What's New in Alcohol, Drugs and Traffic Safety in the U.S.

James C. Fell

National Highway Traffic Safety Administration, NTS-20, 400 Seventh Street, SW, Washington, DC 20590, USA

ABSTRACT

Alcohol involvement in fatal traffic crashes has decreased 30% over the past twelve years but still accounts for over 40% of traffic fatalities. Other drugs are also a significant problem in fatal crashes but nowhere near the extent of alcohol. New impaired driving goals have been set in the USA that will take bold new strategies to realize. New research in strategic advertising, alternative transportation, enforcement procedures and target populations hold promise to form the foundation for these new strategies.

ALCOHOL

Alcohol involvement in fatal traffic crashes declined in the United States (USA) from close to 60% in the early 1980s to about 50% by 1990. More recently, another substantial decline occurred with the proportion involving alcohol dropping from 50% in 1990 to 44% in 1993. The National Highway Traffic Safety Administration (NHTSA) defines a fatal traffic crash as being alcohol-involved or alcohol-related if either a driver or pedestrian/bicyclist had a blood alcohol concentration (BAC) of .01 g/dl (.01%) or greater. Any crash which involves a driver (or pedestrian/cyclist) with a BAC of .10% or greater is considered to be a "high alcohol" involved crash. Since BAC tests are not given to all active participants in fatal crashes (i.e. drivers, pedestrians or bicyclists), an estimation procedure using discriminant function analyses is used in NHTSA's Fatal Accident Reporting System (FARS) to determine these percentages (Klein, 1986).

NHTSA uses another procedure to estimate the number of lives that were saved each year since 1982 due to this remarkable decrease in alcohol involvement in fatal crashes. In 1982, the base year for this analysis, a total of 43,945 people were killed in traffic crashes. Using the discriminant function analysis, 57.3%, or 25,165 fatalities, were the result of a crash where either a driver, or a pedestrian or bicyclist (if they were involved), had some alcohol in their blood systems (.01% or greater) at the time of the crash. The other 18,780 fatalities (42.7%) were the result of crashes where alcohol was not involved. In order to estimate the lives saved due to the reduction of alcohol in fatal crashes, there should be some control over any changes in that may have occurred in non-alcohol related fatalities. These fatalities are assumed to be the result of influences other than alcohol such as crash speeds, restraint usage, vehicle size, and so on. A straight forward way to control for the non-alcohol related fatalities each year is to obtain their number, and then make the assumption that they represent 42.7% of the total traffic fatalities each year beyond 1982 (NHTSA, 1991). When this procedure is applied to the year 1983, for example, it reveals the following:

There were 42,589 total traffic fatalities in 1983, with 55.5% involving alcohol (23,646) while 44.5% were non-alcohol related (18,943). If the 18,943 non-alcohol related fatalities represented 42.7% of the total traffic fatalities (as they did in 1982) then 18,943 divided by .4273523 gives an estimated total of 44,326 fatalities that *would have occurred*. The difference between the estimated 44,326 and the real total of 42,589 fatalities in 1983 was 1737. This difference of 1737 represents the *lives saved* due to the reduction in alcohol involvement from 57.3% in 1982 to 55.5% in 1983. Table 1 shows the application of this method from 1983 through 1993.

Table 1 indicates that during the period from 1983 to 1993, a total of 81,042 lives were saved due to the reduction in alcohol involvement in fatal crashes. In 1993 alone, there were 12,895 fewer fatalities than were expected due to this decrease in alcohol from the base level in 1982.

Table 1
Lives Saved Due to Reduction in Alcohol Involvement in Fatal Crashes 1982-1993

Year	Total Traffic Fatalities	Alcohol-Related Fatalities		Non-Alcohol Fatalities		Estimated Total Fatalities if Alcohol had Remained at 1982 Level	Lives Saved Due to Reduction in Alcohol Related Fatalities
		Percent	Number	Percent	Number		
1982	43,945	57.3	25,165	42.7	18,780		
1983	42,589	55.5	23,646	44.5	18,943	44,326	1,737
1984	44,257	53.7	23,758	46.3	20,499	47,967	3,710
1985	43,825	51.8	22,716	48.2	21,109	49,395	5,570
1986	46,087	52.2	24,045	47.8	22,042	51,578	5,491
1987	46,390	51.0	23,641	49.0	22,749	53,232	6,842
1988	47,087	50.2	23,626	49.8	23,461	54,898	7,811
1989	45,582	49.2	22,436	50.8	23,178	54,236	8,654
1990	44,599	49.5	22,084	50.5	22,515	52,685	8,086
1991	41,508	47.9	19,887	52.1	21,621	50,593	9,085
1992	39,235	45.1	17,699	54.9	21,536	50,394	11,159
1993	40,115	43.5	17,461	56.5	22,654	53,010	12,895
Total Lives Saved Due To Reduction In Alcohol Involvement Since 1982 =							81,042

