



Passenger Vehicles in Untripped Rollovers

SUMMARY

Approximately 214,700 passenger vehicles roll over annually in crashes that are severe enough to require towing. Of these, around 7,900 or 3.7%, are untripped. Untripped rollovers are those for which there is no other apparent cause than normal surface friction. Not surprisingly, most (around 7,500) of these untripped rollovers are on-road.

Untripped rollovers account for around 4.4% of rolled passenger vehicles in single-vehicle crashes annually.

BACKGROUND

The National Automotive Sampling System Crashworthiness Data System (NASS CDS) is a survey of all crashes in the United States that involve damage to a passenger vehicle (car, light truck or van) of sufficient severity to require towing. From 1992 through 1996, 3,578 passenger vehicles (unweighted) in the NASS CDS were coded as having undergone some type of rollover.

Of these, the breakdown by rollover initiation mechanism was:

Trip over.....	1,701
Turn over (also called untripped).....	267
Other.....	1,412
Unknown.....	198

A trip over is the most common type of rollover. A turn over is one in which the only cause is ordinary friction, i.e., an untripped rollover. The "other" category includes, among others, bounce overs and collisions

with another vehicle. Difficulties arise in estimating the extent of the untripped rollover experience for two reasons. One is that, after the fact, disagreement can exist in distinguishing between a trip over and a turn over. Also, while the other known rollover types are extremely unlikely to actually be untripped, the passenger vehicles coded as unknown type are generally merely cases for which information was no longer available at the time of the inspection.

In 1998, all of the 267 rolled vehicles originally coded as untripped and 43 cases originally coded as trip over in the 1992-1996 NASS CDS were revisited by the NASS Quality Control Zone Centers. The Zone Centers disagreed in 190 of the cases originally coded as untripped. The Calspan Corporation, under contract to the American Automobile Manufacturers Association (AAMA), in an audit of these cases, had disagreed with the original coding in 160 cases. This analysis uses the Zone Centers' determinations and, therefore, presents a lower estimate of the actual number of untripped rollovers than would be the case using Calspan's numbers. In addition, when the Zone Centers re-examined 43 cases that had been coded as trip over, 1 was changed to turn over. None of the 198 rollovers that had been coded as unknown type were re-examined.

As a result of this review of former NASS cases, measures have been implemented to enhance the collection of rollover data in NASS. For example, all wheels and rims of rolled vehicles are now photographed. In 1997, 1.85% (weighted) of the passenger vehicle rollovers were coded as untripped, but, as this was a sample size of 15, it will require more years of data to estimate the actual magnitude of the effect of these measures.

OUTLINE OF METHODOLOGY

A passenger vehicle rollover is usually designated "unknown" type only if the NASS investigator is unable to inspect the crash site before evidence is lost. The "unknown" type designation usually does not stem from any characteristic of the crash itself. Therefore, the rollovers of "unknown" type were distributed among the other (known) types in the same proportion as the "known" rollovers. Next, each rollover vehicle that had not been actually audited received an imputed audited turn over status (yes/no) in the following way: If the vehicle was originally coded a turn over, its imputed audited status was "yes" with probability 77/267 since 77 of the 267 cases coded as turn over between 1992 and 1996 were retained as turn overs by the NASS auditors. If the vehicle was originally coded a trip over, its audited status was "yes" with probability 1/43 since one of the audited trip overs was found to have been a turnover. All vehicles with original codes other than turn over or trip over were given an imputed turn over status of "no".

The goal was to create national estimates of the number and proportion of the annual incidence of untripped rollovers. A second goal of the analysis was to estimate the variance of these estimates, taking account of the auditing process. The tacit assumption was made that, when a vehicle actually has been audited, the audited status is correct. Therefore, the estimate of the actual number of untripped rollovers that take place annually is actually the estimated number of rollovers that would have been found to be turn overs if every rollover had been audited.

Because the NASS CDS is a survey rather than a complete census of crashes, the survey weights must be used to create national estimates. Programs were run in SUDAAN in order to estimate the survey standard errors. This process was repeated several times in order to estimate the additional component of

variance due to the distribution of the unknowns and to the imputation process.

The estimate (95.1%) of the percentage of the untripped rollovers that were on road is the weighted estimate based on the 78 verified untripped rollovers. Since imputed values for the variable on which "on-road" is based were not created in this analysis as they were for rollover initiation, no estimates are presented for the standard error of the percentage that were on road.

Since the average annual number of single vehicle passenger vehicle rollovers in the CDS is 179,406 (1992-96), the percentage that are untripped rollovers is $7,866 * 100 / 179,406$ or around 4.4%.

CONCLUSIONS

Based on the NASS CDS 1992-96 and the Zone Centers' review, there are approximately 214,700 passenger vehicle rollovers annually, of which around 3.7 % are untripped. The findings are summarized in Table 1.

Table 1
Annual Passenger Vehicle Rollovers
Estimates Based on CDS 1992-6

	Estimate	Standard Error
Total Rollovers	214,722	34,507
Untripped Rollovers	7,866	2,340
On-Road Untripped	7,481	-
% of Rollovers That are Untripped	3.66	1.10
% of Rollovers That are Both Untripped and On-Road	3.48	-

For additional copies of this research note, please call (202) 366-4198 or fax your request to (202) 366-7078. For questions regarding this research, contact Ellen Hertz, Ph.D. [202-366-5360] of the National Center for Statistics and Analysis. This research note and other general information on highway traffic safety may be accessed by Internet users at <http://www.nhtsa.dot.gov/people/nca>.

