

# Worldwide Trends in Impaired Driving: Past Experience and Future Progress

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## **Abstract**

In the past 20 years, considerable progress has been made in reducing impaired driving in many developed countries. What strategies have been most effective in bringing about this progress? What is needed for further progress to occur? This paper will address these questions and provide an overview of trends in alcohol impaired driving in countries around the world.

Most European countries, as well as the United States, Canada, and Australia, were successful in significantly reducing impaired driving crashes throughout the 1980s and 1990s. These reductions appear to have resulted from changing public attitudes about drinking and driving, more effective laws, and vigorous enforcement that has deterred drinking and driving. Some countries have continued to make progress while in many countries this progress has stalled.

New efforts seem to be needed to take us to the next step in safety. Stronger implementation of known effective strategies may help. Perhaps even more promising, technological advances may provide ways of both controlling the behavior of known drinking drivers and preventing impaired driving among the general population. Vehicle-based technologies include alcohol ignition interlocks that can be installed on the cars of known impaired drivers. These devices are already available and their wider use could have a significant impact on safety. Technologies in development can use a variety of devices to assess whether a driver is impaired by alcohol or other problems and can prevent driving while unfit. These devices would be passive and unobtrusive to the unimpaired driver, coming into play only when illegal alcohol levels or significant other impairment are detected.

While many strategies for reducing the toll of impaired driving are known and in development, the most important factor is often the political will to make needed changes and investments. This paper will also address ways in which researchers, citizen advocates, and policy makers can motivate and facilitate change.

## **Introduction**

In the past 20 years, considerable progress has been made in reducing alcohol impaired driving in many developed countries. This progress, however, has been uneven. In some cases, progress has been stalled or even eroded. In other cases it has continued. Analysis of these trends provides information regarding the strategies that have been most effective in bringing about progress and

the problems that have impeded progress. This analysis also suggests what is needed for further progress to occur.

This paper summarizes recent trends in alcohol impaired driving in a number of industrialized countries around the world and discusses the reasons for the changes that have occurred, and reviews current programs designed to produce further reductions in impaired driving. It also suggests how progress may be continued, both through reinvigoration of existing effective strategies and the adoption of emerging technologies. Finally, it will discuss how awareness and involvement by advocates, policy makers, and researchers can assist in the implementation of needed changes.

## **Worldwide Trends in Alcohol Impaired Driving**

In the decade of the 1980s, there were impressive declines in drinking and driving in much of the industrialized world. The declines included about 50% in the Great Britain, 28% in Canada and The Netherlands, 32% in Australia, 37% in Germany and 26% in the U.S. Suggested reasons for the declines included improved laws, enhanced enforcement, and public awareness brought about by citizens' concern. Other possible explanations included lifestyle changes, demographic shifts, and economic conditions. The magnitude and reasons for the worldwide decline varied from country to country<sup>1</sup>. These declines did not continue in the early part of the 1990s. In some countries, there were actually increases<sup>2</sup>. Toward the middle and latter part of the decade the increases stabilized and we again began to see some decreases. However, these decreases have been at a slower rate than the dramatic decreases in the 1980s<sup>3</sup>. Approaching the end of the 1990s and early in the new century, the record has been mixed<sup>4</sup>. In the last few years, some countries (France and Germany) continued to reduce drinking and driving while in other countries (Australia, Canada, the Netherlands, Great Britain and the United States), there has been stagnation and in some cases small increases or even a large increase in the proportion of alcohol related fatalities, as was the case in Sweden<sup>5</sup>.

It is important to keep in mind that comparisons among countries are complicated by differing methods in each country of measuring and reporting alcohol involvement in traffic crashes. For example, definitions vary on such basic items as, *fatality*, *alcohol-involved drivers* and *legal limit*. In addition, the number of drivers in fatal crashes tested for alcohol varies from country to country and it is not possible to know in some cases whether these drivers are representative of drivers in fatal crashes as a whole. While it is not meaningful to compare the record of one country against another, it is useful to examine the trends in each country.

