

ALASKA LEGISLATURE COMMITTEE FILES 2001-2002 8672

10476 HOUSE TRANSPORTATION

## RECENT STUDIES OF THE EFFECTS OF .08 BAC LEGISLATION

NHTSA recently completed three studies of the effects of lowering the illegal blood alcohol concentration (BAC) limit from .10% to .08%. Two of these studies indicate that .08 BAC laws have reduced alcohol-related crash involvement, particularly in conjunction with the presence of other impaired driving laws and programs such as administrative license revocation (ALR). The third study looked at the effect of a .08 BAC law in a single state (NC) and found no statistically significant change in a pre-existing downward trend in factors related to alcohol-related crashes.

The most comprehensive study (covering all 50 states) analyzed the effects of both .08 and .10 illegal per se laws, as well as administrative license revocation (ALR) laws over a 16-year time period. After extensive efforts to control for extraneous factors, this study found that all three laws were associated with reductions in drinking drivers involved in fatal crashes. It estimated that .08 BAC laws had an 8% effect in reducing fatal crashes involving drivers at both high BACs and lower BACs and resulted in 275 fewer fatalities in the 15 states where they were in effect in 1997. If all 50 states had such laws in effect, an additional 590 fatalities would have been prevented.

An 11-state study also examined the effects of .08 BAC (and ALR) laws. It found that 0.08 BAC legislation was associated with reductions in alcohol-related fatalities, alone or in conjunction with ALR laws, in seven of the eleven states studied. In five of these states (VT, KS, NC, FL, NM), implementation of the 0.08 BAC law itself was associated with significantly lower rates of alcohol related fatalities. These results take into account any pre-existing downward trends the states were already experiencing, due to other factors such as the presence of other laws, use of sobriety checkpoints, etc. In two states (CA and VA), significant reductions were associated with the combination of .08 BAC and ALR laws, implemented within 6 months of each other.

The third study analyzed the effects of a .08 BAC law implemented in 1993 in North Carolina, a state which had already been experiencing a sharp decline in alcohol-related fatalities since 1987. This study concluded that there was little clear effect of the lower BAC limit. Results from various analyses suggested that some portion of the reductions may have been associated with the law but the magnitude of these effects was not sufficient to make this conclusion.

In aggregate, these three studies provide additional support for the premise that .08 BAC laws help to reduce alcohol-related fatalities, particularly when they are implemented in conjunction with other impaired driving laws and programs. Nearly all of the findings of these and previous studies show changes that suggest that .08 BAC legislation (as well as .10 BAC laws and ALR laws) have contributed to the trend toward reduced alcohol-related crashes and fatalities that have been experienced across the nation.

- While alcohol-related traffic fatalities have been decreasing (and the 39 percent in 1997 represented an all-time low in the U.S.), we have a long way to go to meet the national goal of no more than 11,000 alcohol-related fatalities by the year 2005.
- We know what works. In order to reduce impaired driving in this Nation, we need tough laws set by the states, highly visible enforcement of these laws, and a change in the public's attitude regarding this problem.
- One step in that direction will be to adopt .08 BAC as the illegal limit for adult drivers in all 50 states. Currently, only 16 states and the District of Columbia have such laws.
- Research shows that virtually all drivers, even experienced drinkers, are substantially impaired at .08 BAC with regard to critical driving tasks (such as braking steering, lane changing, judgement, and divided attention)
- The risk of being involved in a crash increases gradually at each blood alcohol level, but rises very rapidly after a driver reaches or exceeds .08 BAC.
- .08 BAC is a reasonable limit to set. A 170-lb. male would have to consume 5 or more 12-ounce beers in a 2-hour period on an empty stomach to reach .08 BAC. An average (137 lb.) female would need to consume 4 beers in 2 hours to reach .08.
- Surveys show that most people would not drive after consuming 2 or 3 drinks and that 2 out of 3 Americans favor lowering the limit to .08, when they are made aware of how much alcohol that means.
- Most other industrialized nations have set BAC limits at .08 or lower. For example, Canada and Great Britain have had .08 for many years; Australia, France and Germany are at .05; and Sweden has an illegal limit set at .02 BAC.
- Past research has shown that .08 laws have been effective in reducing impaired driving in several states that have adopted them. However, some have suggested that because these studies have found different results in various states that they provide only "equivocal" evidence of the effectiveness of these laws.
- In fact, the quality and consistency of the results of the past studies is quite similar to that of studies conducted from 1980 -1990 to evaluate the effectiveness of minimum drinking age laws. Any inconsistency found in the studies (in both areas) has generally been in magnitude, not direction of effect, and it has involved primarily smaller states where fatal crashes vary significantly from year-to-year.
- However, because concerns have been raised, the Department of Transportation commissioned these three new studies to further investigate the effectiveness of .08 BAC laws.

effective when coupled with other efforts, including ALR laws, sobriety checkpoints, enforcement blitzes, and public information campaigns.

- Even with these studies, there will undoubtedly be those who will still claim the evidence for the impact of .08 laws is still "equivocal." All research is (equivocal). However, with the addition of these studies, the quantity and quality of studies is reinforced. In fact, it can be argued that both the quality of the studies and the consistency of their results parallels that of the minimum drinking age (MDA 21) studies, which have been widely viewed (including GAO reviewers) as constituting one of the most unequivocal areas of highway safety evaluation]

## Questions and Answers Regarding the .08 Issue and the Recent Studies Supporting Its Impact

### Questions Directly Related to the .08 Studies

- Q. How do you resolve the fact that in one study of the effects of .08 BAC legislation in North Carolina, the researchers found "no clear effect," while in the other study a significant effect of the law was found?

There is more consistency than inconsistency in the findings of these two recent studies of the North Carolina .08 law implemented in 1993. Both studies found that the .08 BAC law was *implemented in the midst of a sharp decline* in alcohol-related crashes that had begun in 1987. Thus, both studies attempted to find evidence of an *additional* effect, above and beyond the downward trend that was already occurring.

