safety seat, while in cases where a driver was not using their belt only 43.8% of children were in a child safety seat, an association statistically significant at the .001 level.

Child safety seat usage in the Atlanta MSA was 85.1%, 89.7% in other MSAs, and 96.4% in rural areas of the state. Child safety seat usage was significantly higher in vehicles driven by white drivers (93.0% white versus 83.3% non-white). Child safety seat usage in vehicles driven by females was significantly higher (89.5% versus 84.0%) than vehicles driven by male drivers. Child safety seat usage in cars was 87.2%, 88.1% in trucks, and 91.3% in vans.

Table 9 displays child safety seat usage by county. The highest reported child safety seat usage was observed in Bartow County (98.3%) and Chatham County (96.6%). Lowest reported child safety seat usage was observed in DeKalb County (73.8%), the only county to post a usage rate below 80.0%. Table 10 presents historical Child Safety Seat Usage data from 1995 – 2009, along with use rates by location, driver's ethnicity, driver's gender, and vehicle type.

## Discussion

Child safety seat usage in 2009 rose slightly (2.1%) from the observed rate in 2008, and since 2001 the proportion of child safety seat usage in Georgia has remained above 85.0%, indicating that Georgia's child safety seat law and efforts to enforce that law have resulted in compliance of more than 8 of 10 Georgians in restraining Georgia children in a child safety seat. Although the observations conducted in this study cannot determine whether or not children are properly restrained, data collected appear to suggest that efforts by the Georgia Governor's Office of Highway Safety to increase child safety seat usage among drivers have been successful.

**Table 7: 2009 Child Safety Seat Sample (%)**

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<b><i>Location:</i></b>	<b><u>%</u></b>
Atlanta MSA	48.4
Other MSAs	43.2
Rural	8.4
<b><i>Driver Ethnicity:</i></b>	
White	42.5
Nonwhite	57.5
<b><i>Driver Gender:</i></b>	
Male	26.7
Female	73.3
<b><i>Vehicle:</i></b>	
Car	64.8
Truck	19.9
Van	15.2
<b><i>Location of Child Safety Seat:</i></b>	
Front	83.6
Rear	16.4
<b><i>Weather:</i></b>	
Clear/Sunny	57.4
Cloudy	36.1
Light Rain	5.8
Clear and Wet	0.7
Fog	0.0
NUMBER OF OBSERVATIONS	678

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**Table 8: 2009 Overall Child Safety Use (%) by Major Study Variables**

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<b>Overall</b>	<b>(%) Use</b>
<b><i>Child in Safety Seat:</i></b>	
Yes	88.0
No	12.0
<b>% Use By:</b>	
<b><i>Driver Using Safety Belt:**</i></b>	
Yes	93.2
No	43.8
<b><i>Location:*</i></b>	
Atlanta MSA	85.1
Urban MSA	89.7
Rural	96.4
<b><i>Driver Ethnicity:*</i></b>	
White	93.0
Nonwhite	83.3
<b><i>Driver Gender:*</i></b>	
Male	89.5
Female	84.0
<b><i>Vehicle:</i></b>	
Car	87.2
Truck	88.1
Van	91.3
<b><i>Seat Location:**</i></b>	
Front	93.7
Rear	64.5

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\* p < .01, \*\* p < .001

**Table 9: 2009 Overall Child Safety Seat Use (%) by County**

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	%
Bartow	98.3
Bibb	83.7*
Chatham	96.6
Clarke	88.2
Clayton	84.1
Dekalb	73.8
Lowndes	96.2
Spalding	87.1
Stephens	96.4
Troup	87.9

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\* In counties with fewer than 50 total observations estimates should be interpreted with caution due to small sample sizes and large standard error

