

Traffic Safety Facts

Research Note

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Booster Seat Use in 2007

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Booster seat use among 4- to 7-year-old children stood at 37 percent in 2007, statistically unchanged from the prior year's rate of 41 percent. This result is from the National Survey of the Use of Booster Seats (NSUBS), the only probability-based nationwide child restraint survey that observes restraint use and obtains age by interview. The NSUBS is conducted by the National Center for Statistics and Analysis of the National Highway Traffic Safety Administration.

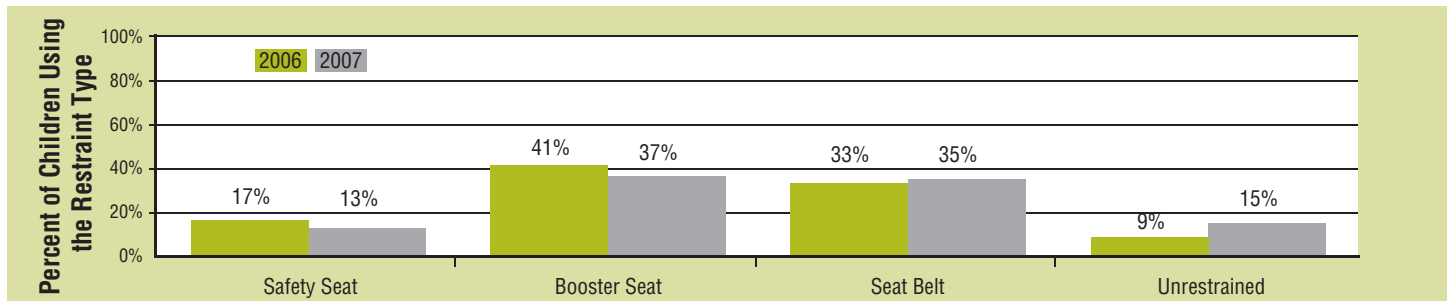
The appropriate restraint system for children 4 to 7 is either a front-facing safety seat or a booster seat, depending on the child's height and weight. However, the NSUBS found that in 2007, 37 percent of children in this age group were using booster seats (whether high-backed or backless), 13 percent

were restrained in child safety seats, 35 percent were in seat belts, and 15 percent were unrestrained. These results indicate that as many as one half of children 4 to 7 in the United States were not being properly protected (35% prematurely in seat belts and 15% unrestrained).

The 2007 NSUBS survey also found the following:

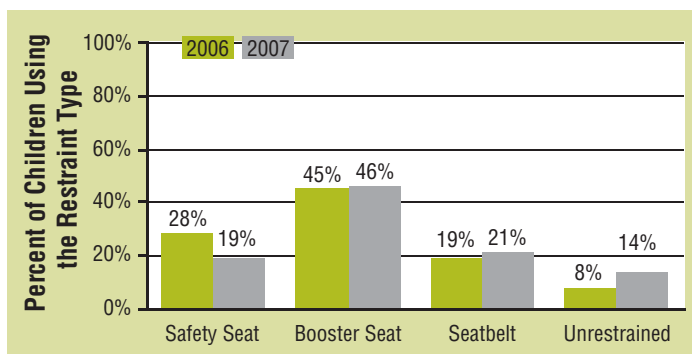
- In 2007, 46 percent of children age 4 and 5 were restrained in booster seats.
- The booster seat use rate for children age 6 and 7 dropped from 36 percent in 2006 to 25 percent in 2007. This decrease is statistically significant.

Restraint Use for Children Age 4 to 7



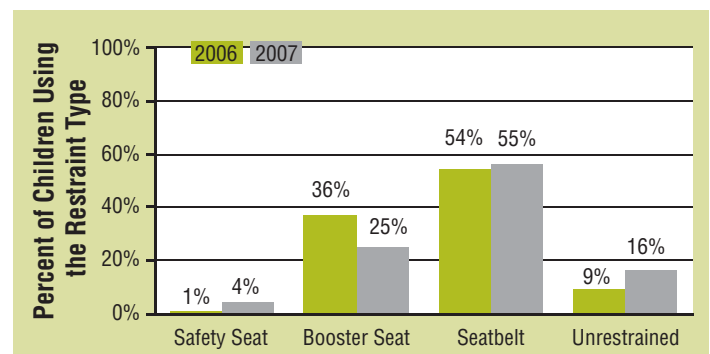
Source: National Survey of the Use of Booster Seats, NHTSA's National Center for Statistics and Analysis, 2006, 2007