In fact, both studies did find evidence of an *additional* effect associated with the .08 BAC law. In the 11-state study (Apsler, Char, Harding, and Klein), the outcome (for North Carolina) was a statistically significant reduction in alcohol related fatalities. In the case of the North Carolina study (Foss, Stewart, and Reinfurt), several analyses were conducted, the majority of which found evidence of an *additional* reduction in alcohol related crashes associated with the .08 BAC law (in comparison with all states without .08 laws and in comparison with 11 other states with high BAC testing). In this study, however, the magnitude of these results was not great enough for the researchers to conclude that there was a clear effect. Some of the differences in the size of the effect observed appear to be related to differences in pre/post time periods. In any case, the majority of the outcomes of both studies suggested an *additional* effect associated with the law.

In summary,

Both studies found long term declines in alcohol-related fatal crashes in North Carolina, due to a variety of activities and programs implemented within the State.

on this very difficult problem. Thus, many countermeasures are in operation at any one time and it is very difficult try to separate out the impact of specific actions.

In addition, there are many extraneous factors that can affect drunk driving (e.g. alcohol consumption levels and patterns, unemployment, etc.). These factors (at least those which are known to affect alcohol-related crashes) must also be accounted for in any credible study.

Efforts to control for the impact of extraneous variables and to estimate the impact of individual measures are never perfect.

*However, primarily because of differences in the timing of various efforts, it is often possible to determine (using time series analysis) with some confidence if a particular countermeasure (such as .08 BAC legislation) is having an impact.*

It is also possible to use different measures and comparisons with other states to show differences.

The replication of such impact by an accumulation of studies, conducted over different time periods and using different measures and techniques adds to the confidence of these findings.

**Q. How did you account for public attitude changes to drunk driving mainly due to the work of grass roots groups such as MADD and SADD?**

All of the studies took into account the potential impact of such factors by including a "year trend" factor in their analyses. Even taking this trend into account, the two national level studies still found that .08 laws had a significant effect on reducing alcohol related fatal crashes.

**Q. Intuitively a .08 law with lots of publicity and enforcement should work better than a law with little of either. Does that account for some of the variability in your results? Can you be assured that the presence or absence of publicity and/or enforcement in conjunction with these laws has been taken into account?**

Unfortunately, there is not good data available regarding the level of enforcement or publicity that accompanied the implementation of .08 BAC laws in all of the states that enacted them. It is certainly possible that differences in the levels of these complementary activities resulted in differences in measured impact in various states with .08 BAC legislation.

**Q. Everybody knows that the baby boomers are getting older and more health conscious and that alcohol consumption is going down in the U.S. The young population was also decreasing over the years of your study. Those factors cause a long-term decline in drinking and driving along with many other social problems. How did your analyses account for that?**

All of the studies used "time factors" in their analyses to attempt to control for such factors that are highly correlated with time. Again, even after accounting for these time trends, the two

This legislation sends a message to all potential drinking drivers that the standard is being lowered and that their risk of arrest, conviction and sanction is becoming greater.

**Q. Doesn't a .08 BAC law mean that a 120-lb woman who has two glasses of wine in two hours will be subject to arrest, fines and jail?**

This scenario is extremely unlikely. Obviously, if the woman drinks large glasses of high alcohol-content wine on an empty stomach, her BAC could rise to that level. However, numerous demonstrations have been conducted around the country which have included small-statured women. In those demonstrations, even on an empty stomach, two glasses of wine have not resulted in BACs of .08 -- even though the women often showed obvious signs of impairment.

That is the important point -- all persons, small-statured women or large, heavy men, show significant impairment before reaching a BAC of .08. That is why research shows that the risk of being involved in a fatal or serious injury crash increases significantly by the time one is at a .08 BAC.

**Q. If lowering the illegal BAC limit from .10 to .08 saves lives, why not lower it to .06 or .05 and save even more lives?**

The research on impairment, risk of crash involvement, and effectiveness of legislation, along with the level of public acceptance of current and proposed BAC legislation all points to .08 as the most appropriate illegal level. If future research suggests that lower levels should be adopted and the public agrees, perhaps lower limits will be considered. Right now, .08 is the level recommended for adults. Keep in mind, all states now have adopted per se levels of .04 BAC for commercial drivers (large trucks, buses, etc) and .02 BAC (or zero tolerance) for drivers under the age of 21.

**Q. Some countries with .08 BAC limits (e.g. Mexico, Canada, Austria) have higher alcohol involvement rates in fatal crashes than in the U.S. How do you explain that?**

Some countries do have higher alcohol involved fatal crash rates than the U.S., even though they have .08 BAC limits. Such laws are only one among many factors influencing alcohol-related fatality rates. There are many other factors that affect these statistics, such as enforcement levels, sanctions, public attitudes toward drinking and driving, alcohol consumption levels and patterns, availability of alternative transportation, etc.

In the U.S., 39% of the traffic fatality are alcohol-related. In many countries with lower BAC limits, like Sweden, the percent alcohol-related is far lower, usually below 30%.

