

# Traffic Safety Facts

## Research Note

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### Child Restraint Use in 2004 — Overall Results

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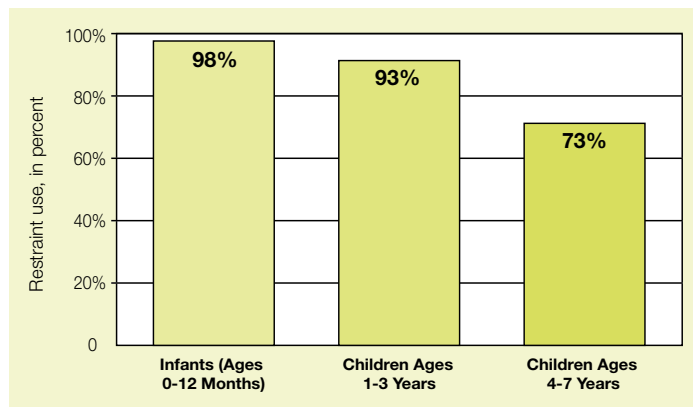
Infants and toddlers continue to be restrained at high use levels when riding in motor vehicles, while use among children ages 4-7 has declined. This result is from the National Occupant Protection Use Survey (NOPUS), which provides the only probability-based observed data on child restraint use in the United States. The NOPUS is conducted by the National Center for Statistics and Analysis (NCSA) in the National Highway Traffic Safety Administration (NHTSA).

Specifically, 98 percent of infants and 93 percent of children ages 1-3 observed in passenger vehicles stopped at a stop sign or stoplight in 2004 were restrained in some type of restraint, whether a rear- or front-facing safety seat, a booster seat, or a safety belt. In contrast, only 73 percent of children ages 4-7 were restrained, down from 83 percent two years ago.

The 2004 survey also found the following:

- Drivers who restrain themselves continue to be more likely to restrain their child passengers. In 2004, 86 percent of 0-7 year old children driven by belted drivers were restrained, compared to 50 percent for children with unbelted drivers. This suggests that getting adults to buckle up may also result in more restrained children.

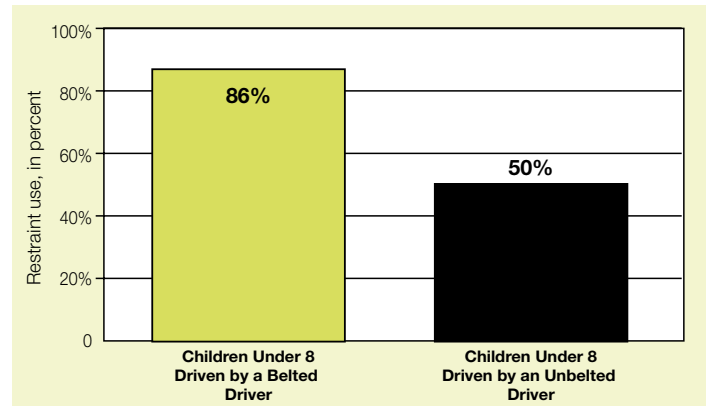
#### Restraint Use Among Children Under 8 Years of Age in 2004



Source: National Occupant Protection Use Survey, National Highway Traffic Safety Administration, National Center for Statistics and Analysis.

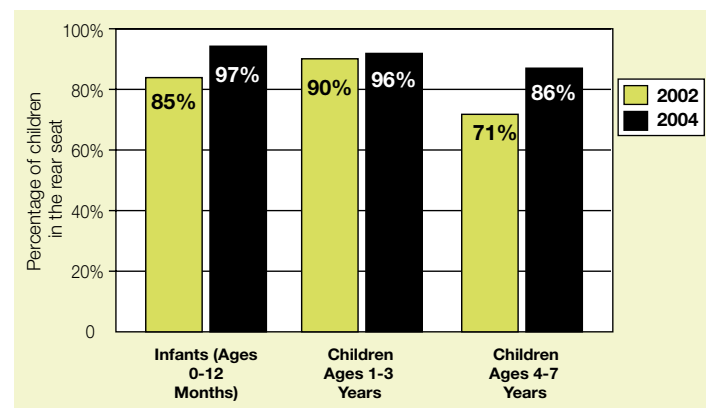
- In 2004, there was marked improvement in placing child passengers in the rear seats, away from the possible harm of a front-seat air bag. However, older children continue to be in the front seat far too often, with 14 percent of children ages 4-7 observed in the front seat.
- The survey found mixed results on the types of restraints used for children. Fewer infants are being prematurely graduated to front-facing safety seats and fewer children ages 1-3 to booster seats, but more infants were restrained in safety belts and backless booster seats.