**Australia** - The percentage of fatally injured drivers and motorcycle riders who had a BAC above the legal limit decreased from 44 percent in 1981 to 30 percent in 1992. (Most of the country had a legal limit of .05% during this period.) There was also a general corresponding decrease in the percentage of drivers found in roadside breath alcohol surveys above .08% from 1979 to 1992. The observed decline in drink driving was accompanied by a decline in alcohol consumption. The quantity of absolute alcohol consumption per person aged 15 years and over decreased by 26 percent from 1981-1983 to 1991. There was a marked change in beer drinking, with low alcohol beer assuming an increasing proportion of beer sales.

The reductions in drinking and driving (through 1992) most likely resulted from a combination of: 1) the widespread use of random breath testing, 2) formal and informal publicity about drink driving and its possible consequences, 3) other factors include the increased use of seat belts (now close to 100 percent), and other vehicle safety measures<sup>6</sup>.

Not much progress has occurred since 1992. From 1988 to 1992, alcohol related fatalities declined from 43% to 35%. From 1992 to 2003, the percentage was fairly steady, ranging from 35% to

39%. The exact number of alcohol related fatalities is not available as the percentage of alcohol related fatalities noted above is based only on those fatalities where there is a known BAC. Total fatalities dropped from 2,887 in 1988 to 1755 in 1998. Since then the number of fatalities has fluctuated from a high of 1817 in 2000 to a low of 1583 in 2004. There were 1601 fatalities in 2006. Figure 1 shows the total fatalities from 1988 to 2006 and the proportion of alcohol related fatalities, where known, from 1988 to 2001<sup>7,8</sup>.

Place Figure 1 here

**Canada** - Previous research has shown that during the 1980s in Canada there was a reasonably consistent and rather dramatic decline in the percent of fatally injured drivers who were positive for alcohol<sup>9</sup>. The downward trend was clearly interrupted in 1991 when the percentage of fatally injured drinking drivers positive for alcohol increased to 48%. But this increase occurred because the number of fatally injured non-drinking drivers declined but the number of fatally injured drinking drivers remained relatively stable. The percentage of fatally injured drinking drivers remained at 48% in 1992. This reflects a decrease in both the numbers of non-drinking and drinking fatally injured drivers. From 1992 to 1999, there was an annual decline in the percentage of fatally injured drivers who tested positive for alcohol – i.e., a decrease from 48% in 1992 to 33% in 1999. The level achieved in 1999 was the lowest point reached in the past three decades and this downward trend strongly suggested a resurgence of the declines in the magnitude of the alcohol-fatal crash problem characteristic of the 1980s. In fact, both the decades of the 1980s and 1990s witnessed an initial increase in the magnitude of the problem followed by a consistent and comparable drop – reductions of about 30% in both of these decades. From 1992 to 1999, the absolute number of drinking drivers decreased by 38% while the percentage of fatally injured drivers who tested positive for alcohol was reduced by 31%.

Since 1999, the percent of fatally injured drivers with positive BACs has fluctuated between 35% and 38%<sup>10</sup>. The number of motor vehicle deaths involving a drinking driver has also fluctuated in the range of 800 to 900 from 1999 to 2005. Figure 2 shows the number and percent of motor vehicle deaths involving a drinking driver in Canada from 1995 to 2005<sup>11</sup>.

Place Figure 2 here

**France** - From 1983 to 2002 the number of injury crashes (with and without alcohol involvement) was reduced by more than half and from 1990 by almost one third (216,139 in 1983, 162,573 in 1990 and 105,470 in 2002). The number of fatally injured victims in alcohol and non-alcohol related crashes has also been reduced (from 11,946 in 1983, to 10,289 in 1990, and 7,242 in 2002). There has also been a reduction in seriously injured victims (from 79,447 in 1983, to 52,578 in 1990 and 24,091 in 2002). The lowering of the BAC legal limit to 0.5% from 1996 would have been expected to increase the proportion of drivers over the legal limit, but this does not appear to be the case. The data show that the prevalence of illegal alcohol levels as well as the proportion of alcohol related crashes did not increase and even tended to diminish since the end of the 90s, especially for fatal crashes. This progress is attributable to the massive alcohol screening enforcement. The number of random breath tests has risen steadily from the late 1980s to reach a high of 9.7 million in 2000<sup>12</sup>.

