Fatalities to Occupants of 15-Passenger Vans, 1997-2006

Summary
- In 2006, fatalities to occupants of 15-passenger vans reached the lowest level since 1992.
- As compared to 2005, fatalities to occupants of 15-passenger vans that rolled over declined by 50 percent, while overall fatalities declined by 40 percent.
- Fatalities to occupants of 15-passenger vans have been on a downward trend since 2001.
- About 50 percent of the fatalities occurred in heavily loaded (10+ occupants) vans that rolled over.
- About 59 percent of the fatally injured van occupants in rollovers were not restrained.

Introduction
The objective of this research note is to report the fatalities to occupants of 15-passenger vans in the 10-year period from 1997 to 2006. Of particular interest are fatalities that occurred to occupants in 15-passenger vans that rolled over. Prior research (Garrott et al.1, Subramanian2) has shown that heavily loaded 15-passenger vans have a higher rate of rollover than lightly loaded vans. Loading 15-passenger vans to gross vehicle weight (GVW) also moves the center of gravity rearward and upward thereby affecting the stability and handling of the van. The research also points out speed and curved road geometry as factors affecting rollover outcome. Belt use rates among occupants in 15-passenger vans involved in fatal crashes are significantly lower compared to other passenger vehicles. Another research note (Thiriez et al.3) also stressed the importance of properly maintaining the tires in such vans. NHTSA has issued three previous consumer advisories (NHTSA4-6) on the rollover propensity of 15-passenger vans.

Data and Methodology
Data from NHTSA’s Fatality Analysis Reporting System (FARS) has been used in this note. It is important to note that fatal crash data provided in this note should not be used to interpret rollover propensity of 15-passenger vans, as such an interpretation would be based on a small domain of crashes. Fatalities are a subsequent event to rollover causation where the crashworthiness of the vehicles and other factors such as restraint use play a role in the severity of injuries.

The 15-passenger vans were identified in FARS using the Vehicle Identification Number (VIN). Only Chrysler, Ford, and General Motors manufacture vans that can be configured to seat 15 passengers. The Dodge 15-passenger van was discontinued in 2002.

Results
Figure 1 depicts fatalities to occupants of 15-passenger vans involved in all fatal crashes and in those vans that rolled over. Fatalities, both overall and in vehicles that rolled over, have been on a downward trend since 2001.

Figure 1: Fatalities (Total and in Rollovers) to Occupants Of 15-Passenger Vans, 1997-2006

Source: NCSA FARS 1996-2005 (Final), 2006 (ARF) Files
Table 1 depicts the numbers underlying Figure 1. In 2006, fatalities, both overall and in vehicles that rolled over, were the lowest in the 10-year period from 1997 to 2006.

**Table 1: Fatalities (Total and Rollovers) to Occupants of 15-Passenger Vans, 1997-2006**

<table>
<thead>
<tr>
<th>Crash Year</th>
<th>Total</th>
<th>Number</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>108</td>
<td>69</td>
<td>64%</td>
</tr>
<tr>
<td>1998</td>
<td>112</td>
<td>71</td>
<td>63%</td>
</tr>
<tr>
<td>1999</td>
<td>116</td>
<td>76</td>
<td>66%</td>
</tr>
<tr>
<td>2000</td>
<td>112</td>
<td>91</td>
<td>81%</td>
</tr>
<tr>
<td>2001</td>
<td>130</td>
<td>91</td>
<td>70%</td>
</tr>
<tr>
<td>2002</td>
<td>108</td>
<td>70</td>
<td>65%</td>
</tr>
<tr>
<td>2003</td>
<td>127</td>
<td>65</td>
<td>51%</td>
</tr>
<tr>
<td>2004</td>
<td>120</td>
<td>69</td>
<td>58%</td>
</tr>
<tr>
<td>2005</td>
<td>99</td>
<td>60</td>
<td>61%</td>
</tr>
<tr>
<td>2006</td>
<td>58</td>
<td>26</td>
<td>45%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,090</strong></td>
<td><strong>688</strong></td>
<td><strong>63%</strong></td>
</tr>
</tbody>
</table>

Source: NCSA FARS 1996-2005 (ARF) and 2006 (Final) Files

Also shown in Table 1 are fatalities in vans that rolled over, as a proportion of total occupant fatalities in 15-passenger vans. Since reaching a high of 81 percent of total fatalities in 2000, this proportion has been on a downward trend. In fact, in 2006, about 45 percent of 15-passenger-van occupant fatalities occurred in vans that rolled over. Table 2 depicts the number of 15-passenger vans, total and those that rolled over, involved in fatal crashes from 1997 to 2006.