#### Restraint Use of Children Under 8 Years of Age in 2004 By Belt Use of Driver



Source: National Occupant Protection Use Survey, National Highway Traffic Safety Administration, National Center for Statistics and Analysis.

#### Percentage of Children Under 8 Years of Age in the Rear Seat



Source: National Occupant Protection Use Survey, National Highway Traffic Safety Administration, National Center for Statistics and Analysis.

## Child Restraint Use by Major Characteristics

Child Motorist Group <sup>1</sup>	2002		2004		2002-2004 Change		
	Restraint Use <sup>2</sup>	Significantly High (H) and Low (L) Rates <sup>3</sup>	Restraint Use <sup>2</sup>	Significantly High (H) and Low (L) Rates <sup>3</sup>	Change in Use, in Percentage Points	Confidence in a Change in Use <sup>4</sup>	Percentage Reduction in Nonuse
<b>Children Under 8 Years of Age</b>	88%		82%		-6	<b>97%</b>	-50%
Ages 0-12 Months	99%	H	98%	H	-1	59%	-100%
Ages 1-3 Years	94%	H	93%	H	-1	51%	-17%
Ages 4-7 Years	83%	L	73%	L	-10	<b>99%</b>	-59%
<b>Children Driven by</b>							
a Belted Driver	92%	H	86%	H	-6	<b>95%</b>	-75%
an Unbelted Driver	72%	L	50%	L	-22	<b>99%</b>	-79%
a Male Driver	91%		82%		-9	62%	-100%
a Female Driver	92%		82%		-10	<b>98%</b>	-125%
a Driver Aged 16-24	75%		88%	H	13	86%	52%
a Driver Aged 25-69	89%		81%	H	-8	<b>99%</b>	-73%
a Driver Aged 70+	94%	H	52%		-42	76%	-700%
a White Driver	91%		84%		-7	<b>99%</b>	-78%
a Black Driver	87%		82%		-5	51%	-38%
a Driver of Another Race	82%		72%		-10	83%	-56%
<b>Children in</b>							
the Front Seat	83%	L	72%	L	-11	82%	-65%
the Rear Seat	90%	H	83%	H	-7	<b>99%</b>	-70%
<b>Child Motorists on</b>							
Expressways	90%		84%		-6	<b>97%</b>	-60%
Surface Streets	87%		81%		-6	89%	-46%
<b>Child Motorists Traveling in</b>							
Fast Traffic	85%		84%	H	-1	28%	-7%
Medium Speed Traffic	92%	H	83%	H	-9	<b>97%</b>	-113%
Slow Traffic	85%		79%		-6	83%	-40%
<b>Child Motorists Traveling in</b>							
Heavy Traffic	NA		NA		NA		
Moderately Dense Traffic	NA		82%		NA		
Light Traffic	88%		82%		-6	<b>95%</b>	-50%
<b>Child Motorists Traveling Through</b>							
Light Precipitation	90%		81%		-9	50%	-90%
Fog	97%	H	NA		NA		
Clear Weather Conditions	88%	L	82%		-6	<b>96%</b>	-50%
<b>Child Motorists in</b>							
Passenger Cars	88%		78%		-10	<b>99%</b>	-83%
Vans & SUVs	91%		88%	H	-3	61%	-33%
Pickup Trucks	77%		71%		-6	56%	-26%
<b>Child Motorists in the</b>							
Northeast	87%		69%		-18	85%	-138%
Midwest	86%		79%		-7	62%	-50%
South	92%		87%	H	-5	<b>91%</b>	-63%
West	86%		84%		-2	46%	-14%
<b>Child Motorists in</b>							
Urban Areas	84%		78%		-6	47%	-38%
Suburban Areas	85%		84%		-1	89%	-7%
Rural Areas	87%		80%		-7	81%	-54%
<b>Child Motorists Traveling During</b>							
Weekdays	89%		83%		-6	<b>97%</b>	-55%
Weekday Rush Hours	90%		80%		-10	<b>99%</b>	-100%
Weekday Non-Rush Hours	87%		85%		-2	64%	-15%
Weekends	85%		79%		-6	66%	-40%