While there is ample evidence that lower BAC levels (.01-.09%) may cause driving impairment and do increase the risk of fatal crash involvement (Moskowitz and Robinson, 1988; Zador, 1991; Snyder, 1991) there is much more agreement that high levels of alcohol (BACs .10% or greater) are causally related to crashes. One NHTSA sponsored study

showed that between 74% and 90% of drivers injured in crashes with BACs of .10% or greater were considered culpable for their crash (Terhune, 1982). Table 2 shows the same method applied to the fatalities from 1983 to 1993, but using only the "high alcohol" related fatalities (where the BAC of the driver, pedestrian or bicyclist was .10% or greater). Table 2 indicates that the total lives saved due to the reduction in high alcohol involvement in fatal crashes from 1983 to 1993 was 57,585. The estimates of lives saved shown in Tables 1 and 2 are very similar to those found in another published study which used much more sophisticated and complex methods of estimation (Evans, 1990).

In summary, NHTSA estimates that between 57,575 and 81,042 lives have been saved since 1982 due to the decrease in alcohol involvement in fatal crashes.

Table 2
Lives Saved Due to Reduction in High Alcohol Involvement in Fatal Crashes 1982-1993

Year	Total Traffic Fatalities	High Alcohol-Related Fatalities (BAC > .10)		Fatalities Without High Alcohol Involvement		Estimated Total Fatalities if High Alcohol had Remained at 1982 Level	Lives Saved Due to Reduction in High Alcohol Related Fatalities
		Percent	Number	Percent	Number		
1982	43,945	46.3	20,356	53.7	23,589		
1983	42,589	45.0	19,174	55.0	23,415	43,621	1,032
1984	44,257	42.9	18,992	57.1	25,265	47,067	2,810
1985	43,825	41.3	18,111	58.7	25,713	47,902	4,077
1986	46,087	41.1	18,936	59.0	27,151	50,581	4,494
1987	46,390	39.9	18,529	60.1	27,861	51,903	5,513
1988	47,087	39.8	18,731	60.2	28,356	52,826	5,739
1989	45,582	39.2	17,863	60.8	27,720	51,639	6,057
1990	44,599	39.6	17,650	60.4	26,949	50,204	5,605
1991	41,508	38.4	15,930	61.6	25,578	47,650	6,142
1992	39,235	36.0	14,124	64.0	25,111	46,780	7,545
1993	40,115	34.9	13,982	65.1	26,133	48,684	8,569
Total Lives Saved Due To Reduction In High Alcohol Involvement Since 1982 =							57,585

DISCUSSION

There are two major assumptions in the use of this procedure to estimate lives saved: (1) that alcohol somehow caused or contributed to the occurrence of these fatal crashes, and (2) that

alcohol programs to reduce drinking and driving did not significantly affect fatal crashes where alcohol was not involved. Certainly a very high percentage of the high BAC crashes (.10%+) can be attributed to alcohol. It is less known what proportion of the low BAC cases (.01-.09%) can be associated with alcohol use. There is no evidence that the more prominent alcohol programs affected public travel or safety belt usage, for example. It is possible that police enforcement efforts (e.g. sobriety checkpoints) may affect the speeding or otherwise reckless driving behavior of non-drinking drivers, but there is no evidence of this either. An increase in safety belt usage by the public occurred during the years studied. But most of the lives saved due to these increases were in non-alcohol related crashes since drinking drivers rarely wear safety belts. Had safety belt usage increases occurred for drinking drivers at the same rate as non-drinking drivers, even more alcohol related lives may have been saved than reported here.