**Table 10: Child Safety Seat Use (%), 1995-2009**


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<b>YEAR:</b>	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
<b>OVERALL CHILD SAFETY SEAT USAGE:</b>															
	64.9	70.0	63.1	72.5	65.7	80.5	93.5	85.3	90.5	92.6	79.9	93.4	85.7	85.9	88.0
<b>USE BY:</b>															
<b>LOCATION:</b>															
Atlanta MSA	61.5	71.4	67.2	73.5	78.0	83.2	96.2	89.9	93.1	96.0	84.4	92.2	86.3	70.8	85.1
Urban MSA	63.1	73.6	64.2	72.7	63.0	78.4	85.3	77.5	90.5	80.0	69.9	95.2	81.7	94.8	89.7
Rural	63.3	69.8	59.9	71.4	56.4	76.3	91.7	83.5	72.5	78.9	81.8	96.4	86.6	100.0	96.4
<b>DRIVER ETHNICITY:</b>															
White	72.2	75.3	74.7	78.8	69.8	86.0	97.0	84.5	91.2	91.6	86.2	96.3	82.0	92.9	93.0
Non-white	51.6	57.7	52.3	60.9	59.0	73.2	87.6	86.3	89.7	93.6	72.6	90.6	85.7	79.4	84.3
<b>DRIVER GENDER:</b>															
Male	56.4	66.1	62.8	65.4	61.7	77.4	93.1	81.3	88.9	92.5	75.8	92.9	82.0	88.0	84.0
Female	68.5	71.8	65.4	74.3	67.6	82.0	93.6	86.9	91.1	92.6	81.1	93.6	84.3	85.3	89.5
<b>VEHICLE TYPE:</b>															
Car	64.1	70.0	63.4	72.5	67.1	78.9	93.6	84.9	91.6	92.5	79.1	93.4	86.6	81.9	87.2
Truck	54.8	58.6	47.3	62.3	53.7	84.6	93.1	78.7	85.4	91.9	75.0	93.8	78.7	95.0	88.1
Van	76.1	79.3	75.2	81.8	78.7	84.1	93.0	91.2	89.4	94.5	83.4	92.9	69.4	98.0	91.3

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**APPENDIX A:**

**METHODS AND PROCEDURES**

***GEORGIA SAFETY BELT OBSERVATIONAL SURVEY***

*June 2009*

## **Safety Belt Observational Survey**

### **Methods and Procedures**

The research design used for the survey is consistent with National Highway Traffic Safety Administration (NHTSA, Final Rule to Section 157, Section 1403 of the Transportation Equity Act for the 21<sup>st</sup> Century, April 13, 2000) guidelines for conducting safety belt surveys in the states. The design of the 2009 Safety Belt Observation Survey represents a replication of surveys conducted in Georgia since 1987 (with slight revision in 1997, 2000, and 2006 to conform to NHTSA guidelines). The methodology used for the 2009 survey is based on a new sampling frame and design developed in 2006, and was developed to allow continued comparison with earlier surveys conducted while accounting for shifts in population which have occurred in the state of Georgia since the previous design in 1997.

A primary purpose of the Safety Belt Observation Survey is to estimate the safety belt usage rate of drivers and front seat occupants in all passenger vehicles in the state of Georgia. In order to represent this group accurately, all members must have an equal chance of being selected for inclusion in the sample. Probability sampling procedures satisfy this requirement and thus provide unbiased estimates of the population parameters. These estimates can be used as baseline data or in trend analyses.

Sampling methods employed in the original (1987) survey were designed to establish a sampling frame of intersections that could be used in subsequent replications. Thus, even small changes in safety belt use can be detected. The overall sample was designed to produce estimates that would be accurate, to the extent called for by the plan, in establishing a statewide usage rate, as well as use rates for specific demographic subgroups.

## Sampling

### *Determining Sample Size*

The number of observations collected in the original (1987) survey was based on: (1) NHTSA's recommendations for a statewide survey, (2) on usage rates reported by previous studies in the state, and (3) on general statistical theory. The latter furnished specific guidelines for determining suitable sample size, and suggested that the number of sites and cases should be as dispersed and as large as possible.

### *Sample Frame*

All passenger vehicles, including commercial passenger vehicles such as taxi cabs, (defined as passenger cars, trucks, and vans) passing the observation site in the designated lane and direction during the time period chosen for observation were eligible for inclusion in the sample. The vehicle's driver and any front seat outboard passenger were observed. Observations were made of drivers and passengers to determine if they were using a shoulder harness.

