

# Traffic Safety Facts

## Research Note

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### **Child Pedestrian Fatality Rates by Striking Vehicle Body Type: A Comparison of Passenger Cars, Sport Utility Vehicles, Pickups, and Vans**

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#### **Background**

NHTSA's National Center for Statistics and Analysis (NCSA) recently completed an examination of data from the Fatality Analysis Reporting System (FARS) comparing pedestrian fatality rates for the two five-year time periods of 1992-1996 and 1997-2001. Rates were stratified according to the body type of the striking vehicle.

This research note focuses on child pedestrian fatalities, examining the age groups 0-3, 4-7, and 8-15 years old. The age group of 16 years and older is included for the purpose of comparison.

From 1992 through 2001, a total of 6679 pedestrian fatalities occurred among children aged 0-15 years old. This number represents 12.6 percent of all pedestrian fatalities over that ten-year time period.

#### **Methodology**

Pedestrian fatalities among four categories of striking vehicle body type were examined: passenger cars, sport utility vehicles, pickups, and vans. The pedestrians were stratified into four age groups: 0-3,

4-7, 8-15, and 16 years and older. Data from FARS for the period 1992 through 2001 were used, and these data were separated into two five-year time periods (1992-1996 and 1997-2001).

R.L. Polk data on registered vehicles were used to determine fatality rates per million registered vehicle-years. The annual counts for the numbers of pedestrian fatalities and the numbers of registered vehicle-years were combined for each five-year time period. In order to determine an annual fatality rate for each five-year time period, the sum of the pedestrian fatalities was divided by the sum of the registered vehicle-years.

The wider age ranges (i.e. age 16 and older) had higher pedestrian fatality rates than the narrower age ranges (i.e. 0 to 3 years old) because the number of registered vehicle-years was used repeatedly as a measure of exposure for each age range. The pedestrian fatality rates for each age range were calculated by dividing the number of fatalities in that age range by the number of registered vehicle-years

for all ages combined.

Vehicle registration was chosen as the measure of exposure in order to account for the large shift seen in the distribution of vehicles. From 1992-1996 to 1997-2001, the number of passenger car vehicle-years rose 4 percent, while the number of sport utility vehicle-years rose 69 percent. Registered vehicle-years was chosen over vehicle miles traveled as the measure of exposure because data on vehicle miles traveled, stratified into passenger cars, sport utility vehicles, pickups, and vans, are not available.

#### **Results**

Pedestrian fatality rates per million registered vehicle-years (MRVY) were calculated for two five-year time periods, 1992-1996 and 1997-2001. These rates have declined across all 16 combinations of the four age groups and four striking vehicle body types, as shown in Table 1.

Passenger cars had the biggest decline in pedestrian fatality rates among each of the four age groups. The decline in pedestrian fatality rates that occurred when a

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was the striking vehicle was nearly twice as large as the decline in fatality rates seen among the three other vehicle body types combined. For all ages combined, the pedestrian fatality rate among passenger cars was 22.2 percent lower from 1997-2001 than from 1992-1996.

Pickups and sport utility vehicles had the second and third largest decreases respectively in pedestrian fatality rates among all four of the age groups. For all ages combined, the pedestrian fatality rate among pickups was 15.8 percent lower from 1997-2001 than from 1992-1996, compared with an 11.4 percent drop in the fatality rate among pedestrians struck by sport utility vehicles.

Vans were the vehicle body type that had the smallest decline in pedestrian fatality rates among all four age groups. For all ages, the pedestrian fatality rate among vans was only 1.8 percent lower during the time period 1997-2001 than during 1992-1996, as vans had the highest pedestrian fatality rate for 1997-2001.

There were not enough pedestrian fatalities involving 15 passenger vans to allow for the cases to be stratified according to the age of the fatally injured pedestrian. For all ages combined, the number of fatalities dropped slightly, from 77 fatalities during 1992-1996, to 74 fatalities during 1997-2001. This decline parallels the decline seen among all vans.

As shown above in Table 1, children age 4 to 7 years old experienced the largest drop, and the 0 to 3 year-old age group had the second largest drop in pedestrian fatality rates for all four striking vehicle body types. The pedestrian fatality rates among children under 8 years old dropped

Table 1  
**Pedestrian Fatality Rates per Million Registered Vehicle-Years (MRVY)**  
By Striking Vehicle Body Type and Age of Pedestrian  
1992-1996 versus 1997-2001

Striking Vehicle Body Type	Year	Age of Pedestrian Fatality (years)				
		0 - 3	4 - 7	8 - 15	16 and older	All Ages
Passenger Cars	1992-1996	0.76	1.19	1.82	21.59	25.59
	1997-2001	0.44	0.61	1.14	17.54	19.90
	% change*	<b>-42.1 %</b>	<b>-49.2 %</b>	<b>-37.2 %</b>	<b>-18.8 %</b>	<b>-22.2 %</b>
Sport Utility Vehicles	1992-1996	0.80	1.57	1.80	22.12	26.47
	1997-2001	0.62	1.13	1.66	19.88	23.44
	% change*	<b>-22.7 %</b>	<b>-28.0 %</b>	<b>-7.7 %</b>	<b>-10.1 %</b>	<b>-11.4 %</b>
Pickups	1992-1996	0.98	1.18	1.92	23.16	27.48
	1997-2001	0.68	0.79	1.43	20.07	23.15
	% change*	<b>-31.0 %</b>	<b>-33.1 %</b>	<b>-25.4 %</b>	<b>-13.3 %</b>	<b>-15.8 %</b>
Vans	1992-1996	0.86	1.26	1.80	21.90	26.05
	1997-2001	0.79	1.04	1.78	21.80	25.58
	% change*	<b>-8.6 %</b>	<b>-17.5 %</b>	<b>-1.4 %</b>	<b>-0.4 %</b>	<b>-1.8 %</b>

Source: National Center for Statistics and Analysis, NHTSA, FARS 1992-2001  
\*Percentage change calculated prior to rounding of individual rates.

a far greater percentage than the fatality rates of pedestrians age 16 and older.