Restraint Use for Children Age 4 and 5



Source: National Survey of the Use of Booster Seats, NHTSA's National Center for Statistics and Analysis, 2006, 2007

Restraint Use for Children Age 6 and 7



Source: National Survey of the Use of Booster Seats, NHTSA's National Center for Statistics and Analysis, 2006, 2007

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The survey found some decrease in restraint use from 2006 to 2007. For instance, the survey found a drop in restraint use among 4- to 7-year-olds from 91 percent in 2006 to 85 percent in 2007. However, this could be due in part to improved training (in this second year of the survey) on what constitutes “use” for front-facing seats and booster seats, and might not reflect an actual decrease in restraint use in this age group. See the Section “A Change to the 2007 Survey that Could Impact Results” on page 6 for more information.

In addition to this data, the NSUBS collects a wealth of information including the types of restraints used and a myriad of demographic information (age, race, ethnicity, gender, and, for children only, height and weight) for up to nine child and adult occupants in each participating vehicle. The purpose of this Research Note is to highlight the survey’s results on booster seat use (see the tables on the following pages) for all booster seat use estimates computed from the survey data. Additional Research Notes that present results from the NSUBS in other topic areas, such as on the degree to which children are restrained in restraint types appropriate for their size (height and weight) and on race/ethnicity breakouts of restraint use, are available at the Web site <http://www-nrd.nhtsa.dot.gov/CMSWeb/index.aspx>.

Who Should Be in Booster Seats?

NHTSA’s official guidance* on booster seats is: Once children outgrow their front-facing seats (usually around age 4 and 40 pounds), they should ride in booster seats, in the back seat, until the vehicle seat belts fit properly. Seat belts fit properly when the lap belt lays across the upper thighs and the shoulder belt fits across the chest (usually at age 8 or when they reach 4’9” tall).

Ages Considered in This Publication

Many 4- to 7-year-olds have outgrown their front-facing safety seats, so many entities study booster seat use among this age group. However, in this Research Note, we present information on all children age 12 and younger, as the NHTSA recommendation involves more than age alone.

Evidence of Premature Graduation to Booster Seats

A review of child safety seats on the market finds a wide variation in height and weight limits. Many height limits range between 36 and 54 inches, and many weight limits range from 40 to 60 pounds. This research note will consider these various limits in applying the NHTSA recommendation to assess the survey results.

From the booster seat use estimates presented in the tables on the following pages, we see some evidence of premature graduation. For instance, 21 percent of children who weigh between 20 and 40 pounds were using booster seats. However, most front-facing safety seats allow weights above 40 pounds. Therefore, according to NHTSA recommendations, many (if not most) of these children should have been in front-facing safety seats (unless they have outgrown the seat’s height limits). We note however that some booster seats have weight limits as low as 30 pounds.

Likewise, 16 percent of children who were at most 36 inches tall were using booster seats. However, most front-facing safety seats allow heights above 36 inches. Therefore, many (if not most) of these children should have been in front-facing safety seats (unless they have outgrown the seat’s weight limits).

The NSUBS provides a rich data source for information on the premature graduation of children from birth to age 12 to restraint types that are inappropriate for their height or weight. Please see the companion publication “Child Restraint Use in 2007—Use of Correct Restraint Types” referenced below for detailed discussions on this topic.