In the last few years, policies and public attitudes about driving have changed radically in France. The new policy includes dramatically stronger enforcement of speed limits with the installation of 1,000 speed cameras, tougher penalties, and heavy media campaigns designed to stigmatize road violations as “road violence” and “road delinquency.” This new policy, which started in July 2002 has had remarkable effects, decreasing traffic fatalities by 39% from 7,720 in 2001 to 4,709 in 2006. It has also decreased injuries (from approximately 150,000 per year to approximately 100,000 per year today). While the target of this new policy was speed, not impaired driving,

vigorous enforcement also had an impact on impaired driving crashes. During this period, the proportion of alcohol related fatalities (where known) declined from 30.7% to 28.1% while the prevalence of positive BAC among all drivers has not changed (2.42% in 2004 to 2.46% in 2005). One logical conclusion from these trends is that as drivers drive more slowly, crashes are less severe. With a similar level of alcohol impairment among drivers, fewer fatalities occur. In fact, the proportion of alcohol related crashes varied very little through the years, but as the total number of crashes has decreased significantly, alcohol followed the general pattern and alcohol related crashes are much less numerous nowadays than ten or even three years ago. Figure 3 shows the total number of fatalities in road crashes in France and the percentage of alcohol related fatalities, where BAC test results were known.

Place Figure 3 here

One interpretation of the observed trend is that the presence of alcohol in traffic fatalities may not be influenced only by measures and policies concerning alcohol, but also by all the other types of traffic safety measures. In France, significant increases in speed enforcement also had a positive impact on alcohol related crashes; drivers drive more slowly (there was a major decrease of average speed during this period), crashes are less severe, and the same presence of alcohol results in fewer fatalities. This phenomenon needs confirmation by future data, and it would be interesting to see if similar results can be obtained in other industrialized countries <sup>13</sup>.

**Germany** - In the years after unification till 1993 trends in road accident in general and especially alcohol related crashes worsened in the former East Germany. Figures from 1994 to 2002 show in general a stabilisation and improvement of the road accident development throughout the country, especially with respect to related injuries and fatalities. But in 2002, the decrease of alcohol related crashes and casualties was lower than expected after the lowering of the BAC-limit to 0.5%. <sup>14</sup>

In 2005, 22,004 alcohol related injury crashes and 603 fatalities were registered in the official German accident database. These figures represent 6.5% of all injury crashes and 11.2% of all road accident fatalities. From 1995 to 2005 fatalities in road crashes declined from 9,454 to 5,361 – a drop of 43%. In that same time period, alcohol related fatalities declined from 1,716 to 603 – drop of 65%. The share of alcohol related fatalities declined from 18.2% to 11.2% - a drop of 38%. The proportion of accident-involved road users influenced by alcohol decreased from 4.9 to 3.4% between 1995 and 2005 whereas the share of alcohol related casualties was reduced from 9.8 to 6.5% during the same period of time. Looking further back to 1975, the overall development of the number of casualties from 1975 to 2005 follows an even stronger downward trend. Fatalities in general have been reduced by more than two thirds from 17,011 fatalities in 1975 to 5,361 fatalities in 2005 – reducing the number of fatalities in alcohol related crashes by more than 80% from 3,461 fatalities in 1975. Progress continued in 2006 and 2007; there were 5,091 fatalities in road crashes in 2006 and 4,958 in 2007. In 2006, 599 of these were alcohol related and in 2007 565 were alcohol related. Figure 4 shows the trend for total fatalities and alcohol related fatalities from 1994 to 2006. <sup>15</sup>

Place Figure 4 here

The overall trends in alcohol related injury crashes in Germany can be described as extremely positive, although the consequences of these crashes are still more severe than those of others.

**The Netherlands** - During the last 35 years the Dutch government was very successful in reducing drink driving. Increased enforcement levels, legal amendments and technological developments, along with national publicity campaigns and educational programs, resulted in a downward trend of drink driving as measured by roadside testing. The proportion of alcohol related

fatalities decreased as well, although not to the same extent as the proportion of drink drivers on the road<sup>16</sup>.

After a period with a more or less stable proportion of illegal BACs in roadside testing, the drink-driving trend decreased from 2003 to present. In 2003, special regional traffic enforcement units were established in all Dutch police regions, resulting in a higher enforcement level. At the same time new mass media campaigns were held and the proportion of offenders dropped from 4.1% in 2002 to 3.0% in 2006. However, the decline was solely visible among lower BAC levels ( $\leq 0.13\%$ ). Despite efforts of police and government, the proportion of high BAC offenders ( $> 0.13\%$ ) did not decrease significantly over the past six years. Although the overall proportion drink-driving offenders dropped since 2000, the proportion of high-BAC drivers remained the same, however.<sup>17</sup> In absolute terms the number of alcohol related traffic fatalities decreased between 2003 and 2006, since the total number of traffic fatalities in the Netherlands dropped by a quarter during the same period, from 1,028 to 730<sup>18</sup>.