**Q. Even in countries like Sweden, the average BAC of a person involved in an alcohol-related fatal crash is .15. How do you explain that?**

## The Relationship of Alcohol Safety Laws to Drinking Drivers in Fatal Crashes

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April 15, 1999

### Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle The Relationship of Alcohol Safety Laws to Drinking Drivers in Fatal Crashes		5. Report Date April 15, 1999
		6. Performing Organization Code
7. Author(s) Robert B. Voas, Ph.D. A. Scott Tippetts		8. Performing Organization Report No.
9. Performing Organization Name and Address Pacific Institute for Research and Evaluation		10. Work Unit No. (TRAIS)
		11. Contract or Grant No.
12. Sponsoring Agency Name and Address Department of Transportation National Highway Traffic Safety Administration 400 7 <sup>th</sup> Street, SW Washington, DC 20590		13. Type of Report and Period Covered
		14. Sponsoring Agency Code

### 15. Supplementary Notes

#### 16. Abstract

This paper presents an analysis of the relationships between the passage of key alcohol safety laws and the number of drinking drivers in fatal crashes. The study evaluated three major alcohol safety laws (administrative license revocation laws, .10 illegal *per se*, and .08 illegal *per se* laws) on the proportion of drinking drivers in fatal crashes. Drivers age 21 and older in fatal crashes at two BAC levels-- .01 to .09 and .10 or greater--were considered separately. Drivers under age 21 were not included because they are affected by the Minimum Legal Drinking Age law. This study used data on drinking drivers in fatal crashes from the Fatality Analysis Reporting System (FARS) covering 16 years from 1982 through 1997 for all 50 states and the District of Columbia. Also, included in the study were such variables as per-capita alcohol consumption and annual vehicle miles traveled, which could impact the number of alcohol-related crashes. The results indicate that each of the three laws had a significant relationship to the downward trend in alcohol-related fatal crashes in the United States over that period. The paper points out that this long-term trend is not the product of a single law, but the result of the growing impact of several laws over time plus the affect of some factors not included in the model tested, such as the increasing use of sobriety checkpoints and the

Alcohol Safety Laws	Adult drivers in fatal crashes	
	BAC .01-.09	BAC .10+
Illegal <i>per se</i> laws (.10)	-13.17%	-8.69%
<i>Per se</i> .08 law	-7.89%*	-8.00%
Admin. license revocation law	-18.96%	-12.81%

\* Significant at  $p=.05$ ; all other significant at  $p<.001$

Because the passage of alcohol safety laws by the states took place over time and is highly correlated with time, it was felt that the introduction of the "time trend" factor absorbed some additional impact properly attributable to the three laws in question and, thus, this analysis produced conservative estimates of the potential impact of these three laws.

Finally, the attribution of savings to any single law should be made with caution since each new law builds to some extent on existing legislation and on other ongoing trends and activities. The synergistic interaction among laws is perhaps most evident in the relationship between illegal *per se* laws (.10 BAC and .08 BAC) and ALR laws.

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91	.5784	.0882	.9020	.7450	.1569	.4509
92	.5974	.0980	.9412	.7932	.1569	.4750
93	.6373	.1127	.9412	.8300	.1765	.5032
94	.6766	.2158	.9510	.8989	.1765	.5377
95	.7451	.2500	.9608	.9413	.1829	.5621
96	.7626	.2745	.9804	.9608	.2059	.5833
97	.7843	.2843	.9804	.9640	.2283	.5961

\* For laws becoming effective part way through the year, state weight was adjusted proportionately to represent time during the year in which the law was in effect.

Fatal crashes result from a multiplicity of factors. Some of the factors that have been shown to affect the number of crashes include amount of travel, the status of the economy, and the quality of vehicles and roadways. Driver alcohol impairment is only one such factor. To properly study the effects of alcohol legislation, it was necessary to control for as many extraneous factors contributing to changes in alcohol-related and non-alcohol-related fatal crash frequency as possible. The most frequently used procedure for studying the legislative impact on crashes is to compare states with and without the stricter BAC laws (for example, see Hingson, Heeren, & Winter, 1994, 1996; and Johnson & Fell, 1995). This approach depends upon selecting *comparison* states similar in significant characteristics to *experimental* states that have enacted the laws in question. An alternative procedure is a panel study that uses all states over a long time. A state-by-year (or state-by-quarter) matrix can be created as a framework for regression analyses where drinking drivers in fatal crashes constitute the dependent variable and where alcohol safety laws and other factors thought to influence fatal crashes constitute the independent (or "predictor") variables.

To conduct such a study, it is necessary to:

1. identify the dependent variable most relevant to the purposes of the study;
2. identify the laws to be evaluated;
3. identify those additional independent variables that can significantly influence the dependent measure, and
4. provide a trend factor to capture those variables omitted from the analysis.

Figure 1 provides a model of the variables thought to be related to crash causation and included in the current analysis. It illustrates the plan for this study. The relationships shown by the arrows are those studied in the current research. Other potential relationships between those measures were controlled, at least partially, through the regression analyses.

Figure 1. Model for analysis of the impact of laws on the proportion of drivers in fatal crashes with BAC >0



enacted within 6 months of each other. Rogers (1997) in a study of the .08 BAC law in California found a relatively modest 7% effect on nighttime crashes occurring between 12 AM and 2 AM. Johnson and Fell (1995) reported that four out of five states (California, Maine, Oregon, Utah, and Vermont) implementing .08 BAC laws showed significant reductions in one or more measures of alcohol-related fatal crashes. A study by Hingson and colleagues (1996), which was limited to five states with such legislation and a somewhat controversial selection of five comparison states, found that .08 BAC laws were associated with a significant reduction in the proportion of drivers in fatal crashes who had BACs greater than .08. That study also showed a significant reduction in the proportion of high BAC drivers involved in fatal crashes (i.e., at or above .15 BAC). However, these results were affected by the fact that these states had also recently enacted ALR legislation.

### 5. Safety belt laws

Occupant restraint programs include three types of laws: child safety seat laws, secondary *safety belt laws*, and primary *safety belt laws*. Secondary laws require the observation of some other traffic offense before a driver can be stopped and cited for nonuse of a safety belt. Primary laws allow an officer to stop and cite the driver based solely on a safety belt violation. Since this study focuses on alcohol use by drivers, child safety seat laws were not included. NHTSA estimates that safety belts have saved 100,000 lives since 1975 (NHTSA, 1997).