### *Sample*

The sampling methodology to be utilized relied on a multi-stage probability sample of approximately 400 road segments. Counties served as the primary sampling units (PSUs). To develop the PSU frame, a database was constructed that included all PSUs in the target population (i.e. all counties in the state of Georgia representing 85% of the state's population) with corresponding measures of size (annual VMT of road segments). Sixty-five counties were determined to contain 85% of the state's population. In order to determine population of the counties of Georgia, population figures were obtained from the U.S. Census, and sorted from least populous to most populous. The population of the most populous counties were then summed until the proportion of population contained 85% of the total state population of Georgia. From these 65 counties, 20 counties were randomly selected using simple random sampling.

In the second stage of sampling, all road segments of the state computerized database of road segments were utilized. Road segments were sorted by road segment type such that one stratum comprised major roads and a second stratum comprised local roads. These road segments represent all of the road segments in each sampled county. Within each of these strata, the sample was allocated to each strata based on annual VMT in each stratum. For example, in Clarke County, annual VMT for Major

Roads was 52.0% and for local roads 48.0%. Thus of 20 road segments to be selected within Clarke County, 10 segments were selected on major roads and 10 segments were selected on local roads. Selected road segments were selected randomly using simple random sampling. Within the randomly selected road segments, a site visit to the segment was made to select an appropriate controlled intersection for observation to occur. The controlled intersection was thus selected by the Survey Research Center and observers then observed at that specified intersection. Direction of travel on the selected roadway and cross street was randomly selected for observation. Observation days were randomly selected from all days (Sunday – Monday), and times were randomly selected in one-hour increments beginning at 8:00 a.m. and ending at 6:00 p.m.

The estimation formula for weighting of the data is:

$$\frac{\sum V_j W_j \text{ belted } j}{\sum V_j W_j \text{ observed}}$$

Where  $j$  runs through the observation sites,  $\text{belted } j$  (respectively  $\text{observed } j$ ) denotes the number of front seat occupants (resp. from outboard occupants) observed at site  $j$ ,  $V_j$  denotes the traffic count obtained at site  $j$ , and  $W_j$  denotes the inverse of the probability of selection for county  $j$ .

$$W_j = 65N(j) / 20n(j),$$

Where  $N(j)$  denotes the number of road segments in the stratum from which  $j$  was selected, and  $n(j)$  denotes the sample size for the stratum. Selection of SSUs is via simple random sampling.

This weighting scheme was applied to all observations collected.

***Variance Estimation:***

Variance estimation was accomplished using the SAS Proc Survey Means Procedure. The unweighted estimate produced was .866, with a confidence interval of .8623 - .8697. The standard error of the estimate was .00165, with a variance of .0000035, producing a sampling error of .0029, indicating that the relative error of the estimate is well below .05 at the 95 percent confidence interval.

To summarize the methodology utilized:

***Primary Stage:***

- Identify counties in Georgia that comprise 85% of the population. Based on the most recent Census, 65 counties comprise 85% of the population of the state.
- From those 65 counties, 20 counties have been randomly selected as observation counties.

The randomly selected counties and MSA/non-MSA designations are:

County:	MSA/non-MSA	Stratum
Baldwin	Non-MSA	3
Bartow	Atlanta MSA	1
Cherokee	Atlanta MSA	1
Clarke	Urban MSA	2
Columbia	Urban MSA	2
Colquitt	Non-MSA	3
DeKalb	Atlanta MSA	1
Douglas	Atlanta MSA	1
Floyd	Urban MSA	2
Fulton	Atlanta MSA	1
Glynn	Urban MSA	2
Houston	Urban MSA	2
Laurens	Non-MSA	3
Lowndes	Urban MSA	2
Muscogee	Urban MSA	2
Spalding	Atlanta MSA	1
Stephens	Non-MSA	3
Troup	Urban MSA	2
Upson	Non-MSA	3
Ware	Non-MSA	3

These counties represent a diverse cross-section of Georgia geographically and encompass all regions of the state. VMT figures for each county are available online on the state Department of Transportation roadway inventory database.

***Secondary Stage:***

- Within each county 20 observation sites were randomly selected using the Georgia DOT road computerized inventory. Roadways segments were stratified by major road or local road type, and the sample allocated based on annual VMT by road type within each county.