Young male drivers are at particularly high risk. While they represent only 4% of the population they are involved in 13% of the serious injury crashes. In the case of drink driving their involvement is even higher. Males from 18-24 form nearly a quarter of all alcohol-intoxicated drivers who are involved in serious injury crashes.<sup>19</sup>

**Sweden** - For a number of years, Sweden enjoyed a position as an example of successful work against drunk driving and its consequences. In the years around 1990 the proportion of alcohol related fatalities declined sharply – coming down from 31% in 1989 to 18% in 1997. This decline has a number of plausible causes. Firstly, on July 1, 1990, the legal BAC limit was lowered to 0.02% from the previous level of 0.05%. This step was evaluated by the Swedish Crime Prevention Council and they concluded that the lowering of the limit was associated with a 7% reduction of overall, with an 11% reduction of single-vehicle crashes and with a 10% reduction of fatal crashes.<sup>20</sup> However, the lowering of the limit coincided with a very deep recession in the Swedish economy, which reduced the proportion of young people who obtained their drivers licenses during the first year after having reached the license age by some 40%. This was also very favorable for road safety and this contribution may account for some 30% of the total effect of the lowering of the limit. Second, drinking-and-driving enforcement increased drastically and reached a peak in 1994, going from approximately 600,000 random breath tests per year to 1.8 million. Third, the penalties for drinking driving were upgraded. Finally, resources for attitudinal work directed towards ages 15 to 24 were tripled<sup>21,22</sup>.

Sweden joined the European Union in 1996. This meant, among other things, that it had to accept a gradual loss of its restrictive alcohol policies. The alcohol monopoly was partly broken; the ban on alcohol advertising now only applies to hard liquor; the import restrictions have been reduced. In conjunction with recent reduction of alcohol taxes in Germany and Denmark, the pressure is now tremendously high on the Swedish Government to lower alcohol taxation. All of the deregulation moves which have been forced upon Sweden have led to a tremendous increase of alcohol consumption in the Swedish society. In 1996, the total alcohol consumption level for persons older than 15 years of age was 8 liters of pure alcohol per year. In 2004, this figure had risen to 10.5 liters. Instead of the 25% decrease which was the World Health Organization goal, Sweden was faced with an increase of more than 25%. The relationship between total alcohol consumption and drinking and driving was studied in 1997 and it was found that if consumption increases by 1 liter, drinking and driving increases by 11% and fatal crashes by 8%.<sup>23</sup> There were also many more conflicts between transportation needs and consumption of alcohol.<sup>24</sup>

In parallel with this development, Sweden has seen a 30% reduction of police enforcement of the 0.02% limit; in 1998, 68% of drivers charged with gross DUI were sentenced to imprisonment – in 2002, the proportion was down to 42%; in the same period, the resources for attitudinal “don’t-

drink-and-drive” campaigns were more than halved. Unfortunately, the records also demonstrate that these factors have contributed to a corresponding increase in the involvement of alcohol among fatally injured drivers. The percentage of fatally injured drivers who had been drinking had risen from 18% in 1997 to 42% by 2006.<sup>25</sup> Figure 5 shows the total fatalities in Sweden and the proportion of fatally injured alcohol positive car drivers.

Place Figure 5 here

The absolute number of alcohol positive fatalities remains almost exactly the same since 2000, The proportion has increased because of a decrease in the total number of fatalities. The total number of road fatalities in Sweden declined from near 600 in 2000 to fewer than 450 in 2006 (preliminary data indicates an increase to 470 total fatalities in 2007)<sup>26</sup>, while the number of alcohol related fatalities remained fairly constant at around 140. The importance of enforcement in general and of RBT in particular is illustrated by results indicating that an increase of the number of breath tests by 100,000 per year saves three to four lives.<sup>27</sup>

