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Technical Report

Alcohol Involvement in Fatal Traffic Crashes 1987

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16. Abstract

This report describes the magnitude of the alcohol related fatal crash problem in the United States, highlights the circumstances under which fatal crashes are associated with alcohol, and presents recent trends in alcohol related fatal traffic crashes. Data are presented which describe the general characteristics of these crashes, and their participants.

The data in this report were obtained from the Fatal Accident Reporting System (FARS) maintained by the National Highway Traffic Safety Administration. FARS data includes the results of chemical blood alcohol tests administered to drivers involved in fatal crashes where they are available from police. These blood-alcohol concentration (BAC) tests form the basis for the statistics contained in this report. Because of the large number of cases where BAC is missing, a statistical procedure is employed to estimate BAC for those cases where it is unknown.

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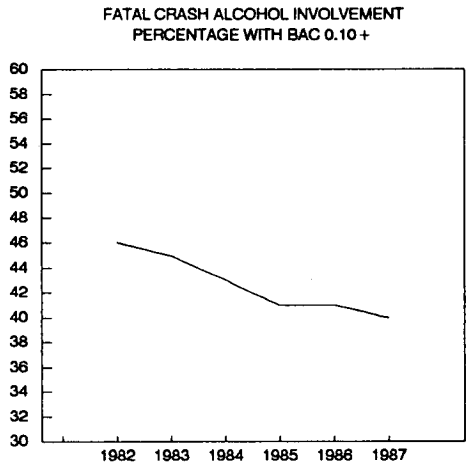
EXECUTIVE SUMMARY

This report presents estimates of alcohol involvement in fatal traffic crashes that occurred during 1987. Several comparisons of alcohol involvement for the period 1982-1987 are also presented to illustrate changes and trends. These data are abstracted from the Fatal Accident Reporting System (FARS) and represent a combination of actual blood alcohol concentration (BAC) test results and estimated BAC distributions for those drivers and non-occupants for whom no BAC test results are available. These estimates are made using a model developed by the National Highway Traffic Safety Administration.

In 1987, 40.0% of all fatal crashes involved a driver or non-occupant with BAC of 0.10 or greater (in this report, a BAC of 0.10 or more is synonymous with intoxication). This represents a reduction of slightly more than 13% compared to 1982, when 46.1% of all fatal crashes involved an intoxicated active participant. Occupant fatalities resulting from crashes involving an intoxicated driver or non-occupant totalled 15,444. Almost 50% of the occupant fatalities in single-vehicle crashes involved an intoxicated driver, compared with 31.3% of the occupant fatalities in multi-vehicle crashes. Slightly less than 40% of the fatalities in non-occupant crashes involved an intoxicated driver or non-occupant.

More than two-thirds (68.7%) of the fatally-injured drivers in single-vehicle fatal crashes on weekend nights were drunk, compared to 3.3% of the surviving drivers in multi-vehicle fatal crashes during weekday daytime hours. Overall, male drivers involved in fatal crashes were almost twice as likely as female drivers to be drunk (27.6% vs. 15.0%, respectively). Drivers of age 25-29 years exhibited the highest rates of intoxication (34.4%) followed by drivers of age 21-24 (34.1%). Of the drivers 16-20 years old involved in fatal crashes, 21.0% were intoxicated.



As shown in the figure at left, the overall trend in fatal crashes involving an intoxicated participant alcohol has declined from 46.1% in 1982 to 40.0% in 1987 .

Much of this reduction is due to a dramatic drop in the estimated proportion of fatal crashes involving intoxicated drivers aged 16 to 20. The percent of drivers in this category has declined from an estimated 31% in 1982 to 21% in 1987, a reduction of

almost 33%. The decline has been consistent, each year experiencing a lower involvement rate than the previous. This reduction in overall involvement rates has occurred across all hours of the day, and days of the week. For example, weekend nightime fatal crashes involving intoxicated drivers aged 16 to 20 declined 29% between 1982 and 1987. Daytime weekday fatal crashes involving intoxicated drivers in this age group declined an estimated 39%.

Reductions in fatal crashes involving intoxicated drivers have also occurred for drivers over 44 years, and female drivers.

Reductions in fatal crash alcohol involvement of 18% have been experienced among drivers of passenger cars, and 15.5% among drivers of light trucks and vans. Drivers of motorcycles continue to exhibit a high rate of intoxication in fatal crashes, 38.2% in 1987 compared with 40.5% in 1982.

INTRODUCTION

It is a well-established fact that alcohol plays a major role in fatal crashes. Research has demonstrated that alcohol in a driver's bloodstream greatly impairs one's ability to operate a vehicle safely. Further, impairment can occur at relatively low levels of intoxication.

This report describes the magnitude of the drunk driving problem in the United States, highlights the circumstances under which fatal crashes are frequently associated with alcohol, and shows recent trends in alcohol involvement in fatal crashes.