Table 2 below compares the pedestrian fatality rates (per MRVY) for the four striking vehicle body type categories. These comparisons are made separately within each age group for the five-year time period 1997-2001. For each of the age groups in Table 2, the pedestrian fatality rate where the striking vehicle is a passenger car is the lowest

fatality rate of the four striking vehicle body types.

Passenger cars were categorized in Table 2 as the baseline striking vehicle group for each age category and were therefore assigned a baseline relative risk of 1.0. Table 2 shows the relative risks for pedestrian fatalities in each age category where the striking vehicles were passenger cars, sport utility vehicles, pickups, and vans.

Table 2  
**Relative Risk of Pedestrian Fatality Rates per Million Registered Vehicle-Years (MRVY)**  
**With Passenger Cars As Baseline for Each Age Group**  
By Striking Vehicle Body Type and Age of Pedestrian  
1997-2001

Striking Vehicle Body Type	Age of Pedestrian Fatality (years)				
	0 - 3	4 - 7	8 - 15	16 and older	All Ages
Passenger Cars	1.0	1.0	1.0	1.0	1.0
Sport Utility Vehicles	1.42	1.87	1.46	1.13	1.18
Pickups	1.54	1.30	1.26	1.15	1.16
Vans	1.79	1.71	1.55	1.24	1.29

Source: National Center for Statistics and Analysis, NHTSA, FARS 1997-2001

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Given that sport utility vehicles, pickups, and vans are likely to be more highly elevated than passenger cars, a note-worthy pattern emerges among these pedestrian fatality rates (per MRVY). Table 2 shows that sport utility vehicles, pickups, and vans have relative risks for child pedestrians under 8 years old that range from 1.30 up to 1.87, while the relative risk for pedestrians age 16 and older is below 1.25 for all body types. This difference may be due to the hypothesis that younger pedestrians are more likely to be struck by higher elevated vehicles than by passenger cars because drivers of the more highly elevated vehicles are more likely to have their view of the smaller children obstructed.

Among children 0 to 3 years old, the pedestrian fatality rate from sport utility vehicles had a relative risk of 1.42 compared to passenger cars. Similarly, the relative risk from pickups and vans are 1.54 and 1.79 respectively compared to passenger cars. This shows that from 1997 through 2001, sport utility vehicles, pickups, and vans fatally injured child pedestrians age 0 to 3 years old at a higher rate than passenger cars.

A similar pattern is seen when examining the pedestrian fatality rates by

striking vehicle body type among children 4 to 7 years old. Child pedestrians 4 to 7 years old were fatally injured by sport utility vehicles, pickups, and vans at a higher rate per million registered vehicle-years than the rate seen among passenger cars.

Child pedestrians age 4 to 7 years old had a relative risk from sport utility vehicles that was 1.87 compared to passenger cars, suggesting that the pedestrian fatality rate per MRVY among sport utility vehicles is nearly twice high as the pedestrian fatality rate among passenger cars.

As pedestrians grow older, their fatality rates among the four striking vehicle body types are more homogeneous than the fatality rates for children in the 0 to 3 year old and 4 to 7 year old age ranges. For pedestrians age 16 and older, the pedestrian fatality rates where the striking vehicle is a sport utility vehicle, pickup, or van have relative risks of 1.13, 1.15, and 1.24 respectively compared to passenger cars (see Table 2).

## Conclusions

Based on crash data recorded in the FARS database, the following conclusions can be made regarding the relationship between pedestrian fatality rates and the body type of the striking vehicle.

Pedestrian fatality rates have declined across all 16 combinations of the four age groups (0-3, 4-7, 8-15, and 16 years and older) and four striking vehicle body types (passenger cars, sport utility vehicles, pickups, and vans) included in this study.

The largest drop in pedestrian fatality rates for all four striking vehicle body types was experienced by children age 4 to 7 years old. Rates dropped the most for all four age groups when the striking vehicle was a passenger car, while these rates dropped the least when the striking vehicle was a van.

Sport utility vehicles, pickups, and vans fatally injured pedestrians at a higher rate than passenger cars during the period 1997-2001, with the greatest difference seen among children under 8 years old. This trend may be attributable to the greater size of sport utility vehicles, pickups, and vans, and/or the frontal configuration of these vehicles which does not allow smaller pedestrians who are being struck to roll up onto the vehicle. The drivers of higher elevated vehicles with a larger frontal configuration also may be more likely to have their view of smaller child pedestrians obstructed.

NCSA will continue to monitor these issues and report new findings as they become available.



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