Use of safety belts has a complex relationship with alcohol-related crashes. Clearly, usage protects both drinking and nondrinking drivers. However, the usage rates among these two driver groups varies significantly and, depending upon the level of usage, a law requiring usage will affect drinking and nondrinking drivers differently. In the absence of safety belt use laws, safety belt usage is lower among drinking drivers than among nondrinking drivers, but the usage rates of both groups is low. In such a situation, the effect of enacting a safety belt use law generally produces proportionally greater usage among nondrinking drivers than among drinking drivers. At higher usage rates, however, where the use rates of nondrinking drivers are already much higher than those of drinking drivers, an upgrade in the law (which usually makes it more enforceable) is likely to affect drinking drivers to a greater degree than nondrinking drivers since their usage rate is so much lower (Voas & Tippetts, 1998)

Thus, initial safety belt laws (enacted when safety belt use rates are quite low) are likely to increase the ratio of alcohol-positive to alcohol-negative drivers involved in fatal crashes. When upgrades in safety belt laws occur (usually when usage rates are much higher), a larger proportion of alcohol-positive drivers than alcohol-negative drivers will begin to use safety belts (making them less likely to be involved in a fatal crash). Thus, at this level, it is hypothesized that such laws will reduce the alcohol-positive to alcohol-negative ratio of drivers involved in fatal crashes.

Because some states moved directly to primary laws while others first passed secondary laws, attempts in the present research to use two separate variables to represent these laws were complicated by the varying sequence in the enactment of these measures. Ultimately, it was decided to represent secondary and primary safety belt laws with a single three-level variable, with values of zero, 0.5, and one. Primary safety belt laws are weighted twice as effective (value = 1) as secondary laws (value = 0.5). This estimate is based on the fact that initial increases in safety belt usage rates were significantly greater in primary law states than in secondary law states. Furthermore, in recent years when several states have upgraded from secondary to primary laws, significant increases in usage have been observed. Prior to any safety belt use laws, the national usage rate stood at approximately 14%. By 1994, the average usage rate in no law, secondary law, and primary law states was 45%, 62%, and 75%, respectively (NHTSA, 1995).

caused by the sampling size of the state's pool of crashes and, therefore, taps into the size-of-state dimension well (Spearman's  $\rho = .858$ ). In addition, the weighting derived from within-state variability has the desirable qualities of a narrower range and a less extreme distribution. Larger states have lower re-sampling variability because they have more crash-involved drivers and random fluctuations tend to wash out, thereby providing more reliable ratios. Weighting cases by this measure naturally places more importance on the experience of larger states or at least on those states having a larger traffic problem in terms of numbers of fatal crashes. These case weights had a mean of 1.0 across all 51 states (including the District of Columbia) within each period, ranging from a low of approximately 0.25 (North Dakota, Alaska, and Rhode Island) to a high of slightly more than 2.5 (California).

### Independent Variables and Covariates

The three alcohol-related laws being evaluated were modeled as dichotomous dummy variables: When a law became effective partway through a quarterly period, the variable represented that portion of the quarter the law was in effect. When a state lowered its *per se* limit from .10 to .08, the dummy variable for the *per se* .10 law was continued so as to ensure that the dummy variable for the .08 law represented only the marginal effect of the lowered limit. Safety restraint laws were modeled as a single three-step variable, with no law represented by a value of zero, a secondary law represented by a value of 0.5, and a primary law represented by 1.0.

Maryland and Massachusetts enacted ALR laws embodying a BAC limit without establishing a *per se* law. Since the ALR limit may have a greater impact in terms of certainty of sanctioning, these two states were modeled as having the corresponding *per se* law BAC limit when they enacted their ALR law. In all other states, the *per se* laws were passed first and then strengthened by the later passage of the ALR.

To avoid over-fitting a model with a dummy parameter for each state and to explain variation over time within states, other variables relating to state environment and conditions were used as covariates. The most important of these in terms of correlating with the prevalence of alcohol in drivers involved in fatal crashes was per-capita beer consumption. Consumption data were not yet available for 1996 and 1997, the two years when many of these laws were enacted. So, rather than eliminate one of the strongest predictors of alcohol-involved crashes, a per-state average beer consumption level, a between state measure that was constant over time within each state, was developed.

As reported earlier in this paper, per-capita alcohol consumption differences between states were unrelated to passage of DWI laws. However, these differences might still be related to the number of drinking drivers in crashes. Where small, but significant, effects of the safety laws on increasing subsequent consumption within states were found, state consumption levels were adjusted for the laws' effects on drinking for those states passing the laws. After averaging the adjusted beer consumption level for each state, this variable served as a between-state covariate only, remaining constant over time within each state.

Among other measures that vary between-states within the same period and within-states over time, three were found to be important predictors: per-capita vehicle miles traveled (VMTPC) changed yearly, urban/rural distribution of the state's population changed yearly, and unemployment rates changed quarterly. The two components of VMTPC—total state VMT and number of licensed

	B	Std. Error	Beta	t	Sig.	Correlations	
						Zero-order	Partial
(Constant)	-4.78598	.146		-32.737	.000		
BEER@ADJ	.58444	.053	.191	11.062	.000	.195	.190
UE@	.01025	.005	.036	2.062	.039	.138	.036
ALR@	-.21021	.027	-.169	-7.764	.000	-.227	-.135
PS@10	-.14125	.028	-.087	-5.031	.000	-.126	-.088
PS@08	-.08224	.041	-.041	-2.019	.044	-.154	-.035
YR2TREND	-.0000851765	.000	-.166	-8.095	.000	-.256	-.141
QTR2	.17652	.023	.124	7.597	.000	.082	.132
QTR3	.21376	.023	.150	9.200	.000	.099	.159
VMT@	.10899	.013	.156	8.153	.000	.183	.142
SB#	.11198	.022	.085	5.016	.000	.132	.088
URBAN	.49323	.082	.112	6.016	.000	.213	.105
ALR#	.15287	.031	.105	4.954	.000	.033	.087
PS#08	-.06672	.027	-.050	-2.465	.014	-.026	-.043