**Great Britain** - The level of drink driving has been continually and consistently monitored in Great Britain since the late 1960s. A clear relationship is evident between the percentage of drivers killed in crashes who were over the UK limit (0.08%) and the level of roadside breath tests conducted. Not until the introduction of evidential breath testing in police stations in 1983 did the situation radically change. This allowed a substantial increase in the number of roadside tests that could be carried out with the same traffic police resources. These increased from 200,000 per year in 1982 to 800,000 in 1998, with a consequent reduction in the level of drink driving. The percentage of driver fatalities over the drink drive limit dropped from around 30% to 20 % over the same period. Although not independent of other activities such as Department for Transport anti-drink-drive campaigns this shows clearly the value of increased police roadside enforcement in reducing drink driving. Indeed in the late 1990s and onwards despite sustained high levels of anti-drink-drive campaigning there is evidence that reductions in the levels of roadside breath testing are again leading to increased levels of drink driving.<sup>28</sup> The number of people killed in drink-drive crashes fell to a low of 460 deaths in 1998, but has since risen, to an estimated 540 deaths in 2006. The number of roadside screening breath tests reached a peak of 816,000 in 1998, and fell steadily to 534,000 in 2003, but increased to 578,000 in 2004. The total number of road fatalities declined steadily from around 5,200 in 1990 to 3,650 in 1994. For the next ten years there was no clear pattern, as fatalities varied between 3,400 and 3,600. Fatalities did decline further to 3,221 in 2004 and to 3,172 in 2006.<sup>29</sup> Figure 6 shows the total number of fatalities and the estimates of fatalities involving illegal BACs (.08%).

Place Figure 6 here

**United States** - After 15 years of decline, in the last decade, the percentage of fatal crashes that involve alcohol has stalled at about 40%. From 1982 to 1999, rates of alcohol related (BAC >.00) crashes declined, as did the total number of alcohol related crashes in the United States. In 1982, there were 26,173 alcohol related fatalities in the United States, 60 percent of the total number of people killed on U.S. roadways. By 1999, that percentage had fallen to 40 percent and alcohol related fatalities fell to 16,572; decreases of 33.3% and 36.7% respectively. The most dramatic declines occurred from 1982 to 1994.<sup>30</sup>

Unfortunately, in 2006 there were increases in the number and rate of alcohol related fatalities. In fact, the number of people killed in alcohol related crashes was the highest since 1992. In 2006, alcohol related fatalities rose slightly (17,590 in 2005 to 17,602 in 2006). Since the number of total deaths in crashes dropped in 2006 (42,642 compared to 43,510 in 2005) there was an increase in the percentage of alcohol related traffic fatalities to 41 percent (up from 40 percent in 2005 and 39

percent in 2003 and 2004).<sup>31</sup> Figure 7 shows the total and alcohol related fatalities in the U.S. from 1982-2006.

Place Figure 7 here

Some have argued that the decrease in alcohol related crashes in the last 25 years resulted from a reduction in impaired driving by the easy-to-deter drinking drivers, whereas the “hard core” drinking drivers remain to be controlled. Evidence, however, does not indicate a change in the characteristics of crash-involved drinking drivers during the last 20 years. Reductions in fatalities have occurred equally at all BAC levels. It is apparent that policies, enforcement levels, geographic, and other factors play a role in determining the level of alcohol involvement in traffic crashes in the U.S. States vary widely in the involvement of alcohol in fatal crashes with state-to-state percentages of fatal crashes involving alcohol ranging from 13% to 55% in 2005.<sup>32</sup>

The lack of progress may in part result from the fact that, while many effective strategies are well known, they are not implemented as widely or as vigorously as possible. For example, as discussed above, many countries have experienced a significant decrease in alcohol impaired crashes along with the implementation of strong random breath testing enforcement programs. In the U.S., while random breath testing is not legally permissible, sobriety checkpoints (which have been shown to have similar impacts) are widely permitted – but not widely used.<sup>33</sup> Thus, stronger implementation of effective strategies could result in further progress.

### **Future Progress**

As is apparent from the discussions above, the worldwide trends in alcohol impaired driving have some common threads and many variations. Most countries experienced declines in total road fatalities and alcohol related crashes and fatalities from the early 1980s to the early 1990s. In the first half of the new century, progress in many countries has stalled while in France and Germany, both total and alcohol related fatalities have continued to fall through 2006.