*<http://www.nhtsa.dot.gov>

Booster Seat Use, by Age, Weight, and Height

| Booster Seat Type ¹ | 2006 | | 2007 | | 2006-2007 Change | |
|--|---|----------------|---|----------------|-----------------------------|---|
| | Percentage ² of Children ³ Using the Booster Type | Standard Error | Percentage ² of Children ³ Using the Booster Type | Standard Error | Change in Percentage Points | Confidence in a Change in Percentage ⁴ |
| Children From Birth - 12 Months | | | | | | |
| Booster Seat (Overall) | NA | NA | 1% | 1% | NA | NA |
| High-Backed Booster Seat | NA | NA | NA | NA | NA | NA |
| Backless Booster Seat | NA | NA | NA | NA | NA | NA |
| Children Age 1-3 Years | | | | | | |
| Booster Seat (Overall) | 19% | 3% | 14% | 3% | -5 | 83% |
| High-Backed Booster Seat | 12% | 5% | 9% | 2% | -3 | 47% |
| Backless Booster Seat | 6% | 5% | 5% | 1% | -1 | 60% |
| Children Age 4-7 Years | | | | | | |
| Booster Seat (Overall) | 41% | 6% | 37% | 5% | -4 | 54% |
| High-Backed Booster Seat | 25% | 7% | 22% | 4% | -3 | 34% |
| Backless Booster Seat | 16% | 5% | 15% | 2% | -1 | 30% |
| Children Age 8-12 Years | | | | | | |
| Booster Seat (Overall) | 8% | 3% | 5% | 2% | -3 | 88% |
| High-Backed Booster Seat | 4% | 1% | 2% | 1% | -2 | 97% |
| Backless Booster Seat | 4% | 3% | 3% | 1% | -1 | 56% |
| Children Age 12 and Younger Who Weigh Less than 20 Pounds | | | | | | |
| Booster Seat (Overall) | NA | NA | NA | NA | NA | NA |
| High-Backed Booster Seat | NA | NA | NA | NA | NA | NA |
| Backless Booster Seat | NA | NA | NA | NA | NA | NA |
| Children Age 12 and Younger Who Weigh Between 20 and 40 Pounds | | | | | | |
| Booster Seat (Overall) | 25% | 6% | 21% | 3% | -4 | 61% |
| High-Backed Booster Seat | 16% | 7% | 14% | 2% | -2 | 26% |
| Backless Booster Seat | 9% | 5% | 7% | 1% | -2 | 57% |
| Children Age 12 and Younger Who Weigh Between 41 and 60 Pounds | | | | | | |
| Booster Seat (Overall) | 39% | 5% | 33% | 5% | -6 | 87% |
| High-Backed Booster Seat | 23% | 6% | 17% | 3% | -6 | 78% |
| Backless Booster Seat | 16% | 5% | 15% | 3% | -1 | 22% |
| Children Age 12 and Younger Who Weigh More than 60 Pounds | | | | | | |
| Booster Seat (Overall) | 8% | 2% | 5% | 2% | -3 | 79% |
| High-Backed Booster Seat | 4% | 1% | 2% | 1% | -2 | 65% |
| Backless Booster Seat | 4% | 2% | 3% | 1% | -1 | 68% |
| Children Age 12 and Younger Who Are At Most 36 Inches Tall | | | | | | |
| Booster Seat (Overall) | 20% | 6% | 16% | 3% | -4 | 72% |
| High-Backed Booster Seat | 12% | 7% | 11% | 2% | -1 | 23% |
| Backless Booster Seat | 8% | 6% | 5% | 1% | -3 | 69% |
| Children Age 12 and Younger Who Are Between 37 and 53 Inches Tall | | | | | | |
| Booster Seat (Overall) | 34% | 4% | 29% | 4% | -5 | 73% |
| High-Backed Booster Seat | 20% | 4% | 17% | 3% | -3 | 63% |
| Backless Booster Seat | 13% | 3% | 12% | 2% | -1 | 42% |
| Children Age 12 and Younger Who Are Between 54 and 56 Inches Tall | | | | | | |
| Booster Seat (Overall) | 13% | 10% | 11% | 3% | -2 | 25% |
| High-Backed Booster Seat | 9% | 5% | 3% | 2% | -6 | 91% |
| Backless Booster Seat | 4% | 5% | 8% | 2% | 4 | 63% |
| Children Age 12 and Younger Who Are Taller than 56 Inches | | | | | | |
| Booster Seat (Overall) | 1% | 1% | 4% | 2% | 3 | 96% |
| High-Backed Booster Seat | 1% | 1% | 1% | 1% | 0 | 42% |
| Backless Booster Seat | NA | NA | 3% | 2% | NA | NA |

¹ Booster seats are classified into two types: those with seat backs ("high-backed") and those without ("backless").

² Estimates might not sum to totals due to rounding.

³ Survey data was obtained on children age 12 and younger in passenger vehicles at a nationwide probability sample of gas stations, day care centers, recreation centers, and restaurants in five fast-food chains. Restraint use is observed by trained data collectors prior to or just as the vehicle comes to a stop, except in the case of observation at fast-food drive-through lanes, where restraint use is observed prior to the vehicle reaching the drive-through window.

⁴ The degree of statistical confidence that the 2007 use rate is different from the 2006 rate. Confidence levels that meet or exceed 90% are formatted in boldface type.

Note: Decreases in restraint use from 2006 to 2007 could be due in part to improved training in the 2007 survey. For more information see "A Change to the 2007 Survey That Could Affect Results" on Page 6.