<sup>1</sup> Motorists under 8 years of age observed between 8 a.m. and 6 p.m. in the right-front seat or the second row of seats in passenger vehicles with no commercial or government markings that are stopped at a stop sign or stop light. Age, gender, and racial classifications are based on the subjective assessments of roadside observers.

<sup>2</sup> Use of child safety seats (front-or rear-facing), booster seats, and safety belts.

<sup>3</sup> Rates flagged with an "H" or "L" are statistically high or low in their category at a 90 percent confidence level.

<sup>4</sup> The degree of statistical confidence that the 2004 use rate is different from the 2002 rate.

**NA:** Data insufficient to form a reliable estimate.

**Source:** National Occupant Protection Use Survey, National Highway Traffic Safety Administration, National Center for Statistics and Analysis

## The Percentage of Child Motorists Who Are in the Rear Seat, by Major Characteristics

Child Motorist Group <sup>1</sup>	2002		2004		2002-2004 Change		
	Percentage Who Were in the Rear Seat <sup>2</sup>	Significantly High (H) and Low (L) Rates <sup>3</sup>	Percentage Who Were in the Rear Seat <sup>2</sup>	Significantly High (H) and Low (L) Rates <sup>3</sup>	Change Estimate, in Percentage Points <sup>4</sup>	Confidence in a Change in Percentage in the Rear Seat <sup>5</sup>	Percentage Reduction in Front Seat Occupancy <sup>6</sup>
<b>Children Under 8 Years of Age</b>	76%		90%		16	<b>99%</b>	58%
Ages 0-12 Months	85%		97%	H	12	<b>99%</b>	80%
Ages 1-3 Years	90%	H	96%	H	6	<b>95%</b>	60%
Ages 4-7 Years	71%	L	86%	L	15	<b>99%</b>	52%
<b>Child Motorists in Jurisdictions Governed by<sup>7</sup></b>							
Laws Requiring Children Ages 0-5 to Be in the Rear Seat	88%	H	90%		2	64%	17%
No Such Law	72%	L	90%		18	<b>99%</b>	64%
<b>Children Driven by</b>							
a Restrained Driver	77%		91%		14	<b>99%</b>	61%
an Unrestrained Driver	77%		85%		8	64%	35%
a Male Driver	78%		90%		12	<b>90%</b>	55%
a Female Driver	76%		91%		15	<b>99%</b>	63%
a Driver Aged 16-24	76%		90%		14	<b>96%</b>	58%
a Driver Aged 25-69	76%		90%		14	<b>99%</b>	58%
a Driver Aged 70+	67%		65%		-2	3%	-6%
a White Driver	79%		91%		12	<b>99%</b>	57%
a Black Driver	83%		92%		9	88%	53%
a Driver of Another Race	73%		86%		13	77%	48%
<b>Child Motorists on</b>							
Expressways	83%		94%	H	11	<b>99%</b>	65%
Surface Streets	73%		88%	L	15	<b>98%</b>	56%
<b>Child Motorists Traveling in</b>							
Fast Traffic	77%		93%		16	<b>98%</b>	70%
Medium Speed Traffic	81%		92%		11	<b>96%</b>	58%
Slow Traffic	69%		86%	L	17	<b>99%</b>	55%
<b>Child Motorists Traveling in</b>							
Heavy Traffic	NA		NA		NA		
Moderately Dense Traffic	NA		96%		NA		
Light Traffic	76%		89%		13	<b>99%</b>	54%
<b>Child Motorists Traveling Through</b>							
Light Precipitation	57%	L	92%		35	<b>99%</b>	81%
Fog	88%		NA		NA		
Clear Weather Conditions	76%		90%		14	<b>99%</b>	58%
<b>Child Motorists in</b>							
Passenger Cars	79%	-*	93%	H	14	<b>99%</b>	67%
Vans & SUVs	80%		92%		12	<b>99%</b>	60%
Pickup Trucks	44%	L	50%	L	6	46%	11%
<b>Child Motorists in the</b>							
Northeast	76%		92%		16	<b>97%</b>	67%
Midwest	70%		93%		23	<b>99%</b>	77%
South	82%		87%		5	62%	28%
West	74%		90%		16	<b>92%</b>	62%
<b>Child Motorists in</b>							
Urban Areas	75%		95%	H	20	<b>99%</b>	80%
Suburban Areas	77%		91%		14	<b>98%</b>	61%
Rural Areas	75%		84%		9	75%	36%
<b>Child Motorists Traveling During</b>							
Weekdays	76%		90%		14	<b>99%</b>	58%
Rush Hours	74%		88%		14	<b>99%</b>	54%
Non-Rush Hours	77%		92%		15	<b>99%</b>	65%
Weekends	78%		90%		12	80%	55%