Stronger laws, vigorous enforcement, and changes in social norms have all contributed to the progress that has been made. A number of countries found a strong link between levels of enforcement (especially random and roadside breath tests) and the alcohol related fatalities. When the number of breath tests increased, the alcohol related fatalities dropped. When the number of tests dropped, alcohol related fatalities increased. Complacency and a deflection of attention to other issues in recent years have been difficult to overcome in some countries. Harmonization of traffic safety laws in the European Union has strengthened laws in some countries but threatens existing strong policies in others.

Despite the potential for better implementation of existing strategies, especially vigorous enforcement, the argument can be made that we are approaching the limits of policy and deterrence to suppress impaired driving. This possibility, along with the dramatic advances in technology, has led some advocates and policy makers to promote the wider application of technological approaches to preventing impaired driving.<sup>34</sup> One promising approach is wider implementation of alcohol interlocks for impaired driving offenders. Interlocks require the driver to provide a breath sample before starting the vehicle. If an unacceptable level of alcohol is present in the breath, the vehicle will not start. Interlocks have been shown to be effective in reducing recidivism when used. More states in the U.S. are passing laws mandating interlocks for more offenders, including first offenders in some instances. Other countries are also considering adoption of this approach as well as the use of interlocks in commercial fleets or for drivers of public transportation. The technology for interlocks is well developed.

New technologies are being explored that could be applied to all vehicles to prevent operation by drivers who are over the legal limit for alcohol or who are otherwise impaired. A public-private

partnership has been formed in the United States to help facilitate the development of in-vehicle alcohol detection systems. These systems would be designed to be transparent to the driver so that they would not intrude upon non-impaired drivers. These technologies may be farther in the future, but have the potential for a dramatic impact on impaired driving.<sup>35</sup>

### **The Role of Advocates**

Progress in the impaired driving field requires economic and social investments that are usually made reluctantly. All countries have competing priorities and pressing needs. Traffic deaths and injuries often do not get the same attention as more exotic or dramatic tragedies – even though they constitute one of the major threats to health and welfare in all countries. Advocacy groups have played important roles in some countries in bringing about the kinds of changes needed to bring about the progress that has already occurred. In the United States, victims organizations have played a key role in bringing attention to the tragedies caused by impaired driving and calling for changes in laws and enforcement priorities.<sup>36</sup> Mothers Against Drunk Driving (MADD) is the most well known of these groups and is currently focusing on its Campaign to Eliminate Drunk Driving, which includes an emphasis on the kind of enforcement that has been so important worldwide in the past. The major thrust, however, is the adoption of alcohol interlocks more widely and on the new vehicle technologies that can prevent impaired driving.<sup>37</sup>

### **Conclusions**

Significant progress in reducing impaired driving has been made in many developed countries around the world. Vigorous enforcement seems to be one component that is associated with progress. Future progress may rely on the widespread application of technologies that can prevent driving while impaired by alcohol. Advocacy groups may play an important role in bringing needed attention to impaired driving and motivating change.





Figure 5 Sweden-Total fatalities & proportion of fatally injured alcohol positive car drivers

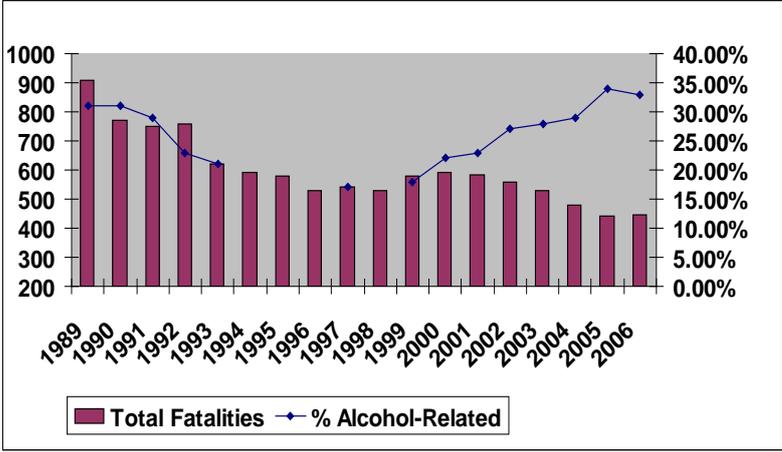


Figure 7: U.S. total & alcohol related fatalities  
1982-2006  
Source: NHTSA

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