NA: Data not sufficient to produce a reliable estimate.

Source: The National Survey of the Use of Booster Seats, NHTSA's National Center for Statistics and Analysis, 2006-2007

Distribution of Restraint Types Among Children Age 4-7 by Sub-age Groups

| Restraint Type ¹ | 2006 | | 2007 | | 2006-2007 Change | |
|--------------------------------|--|----------------|--|----------------|-----------------------------|---|
| | Percentage of Children Observed in the Restraint Type ² | Standard Error | Percentage of Children Observed in the Restraint Type ² | Standard Error | Change in Percentage Points | Confidence in a Change in Percentage ³ |
| Children Age 4-5 Years | | | | | | |
| Rear-Facing Child Safety Seat | NA | NA | NA | NA | NA | NA |
| Front-Facing Child Safety Seat | 28% | 6% | 19% | 5% | -9 | 97% |
| Booster Seat (Overall) | 45% | 7% | 46% | 5% | 1 | 10% |
| High-Backed Booster Seat | 27% | 10% | 27% | 4% | 0 | 4% |
| Backless Booster Seat | 18% | 7% | 18% | 2% | 0 | 12% |
| Seat Belt | 19% | 5% | 21% | 6% | 2 | 21% |
| No Restraint Observed | 8% | 3% | 14% | 4% | 6 | 91% |
| Children Age 6-7 Years | | | | | | |
| Rear-Facing Child Safety Seat | NA | NA | NA | NA | NA | NA |
| Front-Facing Child Safety Seat | 1% | 1% | 4% | 1% | 3 | 98% |
| Booster Seat (Overall) | 36% | 9% | 25% | 5% | -11 | 92% |
| High-Backed Booster Seat | 21% | 8% | 14% | 4% | -7 | 78% |
| Backless Booster Seat | 14% | 4% | 11% | 3% | -3 | 69% |
| Seat Belt | 54% | 9% | 55% | 4% | 1 | 14% |
| No Restraint Observed | 9% | 2% | 16% | 5% | 7 | 83% |
| Children Age 4-7 Years | | | | | | |
| Rear-Facing Child Safety Seat | NA | NA | NA | NA | NA | NA |
| Front-Facing Child Safety Seat | 17% | 4% | 13% | 3% | -4 | 79% |
| Booster Seat (Overall) | 41% | 6% | 37% | 5% | -4 | 54% |
| High-Backed Booster Seat | 25% | 7% | 22% | 4% | -3 | 34% |
| Backless Booster Seat | 16% | 5% | 15% | 2% | -1 | 30% |
| Seat Belt | 33% | 6% | 35% | 4% | 2 | 26% |
| No Restraint Observed | 9% | 2% | 15% | 4% | 6 | 91% |

¹ Survey data was obtained on children age 12 and younger in passenger vehicles at a nationwide probability sample of gas stations, day care centers, recreation centers, and restaurants in five fast-food chains.

² Restraint use is observed by trained data collectors prior to or just as the vehicle comes to a stop, except in the case of observation at fast-food drive-through lanes, where restraint use is observed prior to the vehicle reaching the drive-through window

³ The degree of statistical confidence that the 2007 use rate is different from the 2006 rate. Confidence levels that meet or exceed 90 percent are formatted in boldface type.

Note: Decreases in restraint use from 2006 to 2007 could be due in part to improved training in the 2007 survey. For more information see "A Change to the 2007 Survey That Could Affect Results" on Page 6.

NA: Data not sufficient to produce a reliable estimate.

Source: The National Survey of the Use of Booster Seats, NHTSA's National Center for Statistics and Analysis, 2006-2007

Survey Methodology

The National Survey of the Use of Booster Seats obtains its data by sending trained data collectors to a probability sample of gas stations, day care centers, recreation centers, and restaurants in five national fast-food chains across the United States. The choice of these types of data collection sites stems from the necessity of observing restraint use from a close range in a slow-moving or stopped vehicle (as is required in order to distinguish a seat belt being used in conjunction with a backless booster seat from a seat belt being used alone), combined with the desire to capture large numbers of children.

Data collectors approach passenger vehicles appearing to have child occupants under the age of 13, observe the restraint use of up to nine occupants in the first three rows of seats and conduct interviews to obtain the race and ethnicity of all occupants (obtained in compliance with OMB standards for such data) and the heights, weights, and ages of child occupants appearing to be under age 13. (The approximate ages of other occupants (expressed as an age range, such as 16-24 years), and the genders of all occupants, are subjectively assessed by the data collectors.)