Multiple R's—Without trend component: .443; with trend component: .484

Table 3. Variables significantly related to the proportion of drinking drivers in fatal crashes with BACs at or above .10

	B	Std. Error	Beta	t	Sig.	Correlations	
						Zero-order	Partial
(Constant)	-2.39975	.072		-33.150	.000		
BEER@ADJ	.63269	.031	.303	20.687	.000	.258	.341
VMTPERLD	.04778	.004	.233	13.054	.000	-.111	.223
UE@	.01546	.003	.080	4.681	.000	.226	.082
ALR@	-.13708	.014	-.162	-9.489	.000	-.258	-.164
PS@10	-.09090	.018	-.081	-4.979	.000	-.219	-.087
PS@08	-.08340	.025	-.062	-3.334	.001	-.243	-.058
YR2TREND	-.0000889403	.000	-.254	-4.266	.000	-.442	-.075
YR_TREND	-.0050083072	.002	-.220	-3.295	.001	-.441	-.058
QTR2	.11763	.015	.121	8.080	.000	.090	.140
QTR3	.11648	.015	.120	8.003	.000	.069	.139
SEATBELT	.09460	.023	.078	4.201	.000	-.242	.073
PS#08	.04869	.015	.054	3.141	.002	-.023	.055

Multiple R's—Without trend component: .502; with trend component: .594

For both analyses, the adjusted beer consumption factor (BEER@ADJ) was correlated with an increased number of drinking drivers in fatal crashes. This factor represents the difference between states in beer consumption, not a change in sales over time within-state, since our preliminary study indicated that beer consumption fell following the passage of alcohol safety legislation. As previously

\* Significant at p=.05; all other significant at p<.001

*Interpreting effects sizes:* The effect sizes shown in Table 4 are somewhat difficult to interpret because they are percentages of ratios. Further, they are not additive because they are expressed as percentages. Rather, they are multiplicative. This means that the total percentage reduction attributable to a combination of two or more laws is slightly less than it would be if the percentages were simply added together. Thus, two or more of the laws studied account for some involvement of the same drivers. To make these effect sizes more meaningful, the impact of a single law on fatalities can be estimated using the following assumptions and procedures.

The first assumption is that since this analysis included only adult drivers (21 years and older), the calculation assumes that zero lives were saved by a reduction in crashes involving drivers under age 21. Further, the analyses conducted were based on drivers involved in fatal crashes, not on the number of fatalities. The estimated reductions due to the .08 BAC law "effect" were 7.8% fewer drivers at .01-.09 BAC, and 8% fewer drivers at .10+ BAC. After calculating the number of drivers these percentage reductions represent, that figure is converted into the number of fatalities that would have been associated with those drivers. The conversion rates, calculated from the 1997 FARS data, were .9222 fatalities per driver at .10+ BAC, .8332 fatalities at .01-.09 BAC, and .6901 fatalities at .00 BAC.

To arrive at these conversion "rates," the drivers involved in each crash are divided into three BAC categories based upon the driver-level Klein imputations (.00 BAC, .01-.09, .10+). The total fatalities within each crash are then attributed proportionately to each of the three BAC categories of drivers involved in that crash. For example, if there were four fatalities in a crash involving three drivers, and two of the three drivers were in the .10+ category, with the other driver alcohol-negative, then 2/3 of the 4 fatalities (2.667 fatalities) would be attributed to drivers at the .10+ level, and 1/3 of the fatalities (1.333 fatalities) would be attributed to the driver at the .00 level. This proportional attribution of involvement to drivers implies equal responsibility for the crash to each driver, regardless of BAC level, and ignores the possibility of one or more drivers being more at fault than others. As such, this approach probably underestimates the number of fatalities that alcohol-positive drivers are responsible for, given that these drivers are more likely to be at fault. In the (mathematically) trivial case of single vehicle crashes, the proportional involvement and fault are, with very few exceptions, identical. This procedure yielded the estimate that if, rather than 16 states, all 50 states had .08 laws throughout 1997, 590 (95% confidence interval=200 to 958) additional lives would have been saved. The .08 and .10 illegal per se laws are shown in Table 5.

Table 5. Estimated savings in 1997 for the three alcohol safety laws analyzed in this study

	.08 per se	.10 per se	
States with law in 1997	16	49 & DC*	
Estimated to have been saved in states <u>with</u> laws in 1997	274 95% confidence interval 88 to 472	1115 95% confidence interval 663 to 1586	95% cor 10.

shown in Table 4 are probably conservative.

This study is not the first to produce evidence for the effectiveness of the three laws included in the analysis. However, this study covers the longest period (16 years) and more states (all 50 plus the District of Columbia) than most previous studies. It also specifically includes potentially confounding variables such as alcohol consumption and safety belt laws not directly considered in most previous studies. The credibility of the results is strengthened by their conformity to theoretical expectations. Beer consumption, for example, is associated with proportionally more positive BAC drivers in fatal crashes as would be expected. Furthermore, the relationships between alcohol safety laws and reductions in drinking-driver involvements, while significant, are generally consistent with the results of other studies.

Perhaps, more significant than the effect of any one law is the evidence that each of these major alcohol-safety laws has contributed to the downward trend over the last two decades of alcohol-related crashes. As should be expected, this long-term national trend is not the product of any single policy act, and it is undoubtedly influenced by factors not in the present analysis such as the increasing use of sobriety checkpoints in some states. Since factors such as alcohol policies, roadway and vehicle characteristics, and economic conditions all interact in their influence on crashes, it is important to interpret estimates of lives saved due to any single law with considerable caution.