**Table 2: 15-Passenger Vans (Total and Rollovers) Involved in Fatal Crashes, 1997-2006**

<table>
<thead>
<tr>
<th>Crash Year</th>
<th>Total</th>
<th>Number</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>127</td>
<td>42</td>
<td>33%</td>
</tr>
<tr>
<td>1998</td>
<td>158</td>
<td>53</td>
<td>34%</td>
</tr>
<tr>
<td>1999</td>
<td>150</td>
<td>45</td>
<td>30%</td>
</tr>
<tr>
<td>2000</td>
<td>131</td>
<td>55</td>
<td>42%</td>
</tr>
<tr>
<td>2001</td>
<td>147</td>
<td>66</td>
<td>45%</td>
</tr>
<tr>
<td>2002</td>
<td>133</td>
<td>50</td>
<td>38%</td>
</tr>
<tr>
<td>2003</td>
<td>144</td>
<td>46</td>
<td>32%</td>
</tr>
<tr>
<td>2004</td>
<td>150</td>
<td>47</td>
<td>31%</td>
</tr>
<tr>
<td>2005</td>
<td>124</td>
<td>34</td>
<td>27%</td>
</tr>
<tr>
<td>2006</td>
<td>110</td>
<td>20</td>
<td>18%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,374</strong></td>
<td><strong>458</strong></td>
<td><strong>33%</strong></td>
</tr>
</tbody>
</table>

Source: NCSA FARS 1996-2005 (ARF) and 2006 (Final) Files

In 2006, about 18 percent of 15-passenger vans involved in fatal crashes rolled over—the lowest proportion in the last 10 years. Table 3 depicts the number of 15-passenger vans involved in fatal crashes by the occupancy level and rollover occurrence. In the period from 1997 to 2006, in fatal crashes, 25 percent of the 15-passenger vans with fewer than 10 occupants rolled over compared to 70 percent of the vans with 10 or more occupants.

**Table 3: 15-Passenger Vans (Total and Rollovers) Involved in Fatal Crashes, by Occupancy 1997-2006**

<table>
<thead>
<tr>
<th>Year</th>
<th>Fewer Than 10 Occupants</th>
<th>10 or More Occupants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>In Rollovers</td>
</tr>
<tr>
<td>1997</td>
<td>102</td>
<td>26</td>
</tr>
<tr>
<td>1998</td>
<td>125</td>
<td>30</td>
</tr>
<tr>
<td>1999</td>
<td>123</td>
<td>28</td>
</tr>
<tr>
<td>2000</td>
<td>103</td>
<td>35</td>
</tr>
<tr>
<td>2001</td>
<td>113</td>
<td>39</td>
</tr>
<tr>
<td>2002</td>
<td>105</td>
<td>30</td>
</tr>
<tr>
<td>2003</td>
<td>112</td>
<td>24</td>
</tr>
<tr>
<td>2004</td>
<td>130</td>
<td>33</td>
</tr>
<tr>
<td>2005</td>
<td>115</td>
<td>26</td>
</tr>
<tr>
<td>2006</td>
<td>96</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,124</strong></td>
<td><strong>285</strong></td>
</tr>
</tbody>
</table>

Source: NCSA FARS 1996-2005 (ARF) and 2006 (Final) Files

15-passenger vans that rolled over in fatal crashes. In comparison, in vans that had fewer than 10 occupants, 49 percent of the fatalities occurred when the vans rolled over. This could simply be ascribed to the increased rollover propensity under heavily loaded conditions.