Method of Presentation

I. Data

FARS contains data on all fatal traffic crashes from each of the States. The data include the results of chemical blood alcohol tests of drivers involved in fatal crashes when they are available. These blood-alcohol concentration (BAC) tests form the basis of the statistics reported here. However, no State reports a BAC value for every driver, for various technical, practical or economic reasons. The number of untested drivers ranges from a few percent in some states to nearly complete absence of testing in others. Although the nationwide BAC reporting rate has risen from about 47% to 73% for fatally-injured drivers and from almost 14% to 22% for surviving drivers during the past eight years, there are still too many unknown BAC values to ignore. Alcohol involvement for drivers with unknown BAC values must be estimated before valid statistics on the role of alcohol in fatal crashes can be determined.

2. Estimation Procedures

Several methods have been used to estimate BAC values for untested drivers. Each method has significant limitations. To overcome many of these, and in particular to estimate BAC values for surviving drivers, the National Center for Statistics and Analysis has developed a method based on discriminant analysis to estimate BAC values for all drivers and non-occupants involved in fatal crashes. The method is documented completely in Reference 2. Briefly, the method estimates unknown BACs from the known BAC data of individuals with similar characteristics (such as sex, crash time, police alcohol indication, and vehicle type). This method was used to produce all statistics in this report.

3. Presentation

BAC test results range from 0.00 to more than 0.30. The numbers represent the amount of alcohol, by weight, per amount of blood, by volume. In practice, BAC test results measure the percentage of alcohol contained in the blood. For the purposes of this report, it is impractical to treat BAC as a continuous variable. In-

stead, BAC is classified into three groups:

- the 0.00 group of drivers whose blood contains no alcohol;
- the 0.01-0.09 group of drivers whose blood contains some alcohol, but less than 0.10 percent; and
- the 0.10+ group of drivers whose BAC is at or above the usual level of legal intoxication.

In the tables of this report, alcohol involvement is typically shown as a percentage of the groups, or a percentage of the high-BAC (0.10+) group only, together with the total number of crashes, drivers, occupants, or non-occupants as appropriate. Note that disaggregated tables may not sum to the aggregate total, due to missing data. For example, the total of day and night crashes is less than the total of all crashes since crash time is unknown for a few crashes.

4. Interpretation of Estimates

All data presented in this report are estimates, not exact counts. Because of the procedure used to estimate missing BAC values, the error of these estimates is not known. However, extensive validation tests suggest that the error of any one estimate is relatively small and, more importantly, does not appreciably affect comparisons such as those in the section on trends.

In addition, it is necessary to emphasize that none of the tabulations presented can be interpreted as implying a direct causal relationship between alcohol use and any other attribute of fatal crashes. Inferences concerning causality can only be made on the basis of additional information that is independent of the FARS data.

5. Reporting Level

Alcohol involvement in motor vehicle crashes is customarily reported for crashes, or for participants. For persons, the BAC status of each active participant (driver, pedestrian, or bicyclist) in the crash is reported individually. For crashes, the entire crash is classified at the highest BAC level of any active participant. Thus, a 0.00 crash is one in which all drivers and non-occupants were sober, a 0.01-0.09 crash had at least one driver or non-occupant at this level but none higher, and a 0.10+ crash had at least one driver or non-occupant at this level.

Section I of this report presents data on fatalities; Section II presents data on crashes; Section III presents data on drivers and non-occupants; and Section IV presents selected trends in alcohol involvement between 1982 and 1987.

SECTION I - FATALITIES

Traffic crashes killed 46,386 persons in 1987. Forty percent (18,529) of these fatalities occurred in crashes in which a driver or non-occupant was drunk. An additional 11% (5,103) of these fatalities involved a driver or non-occupant who had been drinking but whose BAC was between 0.01 and 0.09.

Presented in Table 1 and 2 are the percentage of fatalities for occupants and non-occupants respectively, grouped according to the highest BAC for the crash.

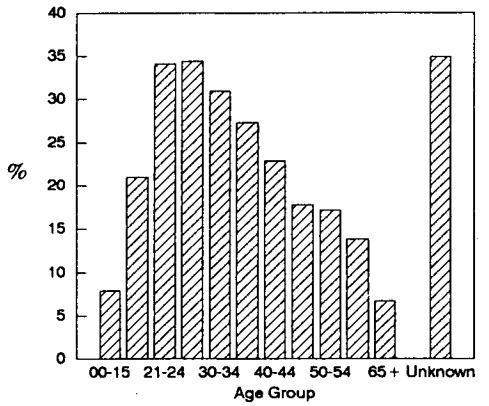


Fig.1-Percentage of Drivers Involved with BAC 0.10+ by Age

Table 1
Occupant Fatalities
By Person Age and Crash BAC
1987

Person Age	0.00	0.01-0.09	0.10+	Total Fatalities
00-15	68.7%	11.3%	20.0%	2,326
16-20	47.9%	16.5%	35.6%	6,972
21-24	33.8%	13.9%	52.4%	5,364
25-29	32.4%	12.4%	55.2%	5,271
30-34	36.2%	9.7%	54.2%	3,746
35-39	40.2%	9.1%	50.7%	2,846
40-44	46.1%	8.6%	45.3%	1,994
45-49	52.0%	8.2%	39.8%	1,491
50-54	55.3%	9.5%	35.2%	1,305
55-64	64.6%	7.6%	27.8%	2,595
65+	80.5%	6.2%	13.3%	4,586
Total	48.7%	11.3%	40.1%	38,558