The reasons for this remarkable decrease in alcohol involvement in fatal crashes include (CDC, 1993):

- a greater public awareness of the problem and the increasing social unacceptability of drinking and driving,
- more effective legislation such as prompt license suspension for persons who drive while intoxicated, lower illegal BAC per se limits for adults (.10 g/dl and .08 g/dl) and for youth (.02 g/dl for under age 21),
- increased enforcement in the form of sobriety checkpoints and saturation patrols,
- raising the minimum drinking age to 21 in all states and a decrease in the youth population, and
- a decrease in the per capita alcohol consumption in the U.S.

DRUGS

While drugs, other than alcohol, continue to be a highway safety problem in the USA, the magnitude and extent of the problem is much lower than alcohol. A national study of close to 2,000 fatally injured drivers conducted in 1990-91 in seven states in the USA revealed the following (Terhune et al, 1993) (see also Table 3):

- Alcohol was found in 52 percent of the driver fatalities.
- Drugs other than alcohol were found in 18 percent of these fatalities.
- 64 percent of the drug cases also had alcohol.
- A drug was detected without alcohol in only 6.3 percent of the driver fatalities.
- Abuse drugs (.e.g., marijuana, cocaine) were found most frequently in the 25-54 age group.
- Marijuana and cocaine were found more frequently in urban crashes than in rural ones.
- Prescription drugs were found most frequently in the over 55 age group.
- Drugs were found mostly in males.
- Over 90% of drivers who had BACs ≥ .08 were responsible for their crashes.

- The differences in crash responsibility rate between all of the frequently occurring drug groups and the drug free group were found to be statistically insignificant.

Table 3
Most Frequently Occurring Drugs

	Alone	With Alcohol	Other Comb.	Total
Marijuana	1.1%	5.1%	.5%	6.7%
Cocaine	.5%	4.3%	.5%	5.3%
Tranquilizers	.8%	1.8%	.3%	2.9%
Amphetamines	.7%	.9%	.3%	1.9%

A recent study of drivers arrested for reckless driving in Memphis, Tennessee resulted in wide media coverage with reports that two-thirds of these drivers were under the influence of drugs. In fact, the published report (Brookoff et al, 1994) revealed that 175 drivers arrested for reckless driving were suspected by police of being impaired, but tested negative for alcohol. Of the 150 in this group who consented to a urine sample, 59% tested positive for drugs other than alcohol (cocaine and marijuana). The 59% actually represents a "hit-rate" of police suspicions. These arrested drivers were acting impaired, but not by alcohol, and 59% had cocaine and marijuana in their urine. This does *not* mean 59% of drivers arrested for reckless driving were on drugs. The study does not report the proportion of drivers arrested for reckless driving who were impaired by alcohol (we suggest it was high), nor does it report the total number of drivers arrested for reckless driving during the study period. These numbers would be necessary to keep the findings in paper perspective.

In summary, drugs other than alcohol appear to be present in about 18% of fatally injured drivers, but most of the time in combination with alcohol. Some drivers arrested for reckless driving are under the influence of drugs other than alcohol, but certainly nowhere near 59%.

NEW RESEARCH

While the lives saved due to the recent decline in alcohol involvement in fatal crashes in the USA is encouraging, preliminary estimates show that alcohol was still involved in 42% of the 1994 traffic fatalities resulting in 16,884 deaths. The U.S. Secretary of Transportation convened a meeting in February 1995 with over 100 representatives of government, private industry and citizen activists in order to set new goals and develop new strategies in a concerted effort against impaired driving. The goal set for the year 2005 in the USA is to reduce alcohol-related fatalities to no more than 11,000. If this goal can be met, 6,000 lives will be saved annually, and an estimated 323,400 injuries will be avoided each year, saving our society over $11 billion in costs ($1.4 billion in health care costs). In order to reach this goal, the "Partners in Progress" representatives agreed that bold new strategies must be taken (U.S. Department of Transportation, 1995).