**Table 4: Occupant Fatalities in 15-Passenger Vans (Total And Rollovers, by Occupancy 1997-2006**

<table>
<thead>
<tr>
<th>Year</th>
<th>Fewer Than 10 Occupants</th>
<th>10 or More Occupants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>In Rollovers</td>
</tr>
<tr>
<td>1997</td>
<td>59</td>
<td>28</td>
</tr>
<tr>
<td>1998</td>
<td>67</td>
<td>33</td>
</tr>
<tr>
<td>1999</td>
<td>68</td>
<td>34</td>
</tr>
<tr>
<td>2000</td>
<td>58</td>
<td>41</td>
</tr>
<tr>
<td>2001</td>
<td>66</td>
<td>41</td>
</tr>
<tr>
<td>2002</td>
<td>61</td>
<td>28</td>
</tr>
<tr>
<td>2003</td>
<td>79</td>
<td>27</td>
</tr>
<tr>
<td>2004</td>
<td>79</td>
<td>36</td>
</tr>
<tr>
<td>2005</td>
<td>69</td>
<td>34</td>
</tr>
<tr>
<td>2006</td>
<td>38</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>644</strong></td>
<td><strong>318</strong></td>
</tr>
</tbody>
</table>

Source: NCSA FARS 1996-2005 (ARF) and 2006 (Final) Files

Table 5 depicts the restraint use among the occupants of 15-passenger vans that rolled over in fatal crashes. Unknown restraint use has been proportionally distributed to the belted and unbelted categories. As seen in
Table 5, in the period from 1997 to 2006, about 67 percent of the occupants in 15-passenger vans involved in fatal crashes were unrestrained. This compares to about 55 percent for occupants of passenger vehicles (NHTSA7).

**Table 5: Restraint Use of Occupants of 15-Passenger Vans Involved in Fatal Crashes That Rolled Over 1997-2006**

<table>
<thead>
<tr>
<th>Year</th>
<th>Restrained Number</th>
<th>Restrained %</th>
<th>Unrestrained Number</th>
<th>Unrestrained %</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>95</td>
<td>28%</td>
<td>242</td>
<td>72%</td>
<td>337</td>
</tr>
<tr>
<td>1998</td>
<td>191</td>
<td>43%</td>
<td>259</td>
<td>57%</td>
<td>450</td>
</tr>
<tr>
<td>1999</td>
<td>117</td>
<td>32%</td>
<td>246</td>
<td>68%</td>
<td>363</td>
</tr>
<tr>
<td>2000</td>
<td>116</td>
<td>27%</td>
<td>306</td>
<td>73%</td>
<td>422</td>
</tr>
<tr>
<td>2001</td>
<td>156</td>
<td>30%</td>
<td>370</td>
<td>70%</td>
<td>526</td>
</tr>
<tr>
<td>2002</td>
<td>158</td>
<td>44%</td>
<td>199</td>
<td>56%</td>
<td>357</td>
</tr>
<tr>
<td>2003</td>
<td>130</td>
<td>32%</td>
<td>277</td>
<td>68%</td>
<td>407</td>
</tr>
<tr>
<td>2004</td>
<td>133</td>
<td>38%</td>
<td>214</td>
<td>62%</td>
<td>347</td>
</tr>
<tr>
<td>2005</td>
<td>70</td>
<td>31%</td>
<td>158</td>
<td>69%</td>
<td>228</td>
</tr>
<tr>
<td>2006</td>
<td>41</td>
<td>24%</td>
<td>132</td>
<td>76%</td>
<td>173</td>
</tr>
<tr>
<td>Total</td>
<td>1,199</td>
<td>33%</td>
<td>2,411</td>
<td>67%</td>
<td>3,610</td>
</tr>
</tbody>
</table>

Source: NCSA FARS 1996-2005 (ARF) and 2006 (Final) Files

Table 6 depicts the restraint use of fatally injured occupants of 15-passenger vans that rolled over. Unknown restrain use has been proportionally distributed between restrained and unrestrained counts. In the period from 1997 to 2006, about 83 percent of the fatally injured occupants of 15-passenger vans that rolled over were unrestrained. In fact, every seating position in a 15-passenger van is equipped with a lap/shoulder belt or a lap belt.