## References

- Beirness, D. J., Simpson, H. M., & Mayhew, D. R. (1993). Predicting crash involvement among young drivers. In H.-D. Utzelmann, G. Berghaus, & G. Kroj (Eds.). *Alcohol, Drugs and Traffic Safety - T92. Proceedings of the 12th International Conference*. (pp. 885-890). Cologne, Germany: Verlag TUV Rheinland.
- Beirness, D. J., Simpson, H. M., Mayhew, D. R., & Jonah, B. J. (1997). The impact of administrative license suspension and vehicle impoundment for DWI in Manitoba. In C. Mercier-Guyon (Ed.) *Proceedings of the 14th International Conference on Alcohol, Drugs and Traffic Safety*. (pp. 919-925). Annecy, France: Centre d'Etudes et de Recherches en Medecine du Trafic.
- Berger, D. E., & Snortum, J. R. (1985). Alcoholic beverage preference of drinking-driving violators. *Journal of Studies on Alcohol*, 46 (3), 232-239.
- Blomberg, R. (1992). *Lower BAC limits for youth: Evaluation of the Maryland .02 law*. (DOT HS 806 807). Washington, DC: U.S. Department of Transportation.
- General Accounting Office (USGAO). (1987, March). *Drinking-age-laws: An evaluation synthesis of their impact on highway safety*. (GAO/PEMD-87-10). Washington, DC: USGAO.
- Hingson, R. (1996). Prevention of drinking and driving. *Alcohol Health & Research World*, 20 (4), 219-226.
- Hingson, R., Harman, T., & Winter, M. (1994). Lower legal blood alcohol limits for

1997 - *Occupant Protection*. (DOT HS 808 768). Washington, DC: NHTSA, National Center for Statistics & Analysis, Research & Development.

National Highway Traffic Safety Administration. (1998). *Fatality Analysis Reporting System data files, 1982-1997*. Washington, DC: National Center for Statistics and Analysis.

Rogers, P. N. (1997). *The specific deterrent impact of California's 0.08% blood alcohol concentration limit and administrative per se license suspension laws*. (Vol. 2). Sacramento, CA: Research and Development Branch, Licensing Operations Division, California Department of Motor Vehicles and Office of Traffic Safety.

Toomey, T. L., Rosenfeld, C., & Wagenaar, A. C. (1996). The minimum legal drinking age: History, effectiveness, and ongoing debate. *Alcohol Health & Research World*, 20 (4), 213-218.

Voas, R. B., Lange, J. E., & Tippetts, A. S. (1999, in press). Enforcement of the zero tolerance law in California: A missed opportunity? *Journal of Crash Prevention and Injury Control*.

Voas, R. B., Tippetts, A. S., & Taylor, E. P. (1999, in press). Impact of Ohio administrative license suspension. *Journal of Crash Prevention and Injury Control*.

Wagenaar, A. C. (1993). Minimum drinking age and alcohol availability to youth: Issues and research needs. In M. E. Hilton & G. Bloss (Eds.). *Economics and the prevention of alcohol-related problems*. (Research Monograph No. 25, NIH Pub. No. 93-3513, pp. 175-200). Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism.

Wagenaar, A. C., Zobeck, T. S., Hingson, R., & Williams, G. D. (1995). Studies of control efforts: A meta-analysis from 1960 through 1991. *Accident Analysis and Prevention*, 27, 1-16.

Wilde, C. J. S., Hoste, J. L., Sheppard, D., & Wind, G. (1971). Road safety campaigns: Design and evaluation. *Organization for Economic Co-operation and Development*, 75.

Williams, J. D., Stinson, F. S., Sanchez, L. L., & Dufour, M. C. (1997, December). *Apparent per capita alcohol consumption: National, state, and regional trends, 1977-1995*. (Surveillance Report #43). Bethesda, MD: National Institutes for Alcohol Abuse and Alcoholism (NIAAA), Division of Biometry and Epidemiology.

Zador, P. K., Lund, A. K., Field, M., & Weinberg, K. (1988). *Alcohol-impaired driving laws and fatal crash involvement*. Washington, DC: Insurance Institute for Highway Safety.

Zador, P. K. (1991). Alcohol-related relative risk of fatal driver injuries in relation to

42 Pennsylvania	38.5		59.4	
44 Rhode Island	2.2		3.7	
45 South Carolina	15.3		24.6	
46 South Dakota	2.7		4.4	
47 Tennessee	26.6		43.0	
48 Texas	94.4		155.1	
49 Utah		3.7		6.5
50 Vermont		1.9		3.3
51 Virginia		22.7		39.3
53 Washington	15.3		25.0	
54 West Virginia	8.0		12.7	
55 Wisconsin	17.5		28.4	
56 Wyoming	2.1		3.3	
<b>Total</b>	<b>590.3</b>	<b>274.5</b>	<b>965.0</b>	<b>476.9</b>

### Appendix B: Treatment Effects for Analysis Without Time Variable

To illustrate the effect of including the two time trend variables in the analysis, a separate analysis was conducted in which the time trends were not entered. The resulting effect sizes are shown in Table B-1. These should be compared with Table 4 in the text.

Table B-1. Effect sizes for alcohol safety and safety belt laws for two groups of drivers in fatal crashes

Alcohol safety laws	Drivers in fatal crashes age 21 and older—Estimates
Illegal <i>per se</i> laws (.10)	
.01 to .09	-16.54%
.10+	-11.60%
<i>Per se</i> .08 law	
.01 to .09	-15.60%
.10+	-12.15%
Admin. license revocation law	
.01 to .09	-14.60%
.10+	-14.88%



**Evaluation of the Effects of North Carolina's 0.08% BAC Law**

**Robert D. Foss, Ph.D.  
J. Richard Stewart, Ph.D.  
Donald W. Reinfurt, Ph.D.**

**Highway Safety Research Center  
University of North Carolina**

**March, 1999**

Carolina since the early 1980s. To control for the effects of this general trend, as well as seasonal fluctuations, we carried out structural time series analyses examining monthly crash statistics. In each case we looked for evidence of either an immediate decrease in the rate or a change in the general trend of alcohol-related crashes following implementation of the lower BAC limit. There was no significant change in the rate, nor in the trend, coinciding with introduction of the lower BAC limit, for any of the measures examined.