In order to capture restraint usage before children unfasten the restraints, restraint use is observed by the data collectors prior to or just as the vehicle comes to a stop, except in the case of observation at fast-food drive through lanes, where restraint use is observed prior to the vehicle reaching the drive-through window.

In order to reach as wide an audience as possible, the NSUBS uses some Spanish-speaking data collectors.

This (2007) is the second year for the NSUBS survey. The 2007 survey data is based on the observation of 14,000 occupants, 7,500 of whom were under age 13, in 4,800 vehicles at 38 day care centers, 134 fast-food restaurants, 218 gas stations, and 40 recreation centers nationwide. The survey interviews covered 6,560 children under age 13, including 330 infants under 1 year old, 1,494 children 1 to 3 years old, 2,471 children 4 to 7 years old, and 2,265 children 8 to 12 years old. The data was collected between July 19 and August 2, 2007, while the 2006 data was collected between July 17 and July 29, 2006.

Sites, Vehicles, Occupants, and Children Age 12 and Younger in NSUBS

| Numbers of | 2006 | 2007 | Percentage Change |
|--|--------|--------|-------------------|
| Data Collection Sites | 390 | 430 | 9% |
| Vehicles Observed | 3,500 | 4,800 | 38% |
| Occupants Observed | 10,000 | 14,000 | 42% |
| Children Age 12 and Younger Observed | 5,300 | 7,500 | 42% |
| Children Age 12 and Younger Interviewed* | 4,400 | 6,600 | 48% |

* Data obtained by interview with an adult occupant.

The 2007 survey yielded nearly a 50-percent increase in the number of occupants observed compared to the 2006 survey. This could be due in part to eliminating certain questions from the occupant interviews, shortening the interview time per vehicle from about 5 minutes in 2006 to about 2 minutes in 2007, thus allowing for the collection of data on more vehicles per site. The increase in observations in 2007 could also be due to the addition of some sites to the survey and increased site participation rates.

The NSUBS uses a complex multistage 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, as well as for more information on the survey's data collection protocols.

The design of the survey, survey preparation activities, data collection, estimation, and variance estimation for the NSUBS were conducted by Westat, Inc., under the direction of the National Center for Statistics and Analysis in NHTSA under Federal contract number DTNH22-07-D-00057. The OMB clearance number for the NSUBS is 2127-0644.

What Do the Survey Results Tell Us? Are the Results Representative?

By design and necessity, the NSUBS survey data is obtained from a restricted set of site types, namely gas stations, day care centers, recreation centers, and restaurants in five fast-food chains. However, the survey uses a probability sample of these site types, and so its results are representative of children who frequent these types of sites.

For example, the survey result of 37-percent booster seat use among 4- to 7-year-olds means that among children in this age range who were taken by passenger vehicles to gas stations, day care centers, recreation centers, fast-food restaurants in 2007, 37 percent were in booster seats. Whether or not the booster seat use rate for 4- to 7-year-olds who do not frequent these site types is higher or lower than 37 percent is an open question, and not one that the NSUBS (or any other available survey) can answer.

How Do These Results Compare With NOPUS?

NHTSA conducts another survey, the National Occupant Protection Use Survey (NOPUS), which has shed light on the use of one class of booster seats, namely high-backed booster seats. The NOPUS has estimated high-backed booster seat use since 2002. (The most recent NOPUS survey result estimated that 3 percent of 4-7 year old children were using high-backed booster seats in 2006.) However as the NOPUS survey results are obtained from the observations of data collectors stationed at roadsides, from which one cannot reliably discern backless boosters, NOPUS cannot provide an estimate of the percent of children using booster seats. For more information on the NOPUS data, see the publication

“Child Restraint Use in 2006” available at <http://www-nrd.nhtsa.dot.gov/CMSWeb/ViewCatalogbyCategory.aspx>.

Restraint Types and Definition of Use

The NSUBS uses the following definitions of restraint use:

Rear-Facing Child Safety Seat - The child occupant is in a seat that sits on top of the vehicle seat in such a way that the child faces the rear of the vehicle, and the harness straps are across the child’s front. The harness straps might be secured or not.

Front-Facing Child Safety Seat - The child occupant is in a seat that sits on top of the vehicle seat in such a way that the child faces the front of the vehicle, and with harness straps that are across the child’s front.