**Table 6: Restraint Use of Fatally Injured Occupants of 15-Passenger Vans That Rolled Over 1997-2006**

<table>
<thead>
<tr>
<th>Year</th>
<th>Restrained Number</th>
<th>Restrained %</th>
<th>Unrestrained Number</th>
<th>Unrestrained %</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>6</td>
<td>8%</td>
<td>63</td>
<td>92%</td>
<td>69</td>
</tr>
<tr>
<td>1998</td>
<td>13</td>
<td>18%</td>
<td>58</td>
<td>82%</td>
<td>71</td>
</tr>
<tr>
<td>1999</td>
<td>12</td>
<td>16%</td>
<td>64</td>
<td>84%</td>
<td>76</td>
</tr>
<tr>
<td>2000</td>
<td>14</td>
<td>16%</td>
<td>77</td>
<td>84%</td>
<td>91</td>
</tr>
<tr>
<td>2001</td>
<td>13</td>
<td>14%</td>
<td>78</td>
<td>86%</td>
<td>91</td>
</tr>
<tr>
<td>2002</td>
<td>19</td>
<td>27%</td>
<td>51</td>
<td>73%</td>
<td>70</td>
</tr>
<tr>
<td>2003</td>
<td>10</td>
<td>16%</td>
<td>55</td>
<td>84%</td>
<td>65</td>
</tr>
<tr>
<td>2004</td>
<td>19</td>
<td>28%</td>
<td>50</td>
<td>72%</td>
<td>69</td>
</tr>
<tr>
<td>2005</td>
<td>11</td>
<td>18%</td>
<td>49</td>
<td>82%</td>
<td>60</td>
</tr>
<tr>
<td>2006</td>
<td>3</td>
<td>12%</td>
<td>23</td>
<td>88%</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>17%</td>
<td>570</td>
<td>83%</td>
<td>714</td>
</tr>
</tbody>
</table>

Source: NCSA FARS 1996-2005 (ARF) and 2006 (Final) Files

As seen in Table 7, the summer months (June through August), show an elevated level of the number of fatal rollovers involving 15-passenger vans as well as the resulting fatalities. In fact, about a third of fatalities in rollovers involving 15-passenger vans occur in the summer months. This increase could simply be an artifact of increased use of 15-passenger vans during those months.

**Table 7: Fatal Rollovers Involving 15-Passenger Vans and Fatalities, by Month, 1997-2006**

<table>
<thead>
<tr>
<th>Month</th>
<th>Rollovers Number</th>
<th>Rollovers %</th>
<th>Fatalities Number</th>
<th>Fatalities %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec–Feb</td>
<td>113</td>
<td>25%</td>
<td>152</td>
<td>22%</td>
</tr>
<tr>
<td>Mar–May</td>
<td>110</td>
<td>24%</td>
<td>162</td>
<td>24%</td>
</tr>
<tr>
<td>Jun–Aug</td>
<td>144</td>
<td>31%</td>
<td>225</td>
<td>33%</td>
</tr>
<tr>
<td>Sep–Nov</td>
<td>91</td>
<td>20%</td>
<td>149</td>
<td>22%</td>
</tr>
<tr>
<td>Total</td>
<td>458</td>
<td>100%</td>
<td>688</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: NCSA FARS 1996-2005 (ARF) and 2006 (Final) Files

Other Information of Interest

NHTSA’s statute at 49 U.S. Code §30112 requires that conventional 12- to 15-passenger vans cannot be sold or leased, as new vehicles, to carry students to/from schools and child day-care facilities on a regular basis.

Electronic stability control (ESC) was introduced as standard equipment for all model year 2004 and later.

As of July 1, 2006, the latest year for which registration data is available, there were nearly 560,000 15-passenger vans registered in the United States (Polk6).

Conclusions

Fatalities, both total and in vans that rolled over, have been on a declining trend since 2001. Restraint use continues to be low among occupants of 15-passenger vans involved in fatal crashes. The summer months show a slightly elevated level of fatal rollovers and fatalities among 15-passenger vans that simply could be a result of increased use of these vans during those months.
References


This research note was authored by Rajesh Subramanian, a team leader in the Mathematical Analysis Division. If you have any questions about the information presented in this report, please send an e-mail to rajesh.subramanian@dot.gov or contact the National Center for Statistics and Analysis at 800-934-8517.
REDUCING THE RISK OF ROLLOVER CRASHES IN 15-PASSENGER VANS

Fifteen-passenger vans typically have seating positions for a driver and 14 passengers. They are widely used by community organizations to take members on short trips and outings. Colleges use them to drive sports teams to intercollegiate games and vanpools use them for commuters.