To determine whether the trend in alcohol-related crashes in North Carolina may have benefitted in comparison with a broader general trend in the U.S. (which had leveled out and appeared to be on the verge of increasing again), we compared North Carolina fatal crash data with those from 11 other states that have high rates of alcohol testing for fatally injured drivers. The data series representing the North Carolina proportion of all fatally injured drivers in the 12 states who had BACs in excess of 0.10% was examined for either a step shift or a change in the trend. Again there was no evidence that the pattern in North Carolina changed following enactment of the lower BAC limit, or that it differed in comparison to the other 11 states.

To see whether the BAC levels of persons had been reduced by the 0.08% law, even if not brought below the 0.10% threshold of the previous limit, we examined the mean monthly BACs of fatally injured drivers whose BAC was above 0.10%. Again there was no evidence of an effect of the new BAC limit. The monthly average BACs remained essentially unchanged from 1990 through 1995, with an overall mean of 0.21%.

Finally, we conducted a series of simple before-after comparisons of various indicators of alcohol involvement in fatal crashes. These analyses examined each the six measures that the National Highway Traffic Safety Administration used in its initial examination of the effect of 0.08% laws: (1) driver BAC  $\geq$  0.01%, (2) driver BAC  $\geq$  0.10%, (3) police-reported alcohol involvement, (4) single vehicle nighttime crash, (5) single vehicle nighttime male driver crash, and (6) estimated alcohol involvement. To examine changes in these measures we used the same analytic approach employed by Hingson et al. (1996) in their widely-cited study of the first five states to enact 0.08% limits - comparing changes in North Carolina rates with those in comparison states. To avoid potential pitfalls of trying to select a single appropriate comparison state, we compared North Carolina data with all 37 states that had retained higher per se limits from 1991 through 1996.

Of the six measures considered, two showed a significantly greater decrease in North Carolina than in the comparison states: police-reported alcohol and estimated alcohol, which is based in part on police report as well. For both these measures, the apparent effect of the 0.08% law is an artifact of grouping several months data before the law took effect, rather than an effect of the law itself. During the pre-0.08% period, noteworthy changes occurred in North Carolina that are obscured when the data are grouped. When analyses to ameliorate this artifact were conducted, none of the six measures showed a significantly greater decrease in North Carolina than in the states that retained a higher BAC limit.

Although North Carolina has a reputation for being progressive and aggressive in its efforts to deal with drinking drivers, it does not appear that the state is so different as to render it

**THE EFFECTS OF 0.08 BAC LAWS**

**Robert Apsler, Ph.D.  
A.R. Char, M.S., MBA  
Wayne M. Harding, Ed.M., Ph.D.  
Rainbow Technology Inc.**

**and**

**Terry M. Klein  
National Highway Traffic Safety Administration**

**March 1999**

months of one another, were modeled as a single intervention.

These findings are consistent with the hypothesis that 0.08 laws work best in conjunction with other laws, especially ALR laws. All of the states which exhibited a significant association between a 0.08 BAC law and a reduction in alcohol involvement already had an administrative license revocation law in effect (Vermont, Kansas, North Carolina, Florida and New Mexico). In two states the reductions occurred when 0.08 BAC and ALR laws were enacted in close temporal proximity to each other (California and Virginia).

Again, it is clear that many factors have been at work since the early 1980's, which have resulted in long-term declines in alcohol-related fatalities in most states. Some of these factors were in operation prior to the implementation of the 0.08 BAC laws. While it is difficult to pinpoint all the factors that have been responsible for these long-term declines, it is likely that the declines resulted from a combination of legislative, enforcement, judicial, sanctioning, and public information activities implemented in the states. These analyses suggest that the 0.08 BAC laws added significantly to this impact in several of the states studied, usually in conjunction with the presence of administrative license revocation laws.

Reduction of the legal BAC limit from 0.10 to 0.08 also appears to be associated with a reduction in beer consumption in 4 of the 5 states for which consumption data were available. The association is strong in two of these five states (California and Vermont). The association in California is weaker and is clouded by increased volatility following implementation of the 0.08 law. The absence of an association in Oregon could be due to an artifact. A substantial reduction in annual beer consumption occurred two years before the 0.08 law was implemented. This sharp reduction may have made it difficult for an additional reduction to occur.

08klein2.sum

**MADD NATIONAL  
OFFICE**

**PUBLIC POLICY  
DEPARTMENT**

**SAMPLE TESTIMONY**

**ON LEGISLATION TO LOWER THE ILLEGAL BAC LIMIT TO .08**

TESTIMONY BY LYNNE GOUGHLER  
BEFORE THE \_\_\_\_\_ JUDICIARY COMMITTEE  
OF THE MINNESOTA STATE LEGISLATURE  
ON THE MERITS OF A .08 BAC PER SE LAW FOR ADULT DRIVERS

FEBRUARY 5, 1997

Thank you for inviting me to testify today. My name is Lynne Goughler, and I am the Public Policy Liaison for the Mothers Against Drunk Driving Minnesota State Organization. I will be testifying specifically in favor of S.B./H.B. \_\_\_ which proposes to lower the illegal blood alcohol concentration (BAC) limit from .10 to .08 per se. We believe that lowering the illegal per se BAC limit to .08 will not only save lives and reduce injuries in Minnesota, but will also save substantial amounts of money in associated health care costs.