Table 2
Non-Occupant Fatalities
By Person Age and Crash BAC
1987

Person Age	0.00	0.01-0.09	0.10+	Total Fatalities
00-15	77.8%	7.6%	14.6%	1,578
16-20	42.4%	11.8%	45.8%	594
21-24	30.7%	9.9%	59.4%	553
25-29	27.9%	10.9%	61.3%	659
30-34	27.1%	8.5%	64.4%	552
35-39	27.8%	10.0%	62.2%	482
40-44	34.7%	10.9%	54.4%	435
45-49	33.9%	11.1%	55.0%	350
50-54	40.4%	10.3%	49.3%	317
55-64	46.0%	12.0%	41.9%	682
65+	73.2%	9.0%	17.9%	1,536
Total	50.9%	9.7%	39.4%	7,828

The pattern of occupant fatalities by age group in Table 1 is somewhat similar to that for non-occupants (Table 2) for crashes involving an intoxicated participant, although the peak involvement

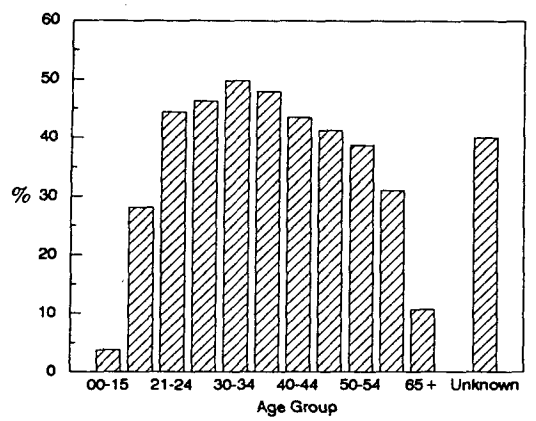


Fig.2-Percentage of Non-Occ. Involved with BAC 0.10+ by Age

age for occupants is slightly lower than for non-occupants (25-29 versus 30-34).

Overall, the proportion of non-occupants who died in crashes (39.5%), involving at least one intoxicated participant, is about the same as occupants (40.1%). However, in comparison to occupant fatalities, the proportion of non-occupant fatalities is higher for all age groups 16 and greater. The distribution of intoxicated non-occupants involved in fatal crashes by their BAC, as opposed to the highest BAC for the crash, is presented in Figure 2.

Table 3
Fatalities
By Crash Type and Crash BAC
1987

Crash Type	0.00	0.01-0.09	0.10+	Total Fatalities
Single-Vehicle	39.2%	11.4%	49.4%	18,606
Multi-Vehicle	57.6%	11.1%	31.3%	19,898
Non-Occupant	50.8%	9.7%	39.5%	7,882

There were almost as many fatalities in single-vehicle as multi-vehicle crashes. However, the proportion of single-vehicle crashes involving high BAC levels is much greater, as shown in Table 3.

Table 4
Fatalities
By Sex and Crash BAC
1987

Sex	0.00	0.01-0.09	0.10+	Total Fatalities
Male	44.2%	11.3%	44.5%	32,628
Female	60.5%	10.3%	29.2%	13,743
Total	49.1%	11.0%	39.9%	46,386

Table 4 presents the BAC distribution of male and female fatalities that occurred in 1987. Of the 32,628 male fatalities, 44.5% occurred in crashes in which a driver or non-occupant had a BAC of 0.10 or greater, as compared to 29.2% of the 13,743 female fatalities.

SECTION II - CRASHES

In 1987, 41,435 traffic crashes resulted in the death of one or more persons. In 40.0% of these crashes, at least one driver or non-occupant (pedestrian or bicyclist) was at or above the level of intoxication (0.10), as shown in Table 5.

Table 5
Fatal Crash BAC Distribution
1987

0.00	0.01-0.09	0.10+	Total Crashes
49.4%	10.7%	40.0%	41,435

The development of effective countermeasures depends on the ability of safety experts and government agencies to understand the conditions under which drunk driving is particularly prevalent. To assist in this understanding, the summary data of Table 5 are disaggregated to reveal relationships between alcohol and other fatal crash attributes. Note that the disaggregated data may not add up to the crash total of 41,435 due to unknown values for some variables.

1. Day and Time

Alcohol is more prevalent in fatal crashes at night than during the day, and on weekends compared to weekdays. The following tables summarize these findings.

Table 6
Fatal Crash BAC Distribution
By Time of Day
1987

Time	0.00	0.01-0.09	0.10+	Total Crashes
Day *	75.3%	7.5%	17.2%	17,915
Night	29.6%	13.1%	57.4%	23,173

* Day is defined as 6:00 a.m. to 6:00 p.m.

Table 7
Fatal Crash BAC Distribution
By Period of Week
1987

Period	0.00	0.01-0.09	0.10+	Total Crashes
Weekday*	59.7%	9.2%	31.1%	22,970
Weekend	36.5%	12.6%	50.9%	18,367

* Weekday is defined as Monday 6:00 a.m. to Friday 6:00 p.m.

Table 8 classifies fatal crashes by both time of day and day of week . During the day on weekdays, 13.9% of all fatal crashes involve at least one intoxicated driver or non-occupant. On weekends, during the day, this percentage almost doubles. On weekend nights, three-fifths

of all fatal crashes involve one or more intoxicated drivers or non-occupants.