What increases the risk of rollover crashes?
Recent research conducted by the National Highway Traffic Safety Administration (NHTSA) has found that the risk of a rollover crash is greatly increased when 10 or more people ride in a 15-passenger van. This increased risk occurs because the passenger weight raises the vehicle's center of gravity and causes it to shift rearward. As a result, the van has less resistance to rollover and handles differently from other commonly driven passenger vehicles, making it more difficult to control in an emergency situation. Placing any load on the roof also raises the center of gravity and increases the likelihood of a rollover.

What situations can cause a rollover?
A rollover crash is a complex event, heavily influenced by driver and road characteristics as well as the design of the vehicle. In studies of single-vehicle crashes, NHTSA has found that more than 90 percent of rollovers occur after a driver has lost control of the vehicle and has run off the road. Three major situations can lead to a rollover in a 15-passenger van.

- The van goes off a rural road. If this occurs, the van is likely to overturn when it strikes a ditch or embankment or when it is tripped by an object or runs onto soft soil.

- The driver is fatigued or driving too fast for conditions. A tired driver can doze off and lose control. The driver can also lose control when traveling at a high speed causing the van to slide sideways off the road. The grassy or dirt medians that line highways can often cause the van to overturn when the tires dig into the dirt.

- The driver overcorrects the steering as a panic reaction to an emergency or to a wheel dropping off the pavement. Especially at freeway speeds, this situation can cause the driver to lose control, resulting in the van sliding sideways and rolling over.

What can organizations do to protect their passengers?
Over the past decade, 80 percent of people killed in rollover crashes in 15-passenger vans were unbelted. Passengers can dramatically reduce their risk of being killed or seriously injured in a rollover crash by simply using their seat belts. Organizations that own 15-passenger vans should have a written seat belt use policy. Drivers should be responsible for enforcing the policy.

Seat belt use is especially critical because large numbers of people die in rollover crashes when they are partially or completely thrown from the vehicle. NHTSA estimates that people who wear their seat belts are about 75 percent less likely to be killed in a rollover crash than people who don’t.

Does an experienced driver make a difference?
Significant differences in the design and handling characteristics of a 15-passenger van make it drive differently from other passenger vehicles. Therefore, an organization that owns a 15-passenger van should select one or two experienced drivers to drive the van on a regular basis.
These drivers will gain valuable experience handling the van. This experience will help make each trip a safe one.

**How can rollover crashes be prevented?**

Because most rollover crashes don’t involve other vehicles, they are often preventable. Here are some tips for drivers to minimize the risk of a rollover crash and serious injury:

- Avoid conditions that lead to a loss of control. Never drive while under the influence of alcohol or other drugs. Make sure you are well rested and attentive, and always slow down if the roads are wet or icy.
- Drive cautiously on rural roads. Be particularly cautious on curved rural roads and maintain a safe speed to avoid running off the road.
- Know what to do if your wheels drop off the roadway. If your wheels drop off the roadway, or pavement, *gradually* reduce speed and steer back onto the roadway when it is safe to do so.
- Properly maintain your tires. Make sure your tires are properly inflated and the tread is not worn down. Worn tires can cause your van to slide sideways on wet or slippery pavement. Improper inflation can cause handling problems and can lead to catastrophic tire failures, such as blowouts. Therefore, check tire pressure and treadwear once a month.

**What are other considerations for safe driving?**

When a 15-passenger van is not full, passengers should sit in seats that are in front of the rear axle.

More than 15 people should never be allowed to ride in a 15-passenger van.

Because a 15-passenger van is substantially longer and wider than a car, it:

- Requires more space and additional reliance on the side-view mirrors for changing lanes
- Does not respond as well to abrupt steering maneuvers
- Requires additional braking time.