<sup>1</sup> Motorists under 8 years of age observed between 8 a.m. and 6 p.m. in the right-front seat or the second row of seats in passenger vehicles with no commercial or government markings that are stopped at a stop sign or stop light. Age, gender, and racial classifications are based on the subjective assessments of roadside observers.

<sup>2</sup> The percentage of the child motorist group who were in the rear (second row of) seats at the time of observation.

<sup>3</sup> Percentages flagged with an "H" or "L" are statistically high or low in their category at a 90 percent confidence level.

<sup>4</sup> The percentage point difference between the percentage of the child motorist group who were in the rear seat in 2004 and the analogous percentage from 2002.

<sup>5</sup> The degree of statistical confidence that the percentage of the child motorist group who were in the rear seat in 2004 is different from the analogous percentage from 2002.

<sup>6</sup> The percentage reduction that occurred during the period 2002-2004 in the percentage of the child motorist group who were in the front seat.

<sup>7</sup> The law in effect at the time the observations were made.

**NA:** Data insufficient to form a reliable estimate.

**Source:** National Occupant Protection Use Survey, National Highway Traffic Safety Administration, National Center for Statistics and Analysis

## The Types of Restraints Used by Children Under 8 Years of Age

Restraint Type	The Percentage of Children of the Specified Age Group Observed Using the Restraint Type <sup>1</sup>		2002 – 2004 Change		What We Should See <sup>4</sup>
	2002 <sup>7</sup>	2004 <sup>7</sup>	Difference, in Percentage Points <sup>2</sup>	Confidence in a Change in Percentage <sup>3</sup>	
<b>Infants (Ages 0-12 Months)</b>					
Rear Facing Car Seat	32%	45%	13	76%	100%
Front Facing Car Seat	66%	48%	-18	<b>92%</b>	0%
Highback Booster Seat	1%	0%	-1	11%	0%
Safety Belt or Backless Booster Seat	1%	4%	3	<b>91%</b>	0%
No Restraint Observed	1%	2%	1	67%	0%
<b>Children Ages 1-3 Years</b>					
Rear Facing Car Seat	4%	6%	2	61%	1.5%
Front Facing Car Seat	62%	62%	0	0%	98 - 98.5%
Highback Booster Seat	16%	2%	-14	<b>99%</b>	See footnote 5.
Safety Belt or Backless Booster Seat	13%	22%	9	86%	See footnote 5.
No Restraint Observed	6%	7%	1	7%	0%
<b>Children Ages 4-7 Years</b>					
Rear Facing Car Seat	1%	NA	NA	NA	0%
Front Facing Car Seat	9%	13%	4	63%	48 - 97%
Highback Booster Seat	6%	2%	-4	<b>98%</b>	See footnote 6.
Safety Belt or Backless Booster Seat	67%	58%	-9	82%	See footnote 6.
No Restraint Observed	17%	27%	10	<b>99%</b>	0%