Table 8
Fatal Crash BAC Distribution
By Time of Day and
Period of Week
1987

Period	0.00	0.01-0.09	0.10+	Total Crashes
Daytime				
-Weekday	79.4%	6.7%	13.9%	12,866
-Weekend	64.8%	9.6%	25.6%	5,049
Nighttime				
-Weekday	34.7%	12.2%	53.1%	10,003
-Weekend	25.7%	13.7%	60.6%	13,170

It is apparent from these tables that alcohol involved driving is much more prevalent during non-working hours than during the work day.

2. Crash Type

Fatal crashes may be classified into three groups according to the type of crash:

- Single vehicle crashes, not involving a non-occupant (pedestrian or bicyclist).
- Multi-vehicle crashes, involving two or more vehicles.
- Non-occupant crashes, involving a vehicle and a non-occupant (almost always a single vehicle and a single fatally injured non-occupant).

BAC distributions for these crash types are presented in Table 9.

Table 9
Fatal Crash BAC Distribution
By Crash Type
1987

Crash Type	0.00	0.01-0.09	0.10+	Total Crashes
Single-veh	39.3%	11.1%	49.6%	17,053
Multi-veh	58.9%	10.8%	30.3%	16,675
Non-occup	50.9%	9.6%	39.5%	7,707

These data indicate that the greatest proportion of alcohol related fatal crashes are single vehicle, accounting for almost 50% of all fatal crashes involving at least one intoxicated participant. If non-occupant crashes are also considered single vehicle crashes, this proportion is almost 70%. A comparison of involvement rates by time of day and day of week for single vehicle crashes (excluding non-occupant crashes) is presented in Table 10.

Table 10
Fatal Crash BAC Distribution
By Time of Day and Period of Week
Single-Vehicle Crashes
1987

Period	0.00	0.01-0.09	0.10+	Total Crashes
Daytime				
-Weekday	72.7%	6.3%	21.0%	3,619
-Weekend	58.0%	9.0%	33.0%	2,027
Nighttime				
-Weekday	28.9%	12.1%	59.0%	4,616
-Weekend	22.9%	13.6%	63.5%	6,507

Table 11
Fatal Crash BAC Distribution
By Time of Day and Period of Week
Multi-Vehicle Crashes
1987

Period	0.00	0.01-0.09	0.10+	Total Crashes
Daytime				
-Weekday	82.5%	6.9%	10.7%	6,913
-Weekend	68.9%	10.2%	20.9%	2,379
Nighttime				
-Weekday	40.0%	13.1%	46.9%	3,268
-Weekend	28.4%	15.8%	55.8%	4,099

Table 12
Fatal Crash BAC Distribution
By Time of Day and Period of Week
Non-Occupant Crashes
1987

Period	0.00	0.01-0.09	0.10+	Total Crashes
Daytime				
-Weekday	81.0%	6.9%	12.1%	2,334
-Weekend	71.2%	9.1%	19.7%	643
Nighttime				
-Weekday	39.2%	11.3%	49.5%	2,119
-Weekend	28.3%	10.8%	60.9%	2,564

Note that 66% (11,123/16,769) of the single-vehicle crashes occur after dark, when alcohol involvement is relatively high. In contrast, Table 11 indicates that 56% (9,292/16,659) of the multi-vehicle fatal crashes occur during daytime when alcohol involvement is relatively low.

The alcohol-involvement level of a crash is defined as the highest BAC found among the active participants in the crash. In two-vehicle crashes, this means either of the two drivers; in non-occupant crashes, it means either the driver or the non-occupant. A comparison of the proportion of fatal crashes involving intoxicated participants in multi-vehicle crashes (Table 11) with intoxicated participants in non-occupant crashes (Table 12) suggests there is a trend for a greater proportion of participants in non-occupant crashes to be intoxicated, regardless of time of day or day of week.

Table 13
BAC Distribution
For Drivers and Non-Occupants in
Non-Occupant Crashes
1987

Non-Occ BAC	Driver BAC 0.00	0.01-0.09	0.10+	Total
0.00	50.9%	4.0%	8.5%	63.4%
0.01-0.09	5.0%	0.7%	1.5%	7.2%
0.10+	18.8%	3.4%	7.3%	29.5%
Total	74.7%	8.1%	17.3%	100.1%

Table 13 presents the BAC distribution for drivers and non-occupants (mostly pedestrians) in non-occupant fatal crashes. Row and column totals in Table 13 conclusively demonstrate that non-occupants are legally intoxicated more frequently than are drivers in non-occupant fatal crashes (29.5% as opposed 17.3%).

3. Crash Environment

Fatal crash BAC distributions differ by crash location within each crash type, as shown in Table 14.