Sample size is determined by using the sample design recommendations in Final Rule 157. All

sample units and their probabilities of selection are listed below.

<b>County</b>	<b>Segments</b>	<b>Local Roads</b>	<b>Major Roads</b>	<b>Weight</b>
Baldwin	131	74	57	$131/20 = 6.55$
Bartow	257	121	136	$257/20 = 12.85$
Cherokee	215	67	148	$215/20 = 10.75$
Clarke	250	202	48	$250/20 = 12.50$
Colquitt	160	94	66	$160/20 = 8.00$
Columbia	127	46	81	$127/20 = 6.35$
DeKalb	663	380	283	$663/20 = 33.15$
Douglas	199	86	113	$199/20 = 9.95$
Floyd	263	177	86	$263/20 = 13.15$
Fulton	1054	433	621	$1054/19 = 55.47$
Glynn	244	135	109	$244/20 = 12.20$
Houston	284	146	138	$284/20 = 14.20$
Laurens	252	95	157	$252/20 = 12.60$
Lowndes	326	148	178	$326/20 = 16.30$
Muscogee	355	257	98	$355/19 = 18.68$
Spalding	169	127	42	$169/19 = 8.89$
Stephens	127	64	63	$127/20 = 6.35$
Troup	255	110	145	$255/20 = 12.75$
Upson	114	64	50	$114/20 = 5.70$
Ware	165	110	55	$165/20 = 8.25$

All passenger vehicles, including commercial passenger vehicles such as taxi cabs, (defined as passenger cars, trucks, and vans) passing the observation site in the designated lane and direction during the time period chosen for observation were eligible for observation. The vehicle's driver and any front seat outboard passenger were observed. Observations were made of drivers and passengers to determine if they were using a shoulder harness.

Data were collected across a single 45-minute time period that was randomly selected and assigned to each site. Observers collect data on each vehicle that passes in the assigned lane for 40 minutes. Observers are instructed to concentrate on one vehicle at a time and to stress accuracy over quantity. If traffic was moving too fast to observe every vehicle observers are instructed to observe the vehicle passing, record the information for that observation, and then observe the next vehicle that passes. At the end of 40 minutes the observer counted all traffic passing in the assigned lane and multiplied that

by 9 to record a count of the total traffic passing the site during the 45 minute period. There were no alternate time periods. Observations were not made during periods of rain or fog that might present unsafe conditions for observers. Observations took place each day of the week, Sunday - Saturday, during the following randomly assigned time periods: Using a random number generator, 20 numbers between 1 and 7 will be generated for each county (1 = Sunday, 2 = Monday, 3 = Tuesday, etc.) – these random numbers determined the day of the week the observation were made. Again using a random number generator, 20 numbers between 1 and 11 were generated for each county (1 = 8:00 am, 2 = 9:00 am, 3 = 10:00 am, etc.). This procedure insured a probabilistic selection of both site times and site days. Detailed procedures were provided for the observers in an observer's handbook. The following section summarizes instructions for the observers.

## **Instructions for Observation**

### ***Where and When to Observe:***

Observers were instructed to observe only on the day and at the site assigned to them. In order to re-schedule a visit, observers were instructed to make arrangements with the contact or supervisor.

### ***How to Observe:***

Observers were instructed to position themselves on a curb beside the intersection to be observed. Only those vehicles traveling in the designated lane closest to the observer were eligible.

### ***Eligible Vehicles:***

1. All passenger cars, pick-up trucks, vans, minivans, and sport utility vehicles are eligible. SUVs are considered passenger vehicles rather than trucks. Observers were instructed in 2007 to survey commercial passenger motor vehicles, specifically including taxicabs, in addition to non-commercial passenger vehicles, in accordance with NHTSA Section 157 Final Rule.
2. If an otherwise eligible vehicle had tinted-glass windows that made it impossible to see inside the vehicle, that vehicle was only counted in the total number of vehicles that passed the observation point.
3. Passenger vehicles are eligible regardless of the state in which they were registered.