<sup>1</sup> Among motorists who appear to be under 8 years of age, observed between 8 a.m. and 6 p.m. in the right-front seat or the second row of seats in passenger vehicles with no commercial or government markings that are stopped at a stop sign or stop light.

<sup>2</sup> The percentage point difference between the percentage of children who were in the restraint type in 2004 and the analogous percentage from 2002.

<sup>3</sup> The degree of statistical confidence that the percentage of children who were in the restraint type in 2004 is different from the analogous percentage from 2002.

<sup>4</sup> The distribution of restraint types that we would see if all children were restrained in the type of restraint recommended by NHTSA.

<sup>5</sup> Between 0 and 0.5 percent of children ages 1-3 years should be in booster seats, and virtually none should be in safety belts.

<sup>6</sup> Between 3 and 51 percent of children ages 4-7 years should be in booster seats, and virtually none should be in safety belts.

<sup>7</sup> Cells might not sum to 100 percent due to rounding.

**NA:** Data insufficient to form a reliable estimate.

**Source:** Data on percentages of children observed in the restraint types are from the National Occupant Protection Use Survey, National Highway Traffic Safety Administration, National Center for Statistics and Analysis. The final column of data labeled "What We Should See" was calculated from the CDC Growth Charts: United States, Center for Disease Control and Prevention, National Center for Health Statistics, May 2000. The details of this calculation can be found in the upcoming NHTSA report "Child Restraint Use in 2002 – Analysis".

## The Types of Restraints Used

The NOPUS observes the following categories of restraints: rear-facing safety seats; front-facing safety seats; high-backed booster seats; and safety belts or backless booster seats. Backless booster seats cannot reliably be distinguished from safety belts from roadside observation. Consequently NOPUS cannot estimate booster seat use.

NHTSA recommends the following concerning the type of restraint that children should use when traveling in motor vehicles:

- Children under 1 year of age should be in a rear-facing safety seat.

- Children older than 1 year who weigh between 20 and 40 pounds should be in a front-facing safety seat.
- Children who have exceeded the height or weight limit for their forward-facing safety seat, are less than 8 years old, and are less than 4'9" tall should be in a booster seat.

Based on these recommendations and data on the height and weight distributions of children, we have calculated the distributions of restraint types that we would see if all children were restrained in the recommended restraint types. These appear in the last column of the table "The Types of Restraints Used by Children Under

8 Years of Age", and the derivations of these distributions can be found in the upcoming NHTSA report "Child Restraint Use in 2004 – Analysis." Note that the distributions for children ages 1-3 and children ages 4-7 involve ranges, reflecting that front-facing safety seats have a range of height and weight limits.

The survey indicates mixed results as to whether infants are restrained in better choices of restraint types than they were two years ago. All infants should be in rear-facing safety seats, but in 2004, only 45 percent were. Fewer infants were prematurely graduated to front-facing safety seats in 2004 than in 2002, but more were observed in safety belts or backless booster seats.

The survey indicates that children ages 1-3 years are in better types of restraints now than two years ago. Based on weight and height data, we estimate that 1.5 percent of this age group should be in rear-facing safety seats, 98 – 98.5 percent should be in front facing safety seats, 0 – 0.5 percent should be in booster seats, and virtually none should be in safety belts. The 2004 survey saw only 62 percent in front-facing safety seats, but fewer children ages 1-3 were in high-backed booster seats in 2004 than in 2002.