Table 14
Fatal Crash BAC Distribution
By Crash Type and Land Use
1987

Crash Type/ Land Use	0.00	0.01-0.09	0.10+	Total Crashes
Single-Veh.				
-Urban	36.9%	11.9%	51.1%	5,589
-Rural	40.5%	10.7%	48.8%	11,445
Multi-Veh.				
-Urban	56.2%	11.0%	32.8%	7,056
-Rural	60.9%	10.6%	28.5%	9,596
Non-Occup.				
-Urban	52.2%	9.8%	38.0%	5,158
-Rural	48.2%	9.4%	42.4%	2,534

Table 15
Fatal Crash BAC Distribution
By Posted Speed Limit
Non-Occupant Crashes
1987

Speed Limit	0.00	0.01-0.09	0.10+	Total Crashes
25 mph	65.3%	7.4%	27.2%	749
30	58.9%	10.4%	30.7%	1,255
35	52.7%	8.4%	38.9%	1,315
40	47.6%	10.1%	42.3%	624
45	44.6%	10.8%	44.6%	857
50	42.6%	9.3%	48.1%	351
55	44.4%	10.1%	45.5%	2,084
60	100.0%	0.0%	0.0%	1
65	44.2%	11.3%	44.5%	119

Note that the percentage of crashes involving intoxication are higher in urban areas for single- and multi-vehicle fatal crashes, while the situation is reversed for non-occupant crashes.

Note also that the proportion of fatal non-occupant crashes involving a BAC of 0.10 or greater tends to increase with speed limit (Table 15).

Table 16
Proportion of High-BAC (0.10+)
Fatal Crashes
By Posted Speed Limit and
Crash Type
1987

Speed Limit	Single Vehicle	Multi-vehicle
25 mph	46.9%	29.7%
30	48.8%	30.6%
35	55.2%	33.8%
40	54.3%	29.7%
45	54.6%	32.9%
50	49.3%	28.4%
55	49.6%	29.4%
60	35.7%	33.4%
65	26.4%	33.5%

There is no evidence of a similar trend for alcohol related single or multi-vehicle crashes; however. (Table 16).

Alcohol involvement in fatal crashes also appears to vary as a function of roadway type; as shown in Table 17 .

Table 17
Proportion of High-BAC (0.10+)
Fatal Crashes
By Crash Type and
Roadway Function Class
1987

Roadway Fct.Class	Single Vehicle		Multi-Vehicle		Non-Occupant	
	Count	Pct	Count	Pct	Count	Pct
Interstate	2,024	34.8	1,343	35.1	707	46.6
Principal Arterial	3,113	47.8	5,865	31.0	2,580	43.5
Minor Arterial	3,067	53.3	4,307	29.6	1,663	38.5
Major Rural Collector	3,094	55.0	2,350	28.8	563	39.8
Local Street/Road	4,011	49.9	1,758	28.0	1,588	32.8

As is apparent, the portion of crashes involving an intoxicated participant (BAC of 0.10 or more) varies both as a function of the type of crash and type of roadway. For example, the highest incidence of single-vehicle fatal crashes in which a participant was intoxicated was on Major Rural Collector and for multi-vehicle fatal crashes it was on the Interstate System. It is also interesting that the highest incidence for non-occupant fatalities is also on the interstate.

SECTION III - DRIVERS AND NON-OCCUPANTS

1. Overview

In 1987, 61,434 drivers were involved in fatal crashes. Of these, 66.8% were sober, 8.2% fell in the 0.01-0.09 group, and 25.0% were at or above a 0.10 BAC. Similarly, of the 7,751 fatally-injured non-occupants, 64.5% were sober, 7.0% fell in the 0.01-0.09 group, and 28.6% were at or above a 0.10 BAC.

Table 18
BAC Distribution of Drivers and Non-Occupants in Fatal Crashes
1987

Person Type	0.00	0.01-0.09	0.10+	Total Persons
All Drivers	66.8%	8.2%	25.0%	61,434
Fat.-Inj.Drivers	53.4%	8.9%	37.7%	26,831
Surv. Drivers	77.2%	7.7%	15.1%	34,603
Fat.-Inj.Non-Occ.	64.5%	7.0%	28.6%	7,751

Table 18 shows that, on the average, drivers surviving a fatal crash are much less frequently drunk than are fatally-injured drivers. Some of this difference may be due to reporting, however,as BAC levels are more frequently known for fatally-injured drivers than for surviving drivers. While the alcohol estimation methodology attempts to correct alcohol underreporting, some bias may still remain. This is true for all major crash types and time periods, as shown in Tables 19-21.

Table 19
BAC Distribution of Drivers and Non-Occupants By Fatal Crash Type
1987

Crash Type/ Person Type	0.00	0.01-0.09	0.10+	Total Persons
Single-Vehicle Crashes				
All Drivers	39.3%	11.1%	49.6%	16,985
Fat.-Inj. Drivers	36.9%	9.4%	53.7%	12,937
Surv. Drivers	47.3%	16.3%	36.5%	4,048
Multi-Vehicle Crashes				
All Drivers	77.6%	7.0%	15.3%	36,191
Fat.-Inj. Drivers	68.8%	8.5%	22.7%	13,804
Surv. Drivers	83.1%	6.1%	10.8%	22,387
Non-Occupant Crashes				
Drivers	75.9%	7.7%	16.4%	8,258
Non-Occupants	64.5%	7.0%	28.6%	7,751

Table 20
BAC Distribution of Drivers By Crash Outcome, Day and Time Multi-Vehicle Fatal Crashes
1987