### ***Eligible Passengers:***

1. Observers are to record data for the driver and the passenger in the right front seat.
2. Data are not recorded for passengers in the back seat or for a third passenger riding in the middle of the front seat. If there is only one passenger and that passenger is riding in or near the middle of the front seat, observers will record as though that person is occupying the right seat.
3. If a child estimated to be under the age of five is present in the front seat, he or she is not counted as a passenger. However, children five years of age or over and riding in the front seat will be observed.

### ***Data Collection Form:***

A data collection form was developed for use by the observer. Each data collection form indicates the observer's name, site location, county, date, start and end time. Variables recorded were: weather, ethnicity and gender of driver, use of belt or harness, vehicle type, ethnicity and gender of passenger and passenger's use of belt or harness. Observers were provided instructions on who to contact and what action to take if site conditions prevented observation (e.g. construction, safety of the site, etc.)

### **Data Processing**

All data collection sheets were checked by supervisors before being given to trainers or contact persons. Data were then checked by the supervisory personnel. Forms were edited to ensure that information was complete and legible. Data were then entered and stored in a data file at the University of Georgia Survey Research Center. Due to road construction issues, three of the four hundred randomly selected sites could not be observed during the field period.

### **Data Analysis and Results**

The Statistical Package for the Social Sciences (SPSS) was used to analyze the data. After cleaning and editing, the final data set contained a total of 60,085 unweighted cases. Appropriate weights were assigned to each observation site to ensure that each site was represented by the number of cases proportionate to the population of the county in which the site was located and to that site's annual VMT.

## Child Safety Seat Observational Survey

### Methods and Procedures

Observations for the 2009 Child Safety Seat Usage study were made at a sample of 85 daycare centers randomly selected within a sub-sample of counties where safety belt observations were conducted. Portions of the original 1987 sampling design remain intact to allow for comparison across years, including sampling in three separate strata in Georgia (Atlanta MSA, MSAs other than Atlanta, rural areas of the state).

Using a list-assisted random sampling technique, a sample of all daycare centers listed in white page telephone directories in the sub-sample of 10 counties seat belt data were collected was obtained. Next, a random sample of 100 daycare centers was drawn across the 10 counties under study. Of these, observations were conducted at 85 sites.

Prior to data collection, each daycare center was contacted by mail to inform them that the Center intended to observe child safety seat usage at their daycare center.

#### 2008 Child Safety Seat Data Collection Sites

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<u>Daycare Centers</u>	# of Sites	# of Counties
ATLANTA MSA	30	4
OTHER MSA	36	5
RURAL	6	1
TOTAL	85	10

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#### Data Collection

Data collection spanned a single period, August 31 – September 11, 2009. Each site was observed for a 45-minute period that was randomly assigned to each of the observation sites. Beginning observation times started at 7:00 a.m., 8:00 a.m., 4:00 p.m. 5:00 p.m., and 6:00 p.m., and were intended to reflect the busiest drop off and pick up times at daycare centers. Observations were not made during periods of rain or fog that might present unsafe conditions for observers, nor were observations conducted on Saturday or Sunday.

Observer responsibilities and instructions were similar to those for the Safety Belt Study. They were to observe only on the day and at the site assigned to them. Detailed procedures were provided for the observers in the observer's handbook.

#### Data Collection Form

A data collection form which indicated the observer's name, site location, county, date, and start and end times was developed for use by the site observers. Variables recorded were weather, ethnicity and gender of driver, use of safety belt by driver, use of CSS by child under 5, and location of CSS (front/rear).

#### Data Processing

Child Safety seat data were processed in the same manner as were the safety belt data. Data collection sheets were checked by both observers and supervisory personnel before they were returned to the Survey Research Center. There they were coded, edited, entered into the computer, and cleaned as noted previously in the Safety Belt Study methods section.

#### Data Analysis

The Statistical Package for the Social Sciences (SPSS) was used to analyze the data. Frequency and cross-tabulation analyses were conducted. The analysis of statistical significance utilized in the bivariate analyses was the chi-square test set at the 95th percent level of confidence where  $p < .05$ . The chi-square test was selected for these data since all variables were measured at the nominal level. Chi-square is the appropriate test at this level of measurement.

After cleaning and editing, the final data set contained a total of 678 cases. Data were analyzed without being weighted