The survey indicates mixed results on children ages 4-7 years. We estimate that 48 – 97 percent of this age group should be in front-facing safety seats, 3 – 51 percent should be in booster seats, and virtually none should be in safety belts or rear-facing safety seats. Although the 2004 survey indicates a substantial amount of premature graduation of this age group to booster seats and safety belts and fewer 4- to 7-year-old children were restrained in 2004 than 2002, the survey found a decline in the percentage observed in high-backed booster seats.

## Survey Methodology

The National Occupant Protection Use Survey (NOPUS) is the only probability-based observational survey of child restraint use in the United States. The survey observes usage as it actually occurs at a random selection of roadway sites, and so provides the best tracking of child restraint use in this country.

### Sites, Vehicles, and Motorists Observed

Numbers of	2002	2004	Change
Sites Observed	2,000	2,000	0%
Vehicles Observed	37,000	38,000	3%
Children Observed <sup>1</sup>			
Infants	500	300	-40%
Ages 1-3	900	700	-22%
Ages 4-7	1,800	1,400	-22%

<sup>1</sup>Estimates do not sum to totals due to rounding.

The survey data is collected by sending observers to a set of probabilistically sampled intersections controlled by a stop sign or stoplight, where motorists are observed from the

roadside. Data is collected between the hours of 8 a.m. and 6 p.m. Only stopped vehicles are observed to permit time to collect the variety of information required by the survey, including subjective assessments of motorists' ages and race. Observers collect data on the driver, right-front passenger, and up to two passengers in the second row of seats. Observers do not interview motorists, so that the NOPUS captures the untainted behavior of vehicle occupants. The 2004 NOPUS data were collected between June 7 and July 11, 2004, excluding the period July 2-5 inclusive. Only a limited study of child restraint use was conducted in 2003. The data from the 2003 study only observed children in the front seat, and so are not comparable to the data in this publication. It is not clear why the number of observed children dropped in the 2004 survey. This may be because data were collected slightly later in the year in the 2004 survey than in previous surveys, and so school sessions terminating for the summer may have affected the child counts. Also in its observation of up to two passengers in the second row of seats, the NOPUS added the observation of adults as well as children in 2004, and this may have decreased the number of children observed in these seating positions. However, data collectors were instructed to collect data on children in cases where they could observe children and adults equally well in the second row of seats.

Because the NOPUS sites were chosen through probabilistic means, we can analyze the statistical significance of its results. Statistically significant increases in restraint use between 2002 and 2004 are identified in the table "Child Restraint Use by Major Characteristics" by a result that is 90 percent or greater in column 7. Significantly high and low levels of restraint use such as the lower use rates by children ages 4-7, compared to younger children, are identified by H's and L's in columns 3 and 5. Such comparisons are made within categories, such as age group, delineated by solid horizontal lines in the table. The exception to this

delineation is the grouping "Children Driven by..." which is divided into the four categories of driver belt use, driver gender, driver age, and driver race. The tables "The Percentage of Child Motorists Who Are in the Rear Seat, by Major Characteristics" and "The Types of Restraints Used by Children Under 8 Years of Age" likewise indicate statistically significant results concerning rear seat occupancy and the types of restraints used.

The NOPUS uses a complex multi-stage probability sample, statistical data editing, imputation of unknown values, and complex estimation and variance estimation procedures. See the NHTSA Technical Report referenced below for more information on these procedures.

We measure improvement in restraint use by the percentage reduction in nonuse. For instance, an increase from 90 percent to 95 percent use represents a 50 percent reduction in nonuse (i.e. nonuse was cut in half, from 10 percent nonuse to 5 percent nonuse). This provides a better measure of improvement than a straight percentage or percentage point increase in use, since e.g., a 10-point jump in use is considerably easier starting at 50 percent use than at 80 percent use, because a greater percentage of nonusers must be converted to users at the 80 percent rate. In fact, while not entirely accurate, given that children may be restrained on some trips and not others, it can be helpful to think of the percentage reduction in nonuse as the percent of nonusers who were "converted" to users. Likewise we measure improvement in rear-seat occupancy by the percentage reduction in front-seat occupancy.