Crash Outcome	Day/ Time	0.00	0.01-0.09	0.10+	Total Drivers
Fatally-Injured Drivers	Daytime				
	Wkday	87.6%	4.7%	7.7%	5,800
	Wkend	76.6%	7.8%	15.6%	1,848
	Nighttime				
	Wkday	53.9%	10.6%	35.5%	2,813
	Wkend	44.3%	13.9%	41.8%	3,328
Surviving Drivers	Daytime				
	Wkday	94.0%	2.7%	3.3%	9,427
	Wkend	88.9%	4.4%	6.8%	3,348
	Nighttime				
	Wkday	75.6%	8.2%	16.2%	4,135
	Wkend	66.4%	11.4%	22.2%	5,458

In multi-vehicle fatal crashes, about twice as many fatally-injured drivers as surviving drivers are intoxicated, for each category of day and time . The absolute differences range from 4.4 percentage points (weekday daytime) to 19.6 percentage points (weekend nighttime). In single-vehicle crashes, the proportion of intoxicated fatally-injured drivers is approximately 1-1/2 times the proportion for surviving drivers (10.2 to 20.3 percentage points for each category of day and time).

2. Driver Sex

Table 22 indicates that male drivers are intoxicated considerably more frequently than are female drivers. This difference holds for all day and time periods (Table 23).

Table 21
BAC Distribution of Drivers
By Crash Outcome, Day and Time
Single-Vehicle Fatal Crashes
1987

Crash Outcome	Day/ Time	0.00	0.01-0.09	0.10+	Total Drivers
Fatally-Injured Drivers	Daytime				
	Wkday	70.6%	6.0%	23.4%	2,762
	Wkend	54.2%	8.8%	37.0%	1,451
	Nighttime				
	Wkday	26.4%	10.7%	63.0%	3,632
	Wkend	20.7%	10.6%	68.7%	4,827
Surviving Drivers	Daytime				
	Wkday	79.5%	7.3%	13.2%	845
	Wkend	67.7%	9.6%	22.8%	573
	Nighttime				
	Wkday	38.1%	17.6%	44.3%	965
	Wkend	29.1%	22.5%	48.4%	1,651

Differences in alcohol involvement between the sexes are more marked for fatally-injured drivers, as shown in Table 24.

Table 22
BAC Distribution of Drivers
Involved in Fatal Crashes
By Driver Sex
1987

Driver Sex	0.00	0.01-0.09	0.10+	Total Drivers
Male	63.6%	8.8%	27.6%	46,882
Female	79.0%	6.0%	15.0%	13,604

Table 23
BAC Distribution of Drivers
Involved in Fatal Crashes
By Sex, and Crash Day and Time
1987

Driver Sex	Day/ Time	0.00	0.01-0.09	0.10+	Total Drivers
Male Drivers	Daytime				
	Wkday	86.9%	4.2%	9.0%	15,426
	Wkend	74.1%	7.2%	18.6%	5,832
	Nighttime				
	Wkday	52.8%	10.5%	36.7%	10,893
	Wkend	43.3%	12.9%	43.8%	14,454
Female Drivers	Daytime				
	Wkday	92.7%	2.9%	4.4%	5,771
	Wkend	88.3%	3.9%	7.8%	2,029
	Nighttime				
	Wkday	64.6%	8.1%	27.3%	2,597
	Wkend	60.4%	11.1%	28.5%	3,162

3. Driver Age

The overall distribution of alcohol involvement by driver age is shown in Table 25. It is interesting to note that about 8% of the drivers aged 15 or less involved in fatal crashes were found to be intoxicated. The percentage of intoxicated drivers is highest at ages 25-29, and decreases steadily to about 7% for drivers 65 years or older.

Table 24
BAC Distribution of Fatally-Injured Drivers by Sex, and Crash Day and Time
1987

Driver Sex	Day/ Time	0.00	0.01-0.09	0.10+	Total Drivers
Male Drivers	Daytime				
	Wkday	78.9%	5.7%	15.3%	5,997
	Wkend	61.3%	9.3%	29.4%	2,441
	Nighttime				
	Wkday	35.6%	11.0%	53.3%	5,228
	Wkend	27.7%	11.9%	60.4%	6,784
Female Drivers	Daytime				
	Wkday	89.5%	3.6%	6.9%	2,596
	Wkend	82.3%	5.2%	12.5%	868
	Nighttime				
	Wkday	50.3%	8.6%	41.0%	1,240
	Wkend	43.6%	12.1%	44.3%	1,395

The age-alcohol pattern shown here for all drivers in fatal crashes -- a rapid increase to the 21-24 age group, peaking in the 25-29 age group, followed by a slow decrease -- remains unchanged when specific groups are considered, for example driver fatalities or drivers in single-vehicle crashes.

Table 25
Drivers in Fatal Crashes with BAC of 0.10 or Greater
1987

Age Group	Total Drivers	BAC 0.10+ Count	BAC 0.10+ Percent
00-15	470	37	7.9%
16-20	9,911	2,082	21.0%
21-24	8,802	3,003	34.1%
25-29	9,498	3,266	34.4%
30-34	7,056	2,181	30.9%
35-39	5,633	1,536	27.3%
40-44	4,141	944	22.8%
45-49	3,039	541	17.8%
50-54	2,433	415	17.1%
55-64	4,221	583	13.8%
65+	5,078	339	6.7%
Unknown	1,152	402	34.9%

4. Driver Age Groups

Presented in Table 26 are the BAC distributions for drivers in three groups: 15-20, 21-44, and 45 or older. Drivers of age 15-20 years cannot legally purchase alcohol.