NHTSA at present is conducting research in the following areas in order to develop the foundation for some new, bold strategies:

- Target populations -- NHTSA has identified at least three target groups where more information is needed and more research is necessary in order to develop strategies to affect these high risk drivers. These include (1) young drivers under age 21, (2) young drivers, legal drivers aged 21-34, and (3) repeat driving while intoxicated (DWI) offenders.
- Strategic Advertising -- A project has identified a group of high risk drivers using a marketing database to detail their demographic lifestyle profiles. The findings indicate that high-risk male drinking drivers can be most influenced by their spouses/girl-friends. Ways are now being explored on how these women can intervene (without confrontation) before these high risk males drive after their drinking.
- Surveys -- NHTSA is conducting numerous drinking driving surveys which promise to reveal what values, decisions, principles and norms have the best potential to affect this behavior.
- Alternative Transportation -- NHTSA will be exploring ways to increase the use of the designated driver programs found in most U.S. communities, but also other methods such as subsidized taxis and shuttle buses.
- Enforcement Procedures -- Existing laser technology will be tested at sobriety checkpoint sites to detect any amount of alcohol in the air of the passenger compartment of the vehicles passing by. This will give police officers reason to check further to determine if drivers are impaired, open container laws are violated, or underage drinking is taking place in the vehicle.
- Crash Risks -- NHTSA is conducting a study of BAC levels in crash drivers and on-the-road drivers in order to calculate the relative risk of crash involvement at various BAC levels (replication of Borkenstein study).
- Drugs -- NHTSA is conducting a study of the incidence of alcohol and other drugs in the blood systems of drivers injured in crashes.

All of this new research will provide a basis for new strategies which must be taken in the USA if we are to achieve our goal in 2005.

CONCLUSIONS

In order to continue this downward trend in alcohol-related fatalities and drinking and driving in general, states and communities must implement new strategies in addition to adopting the legislation and enforcement measures mentioned above. Examples of additional strategies include stronger sanctions for repeat drinking and driving offenders (e.g., license plate tagging, vehicle impoundment or confiscation, alcohol ignition interlock devices), graduated licensing systems for beginning drivers (e.g., learner's permit, then a provisional license, then a full license) and improved enforcement procedures for detecting drinking drivers (e.g., use of passive alcohol sensors at sobriety checkpoints). The public health impact of alcohol-impaired driving underscores the need for even more intensified efforts by traffic safety, public health, police, judicial, and citizen activist organizations.

REFERENCES

Brookoff, D, Cook, CS, Williams, C, and Mann, CS, "Testing Reckless Drivers for Cocaine and Marijuana", University of Tennessee, New England Journal of Medicine, Vol. 331, No. 8, August 25, 1994.

CDC. Reduction in alcohol-related traffic fatalities--United States, 1990-1992. MMWR 1993; 42: 905-9

Evans, L, "The Fraction of Traffic Fatalities Attributable to Alcohol," Accident Analysis and Prevention, 1990, 22:6, 587-602.

Klein, TM, "A Method for Estimating Posterior BAC Distributions for Persons Involved in Fatal Traffic Accidents," Sigmastat, Inc., sponsored by U.S. Department of Transportation, Washington, D.C., DOT HS 807 094, July 1986.

Moskowitz, H and Robinson, DC, "Effects of Low Doses of Alcohol on Driving-related Skills: A Review of Evidence," SRA Technologies, Inc., sponsored by U.S. Department of Transportation, Washington, D.C., DOT HS 807 280, July 1988.

NHTSA and Federal Highway Administration, "Moving America More Safely", US Department of Transportation, Washington, DC, 1991.

Snyder, MB, "Alcohol Limits for Driver: A Report on the Effects of Alcohol and Expected Institutional Responses to New Limits, A Report to Congress," National Highway Traffic Safety Administration, Washington, D.C., DOT HS 807 692, April 1991.

Terhune, KW, Ippolito, CA, et al, "The Incidence and Role of Drugs in Fatally Injured Drivers", Calspan Corporation, sponsored by U.S. Department of Transportation, NHTSA, Washington, DC, DOT HS 808 065, October, 1993.

Terhune, KW, "The Role of Alcohol, Marijuana, and other Drugs in the Accidents of Injured Drivers," Calspan Field Services, Inc., sponsored by U.S. Department of Transportation, Washington, DC, DOT HS 806 199, January 1982.

U.S. Department of Transportation, "Partners in Progress: National Impaired Driving Goals and Strategies for 2005", Washington, DC, DOT HS 808 246. April 1995.

Zador, P, "Alcohol-Related Risk of Fatal Driver Injuries in Relation to Driver Age and Sex," Journal of Studies on Alcohol, 1991, 52:4, 302-310.