High-Backed Booster Seat - The child occupant is in a seat with a seat back that sits on top of the vehicle seat, and has a seat belt across the front of the child’s body, whether lap or lap/shoulder. No harness is in use.

Backless Booster Seat - The child occupant is sitting on a platform with no seat back that sits on top of the vehicle seat, and has a seat belt across the front of the child’s body, whether lap or lap/shoulder. No harness is in use.

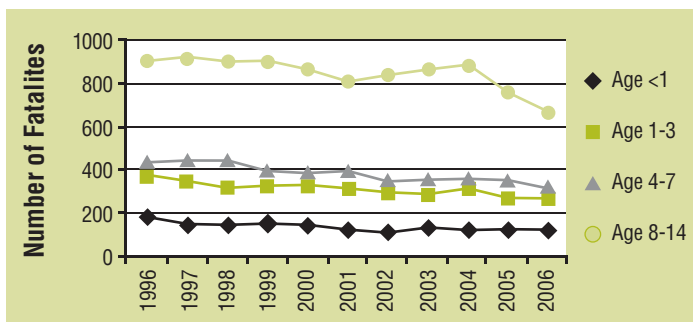
Seat Belt - Child (or adult) is sitting on the vehicle seat and the seat belt is across the front of the body (includes lap belts).

Unrestrained - All other cases.

Progress in Reducing Child Fatalities

We note that child occupant fatalities have declined in the past decade, as demonstrated by NHTSA’s Fatality Analysis Reporting System (FARS). Booster seats, child safety seats, and seat belts provide key tools to achieve further fatality reductions.

Occupant Fatalities Among Children Age 14 and Under by Age Groups, 1996-2006



Source: Fatality Analysis Reporting System (FARS), NHTSA’s National Center for Statistics and Analysis, 1996-2006



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A Change to the 2007 Survey That Could Affect Results

The year 2007 constitutes the second year in which the NSUBS was conducted. In response to requests from data collectors after the 2006 survey, additional training was conducted on what constitutes “use” for front-facing seats and booster seats, particularly regarding that the harness or seat belt must be across the front of the child’s body. This improved training could have contributed to the decrease in restraint use among 4- to 7-year-olds in the 2007 survey, compared to the 2006 survey findings.

For More Information

The NSUBS, although its primary purpose is to estimate booster seat use among 4- to 7-year-olds, provides a rich data source for information on the restraint use of children under age 13 and on race/ethnicity results on restraint use among all ages. In particular, the NSUBS provides data on the premature graduation of children age 12 and younger to restraint types that are inappropriate for their height or weight. This publication is part of a series that presents overall results from the survey on these topics. Please see companion publications such as “Child Restraint Use in 2007—Demographic Results” and “Child Restraint Use in 2007—Use of Correct Restraint Types” for the latest data on these topics. Detailed information on the NSUBS survey design and analysis procedures are provided in the NHTSA Technical Report “The 2007 National Survey of the Use of Booster Seats— Methodology Report.” These publications will be available at the Web site <http://www-nrd.nhtsa.dot.gov/CMSWeb/index.aspx> in 2007 or 2008.

For more information on the campaign by NHTSA to increase child restraint use, see www.nhtsa.gov.

References

1. Child Passenger Safety: A Parent’s Primer, NHTSA, accessible from [http://www.nhtsa.dot.gov/portal/nhtsa-static_file_downloader.jsp?file=/staticfiles/DOT/NHTSA/Traffic Injury Control/Articles/Associated Files/4StepsFlyer.pdf](http://www.nhtsa.dot.gov/portal/nhtsa-static_file_downloader.jsp?file=/staticfiles/DOT/NHTSA/Traffic%20Injury%20Control/Articles/Associated%20Files/4StepsFlyer.pdf). Washington, DC: National Highway Traffic Safety Administration.
2. Glassbrenner, D., The 2007 National Survey of the Use of Booster Seats – Methodology Report, NHTSA, to appear. Washington, DC: National Highway Traffic Safety Administration.
3. Glassbrenner, D., & Ye, J., Child Restraint Use in 2006 – Overall Results, NHTSA, DOT HS 810 737, February 2007. Washington, DC: National Highway Traffic Safety Administration.
4. Glassbrenner, D., & Ye, J., Booster Seat Use in 2006, NHTSA, DOT HS 810 796, August 2007. Washington, DC: National Highway Traffic Safety Administration.