Two observations from Table 26 merit special mention.

- The percentages of legally intoxicated drivers in the three age groups differ markedly from each other.
- The percentage of persons with a BAC of 0.01-0.09 decreases with increasing age.

Tables 27 and 28 disaggregate the fatal crash driver BAC distribution by crash

Table 26
Fatal Crash Driver BAC Distribution
By Age Group
1987

Driver Age	0.00	0.01-0.09	0.10	Total Drivers
15-20	67.1%	12.2%	20.7%	10,194
21-44	60.3%	8.6%	31.1%	35,130
45+	83.1%	4.2%	12.7%	14,771

type, day, and time. Only the percentage of fatally-injured intoxicated drivers (BAC 0.10+) group is presented.

For both single and multi-vehicle fatal crashes, drivers of age 21-44 years have the highest alohol involvement in each day and time class.

Table 27
Percentage of Fatally-Injured Drivers with High BAC (0.10+) in Single-Vehicle Crashes By Driver Age and Crash Day and Time
1987

Period	Driver Age Groups 15-20	21-44	45+
Daytime			
-Weekday	11.4%	31.8%	18.4%
-Weekend	24.6%	45.9%	27.5%
Nighttime			
-Weekday	45.7%	69.6%	54.4%
Weekend	51.9%	75.9%	61.8%

Table 28
Proportion of Fatally-Injured Drivers with High BAC (0.10+) in Multi-Vehicle Crashes By Driver Age and Crash Day and Time
1987

Period	Driver Age Groups 15-20	21-44	45+
Daytime			
-Weekday	5.6%	11.8%	4.7%
-Weekend	7.8%	23.1%	9.9%
Nighttime			
-Weekday	21.9%	45.0%	21.4%
-Weekend	27.4%	50.9%	26.9%

5. Vehicle Class

All but 6% of the vehicles involved in fatal crashes fall into one of the following categories:

- Motorcycles,
- Passenger cars,
- Light trucks and vans,
- Medium trucks, or
- Heavy trucks.

Table 29 shows the number of vehicles of each type involved in fatal crashes in 1987, together with the BAC distribution of their drivers. The highest proportion of intoxicated drivers are motorcyclists, followed by drivers of light trucks, vans, and passenger cars.

Table 29
Fatal Crash Driver BAC Distribution
By Vehicle Type
1987

Vehicle Type	0.00	0.01-0.09	0.10+	Total Vehicles
Motorcycles	48.7%	13.1%	38.2%	4,056
Pass. Cars	66.3%	8.6%	25.1%	36,353
Lt. Trks/Vans	63.2%	7.9%	28.9%	12,568
Med. Trucks	94.1%	1.9%	4.0%	700
Heavy Trucks	95.8%	1.7%	2.5%	4,335

6. Vehicle Age

Data presented in Table 30 indicates that drivers of older vehicles are more likely to have been drinking when their fatal crash occurred than are drivers of newer vehicles.

This relationship holds true for all driver age groups 25 years of age and older (Table 31).

Table 30
Fatal Crash Driver BAC Distribution
By Vehicle Model Year
1987

Model Year	0.00	0.01-0.09	0.10+	Total Vehicles
Older than '77	59.9%	8.8%	31.3%	13,258
1977-1980	65.5%	8.1%	26.4%	15,442
1981-1984	71.1%	7.7%	21.2%	15,084
1985-1988	70.9%	8.0%	21.1%	16,166

7. Restraint Use

Sober drivers in fatal crashes are considerably more likely to use seat belts than are intoxicated drivers.

Table 31
Proportion of High BAC (0.10+) Drivers
in Fatal Crashes
By Vehicle Model Year and Driver Age
1987

Driver Age	Older than '77	1977-1980	1981-1984	1985-1988
15-19	20.4%	19.2%	17.0%	17.1%
20-24	38.7%	34.8%	30.5%	28.8%
25-29	42.0%	37.6%	29.7%	28.7%
30-44	36.4%	28.5%	24.3%	23.1%
45-59	24.5%	17.8%	13.6%	13.1%
60+	11.7%	9.7%	6.5%	7.0%

Table 32 presents the proportion of fatally-injured and surviving drivers reported to have used belts for each BAC group.

Table 32
Percentage of Safety Belt Use for
Fatally-Injured and Surviving Drivers
By BAC Group
1987

Crash Outcome	0.00	0.01-0.09	0.10+
Fatally-Injured Drivers	24.5%	14.1%	7.8%
Surviving Drivers	46.3%	30.8%	18.6%

Note that sober drivers are belted almost twice as frequently as are drivers in the 0.01-0.09 group, who in turn are belted about twice as often as are intoxicated drivers. Also, surviving drivers are belted about twice as frequently as are fatally-injured drivers, in each BAC group. Table 33 indicates that sober drivers are

much more likely to wear belts than intoxicated drivers regardless of whether or not they were fatally injured.