Data collection, estimation, and variance estimation for the NOPUS are conducted by Westat, Inc., under the direction of the National Center for Statistics and Analysis in NHTSA under Federal contract number DTNH22-00-D-07001.

## Definitions

Children observed in the survey were counted as “restrained” if they appeared by observers to either (1) have a shoulder belt across the front of their body, (2) be in a child safety seat with the seat’s harness straps across the front of their body, or (3) be in a booster seat with a shoulder belt or booster seat shield across the front of the body. NOPUS does not observe the use of lap belts because these restraints cannot be reliably observed from the roadside.

The racial categories “Black,” “White,” and “Other Races” appearing in the tables reflect subjective characterizations by roadside observers regarding the race of motorists. Similarly the age groups in the tables represent the observers’ best guesses of motorists’ ages.

“Expressways” are defined to be roadways with limited access, while “surface streets” comprise all other roadways. All expressway data in this report were collected at the terminus of exit ramps having stop signs or stoplights.

A surface street is defined to have “fast traffic” if during the time the street was observed, the average speed of passenger vehicles that passed the observer(s) exceeded 50 mph, with “medium speed traffic” and “slow traffic” defined analogously using the ranges 31-50 mph and 0-30 mph, respectively. Speed characterizations are made subjectively by the observers.

Although restraint data for expressways is collected at exit ramps, speed categorizations reflect speeds on the corresponding expressways. For instance, in the table “Child Restraint Use by Major Characteristics”, the estimates of restraint use in fast traffic reflect use on surface streets and expressways with fast traffic, with data on restraint

use for expressways collected at the proxy sites of exit ramps for reasons of practicability. As mentioned above, NOPUS observes only stopped vehicles in order to reliably collect the wealth of information in the tables above.

A surface street is defined to have “heavy traffic” if the average number of vehicles per lane mile on the roadway during the observation period exceeded 45 vehicles per lane mile, with “moderately dense traffic” and “light traffic” defined analogously using the ranges 26-45 vehicles per lane mile and 0-25 vehicles per lane mile, respectively. Density data was computed using traffic counts and the speed characterizations. As with speed characterizations, traffic density for expressways reflects the density on the expressway, not that on the corresponding ramp at which restraint and occupancy data were collected.

At the time the 2002 and 2004 surveys were conducted, 19 States, D.C., and Puerto Rico required by law that children ages 5 years and younger be in the rear seat when traveling in passenger vehicles.

## For More Information

For detailed analyses of the data in this publication, as well as additional data and information on the survey design and analysis procedures, see the upcoming publication “Child Restraint Use in 2004 – Analysis,” expected to be available on the Web site <http://www-nrd.nhtsa.dot.gov/departments/nrd-30/ncsa/AvailInf.html> in the spring of 2005.

The NOPUS also observes other types of restraints, such as safety belt use by adult motorists and motorcycle helmets, and observes driver cell phone use. This publication is part of a series that presents overall results from the survey on these topics. Please see other members of the series, such as “Safety Belt Use in 2004 – Overall Results,” and the corresponding NHTSA Technical Report “Safety Belt Use in 2004 –Overall Analysis,” for the latest data on these topics.

### States with Laws Requiring Children Ages 5 and Younger<sup>1</sup> To Be in the Rear Seat

2002 <sup>2</sup>	2004 <sup>3</sup>
California	California
Delaware	Delaware
Maine	Georgia
New Jersey	Maine
Rhode Island	New Jersey
South Carolina	Rhode Island
Tennessee	South Carolina
Washington	Tennessee
Wyoming	Washington
	Wyoming
	Puerto Rico

<sup>1</sup>Children ages 5 and younger who weigh less than 80 pounds and are shorter than 4 feet, 6 inches.  
<sup>2</sup>Laws in effect as of June 30, 2002.  
<sup>3</sup>Laws in effect as of July 30, 2004.