Table 33
Fatal Crash Driver BAC Distribution
By Crash Outcome and Safety Belt Use
1987

Crash Outcome	Belt Use	0.00	0.01-0.09	0.10+	Total Drivers
Fatally-Injured Drivers	Yes	77.2%	6.9%	15.9%	2,957
	No	51.0%	8.9%	40.0%	13,824
Surviving Drivers	Yes	86.2%	6.5%	7.3%	7,941
	No	68.1%	10.1%	21.8%	11,631

SECTION IV - ALCOHOL TRENDS, 1982-1987

Alcohol involvement in fatal crashes decreased between 1982 and 1987. The decrease was not uniform; alcohol involvement dropped more for some crash types than for others. This section presents some of the major changes.

Table 34
Fatal Crash BAC Distribution
1982 - 1987

Year	0.00	0.01-0.09	0.10+	Total Accidents
1982	43.3%	10.6%	46.1%	39,092
1983	45.0%	10.3%	44.7%	37,976
1984	46.7%	10.6%	42.7%	39,631
1985	49.3%	10.1%	40.6%	39,168
1986	48.3%	10.9%	40.8%	41,090*
1987	49.3%	10.7%	40.0%	41,435

* previous 1986 figure was 41,062

Tables 34-37 display several facts of special interest. The reduction in alcohol involvement is especially large for drivers under 21 years of age (Table 35), and is seen in all time periods. For the 21-44 year age group the average reduction is much smaller (Table 36), especially during nighttime driving, when alcohol involvement is notoriously high. For drivers of age 45 years or older there is a large reduction in drunk driving during the day as well as on weekday nights (Table 37).

Table 35
Reduction in High-BAC (0.10+) Drivers
By Fatal Crash Day and Time
for Age Group 16-20 Years Old
(Excluding Non-Occupant Crashes)
1982 vs.1987

Period	1982	1987	Reduction
Daytime			
-Weekday	9.3%	5.7%	39%
-Weekend	15.0%	12.0%	20%
Nighttime			
-Weekday	40.0%	29.6%	26%
-Weekend	46.6%	33.2%	29%

Table 36
Reduction in High-BAC (0.10+) Drivers
By Fatal Crash Day and Time
for Age Group 21-44 Years Old
(Excluding Non-Occupant Crashes)
1982 vs.1987

Period	1982	1987	Reduction
Daytime			
-Weekday	12.0%	10.3%	14%
-Weekend	23.6%	21.2%	10%
Nighttime			
-Weekday	47.6%	44.6%	6%
-Weekend	53.0%	51.4%	3%

Table 37
Reduction in High-BAC (0.10+) Drivers
By Fatal Crash Day and Time
for Age Group 45 Years and Older
(Excluding Non-Occupant Crashes)
1982 vs. 1987

Period	1982	1987	Reduction
Daytime			
-Weekday	8.8%	5.8%	34%
-Weekend	13.8%	10.4%	25%
Nighttime			
-Weekday	30.2%	23.9%	21%
-Weekend	33.9%	29.3%	14%

Table 38 presents the reduction in intoxicated driving by vehicle type. Although alcohol involvement is generally low for drivers operating commercial vehicles (medium and heavy trucks), sizeable reductions occurred for drivers of these vehicle types between 1982-1987. In contrast, the high involvement rate for motorcycle drivers was reduced only 6%.

Table 38
Reduction in High-BAC (0.10+) Drivers
in Fatal Crashes
By Vehicle Type
1982 vs. 1987

Vehicle Type	1982	1987	Reduction
Motorcycles	40.5%	38.2%	6%
Passenger Cars	30.6%	25.1%	18%
Light Trucks/Vans	34.2%	28.9%	15%
Medium Trucks	5.4%	4.0%	26%
Heavy Trucks	4.2%	2.5%	40%

Female drivers are not only less frequently drunk than are males but also show a greater reduction in alcohol involvement from 1982-1987.

Table 39
Reduction in High-BAC (0.10+) Drivers
in Fatal Crashes
By Driver Sex
1982 vs. 1987

Driver Sex	1982	1987	Reduction
Male	32.4%	27.6%	15%
Female	18.9%	15.0%	21%
All Drivers	30.0%	25.0%	17%

A different aspect of the trend in alcohol related fatal crashes is shown in Table 40, which presents the 1982-1987 reduction in number of crashes involving intoxicated participants by crash type and land use.

Table 40
Reduction in High-BAC (0.10+) Crashes
By Fatal Crash Type and Land Use
1982 vs. 1987

Land Use	Crash Type	1982	1987	Reduction
Urban	Single.	56.3%	51.1%	9%
	Multi.	38.5%	32.8%	15%
	Non-Occ.	42.3%	38.1%	10%
Rural	Single.	55.2%	48.8%	12%
	Multi.	34.4%	28.5%	17%
	Non -Occ.	51.0%	42.4%	17%

Overall, the proportion of fatal crashes involving at least one intoxicated participant declined 14% in rural areas and 12% in urban areas.

REFERENCES

1. *Fatal Accident Reporting System,* 1982-1987, NHTSA.

2. Klein, T. M., "*A Method for Estimating Posterior BAC Distributions for Persons Involved in Fatal Accidents*", DOT HS 807 094, July 1986, NHTSA.

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