The National Highway Transportation Safety Administration (NHTSA) has produced two reports to the U.S. Congress on the subject of blood alcohol concentration (BAC) limits for drivers. In both of those reports, it is recommended that all states and Washington, D.C. should establish .08 BAC as the illegal limit for drivers aged 21 and older.

In addition, a study was published in the September 1996 *American Journal of Public Health* which supports that if every state passed an illegal .08 BAC limit, the proportion of fatal crashes caused by impaired drivers would decrease by approximately 16 percent – or approximately 600 fewer deaths each year.

There are a number of reasons why MADD supports the passage of .08 BAC levels in every state:

1. Virtually all drivers are substantially impaired at .08 BAC. Laboratory and test track research shows that the vast majority of drivers, even experienced drinking drivers, are impaired at .08 with regard to critical driving tasks. There are significant decrements in performance in braking, steering, lane changing, judgement and divided attention, among other measures at .08 BAC. Performance decrements in these tasks are as high as 60 to 70 percent at .08 BAC according to studies.
2. The risk of being involved in a crash increases substantially at .08 BAC. The risk of being in a crash gradually increases at each BAC level, but rises rapidly after a driver reaches or exceeds .08 BAC compared to drivers with no alcohol in their blood systems. Research by the Insurance Institute for Highway Safety indicates that the relative risk of being killed in a single vehicle crash at BACs between .05 and .09 is 11 times that of drivers at .00 BAC (no alcohol).
3. Lowering the BAC per se limit is a proven effective countermeasure which will reduce alcohol-related traffic fatalities. We have evidence in four states that significant reductions in alcohol-related fatalities occurred after .08 BAC laws went into

Remarks of State Senator Ida Ruben (D-20-Maryland)  
Maryland Senate Sponsor, .08 BAC Legislation  
News Conference on Federal .08 BAC Legislation  
May 22, 1997

Thank you Senator Lautenberg, Senator DeWine, Congresswoman Lowey and my former Maryland General Assembly colleague Congresswoman Connie Morella. I am very pleased to be here today with you and my friends from Advocates for Highway and Auto Safety and MADD.

You might wonder what a state legislator is doing on Capitol Hill talking in support of federal legislation that sanctions the states to take a prescribed action. When my friends at MADD and Advocates for Highway and Auto Safety told me about this gathering, I very much wanted to be here. The fact is, the problems we face in Maryland are sometimes not just Maryland problems but also national problems.

I am a chief sponsor of the .08 legislation in the Maryland State Senate, and I can tell you that from my vantage point in Annapolis, the situation there with respect to the .08 issue is not a positive one.

The alcohol industry has a presence in the halls of the State House. They thwarted our efforts in this past legislative session. They relayed information to legislators that would criminalize so-called social drinking, and they misrepresented how many drinks it takes to get to .08.

We come together today to face the facts about impaired driving. It is fact that .08 is a lot of alcohol and it's a lot of impairment. We all realize that .08 is not the answer to the nation's impaired driving tragedy. Much needs to be done. But it must start with drawing a safer and saner line in the sand against impaired driving at .08.

.08 is the right thing to do. But, it is very very tough competing with the power, influence and money of the alcohol industry as they trip up the safety groups in state capital after state capital. To wage and win this battle state by state will take us into the 21st century.

That is why I, as a state legislator, believe federal action is essential, and I hope the Congress will pass this lifesaving legislation this year. The issue is not a matter of states' rights. It's a matter of life or death. There are times when federal action is needed to solve problems in all the states. And this is one of them.

I thought it was called for in 1984 when Senator Lautenberg sponsored and President Reagan signed into law the national uniform 21 drinking age legislation. You saw how quickly those dangerous blood borders between states with different drinking ages were quickly erased after that federal action. And, I thought it was called for in 1995 when Congresswoman Lowey sponsored and President Clinton signed into law the national "zero tolerance" BAC law.

These national laws are saving so many lives every year. And I now realize that a federal law is essential to make .08 the law of the land.

I would like to see the alcohol industry change its position on this issue because they are wrong. I think they tarnish their image even more in the long-run by fighting MADD, Advocates and the other safety groups than by standing out of the way of progress in this war on impaired driving.

I wanted to be here today to lend my support to your efforts in the Congress. I hope the Congress will pass and the Administration will strongly support your legislation this year. It will make our jobs in the state capitals across this country that much easier. Thank you for allowing me to join you here today. (END)



**ADVOCATES  
FOR HIGHWAY  
AND AUTO SAFETY**

**TESTIMONY OF BILL BRONROTT  
ADVOCATES FOR HIGHWAY AND AUTO SAFETY  
BEFORE THE HOUSE JUDICIARY COMMITTEE, MARYLAND HOUSE OF DELEGATES**

**HB 810: A BILL TO REDUCE "DRIVING WHILE INTOXICATED" TO .08 B-A-C**

**FEBRUARY 20, 1997**

Thank you, Mr. Chairman, and members of the committee.

My name is Bill Bronrott and I am with Advocates for Highway and Auto Safety, which is an alliance of consumer, safety and insurance organizations. I am here to testify in favor of HB 810 which will lower the illegal blood-alcohol concentration (BAC) limit from .10 to .08 for "driving while intoxicated," and from .07 to .06 for the lesser offense of "driving under the influence of alcohol."

In 1995, 671 people were killed in highway crashes in Maryland. Among those killed were 234 people who died in alcohol-related crashes. These 234 alcohol-related traffic deaths represented 35 percent of total motor vehicle fatalities in 1995. On top of this enormous human suffering were the huge economic losses.

The cost per alcohol-related fatality is estimated at about \$1.1 million, according to the U.S. Department of Transportation. It is estimated that the 234 alcohol-related traffic fatalities in 1995 resulted in \$257 million in societal costs in Maryland.

In addition, among these 234 alcohol-related traffic deaths were 57 people who died in crashes where the driver had a BAC below the current .10 limit. In other words, 23 percent of all alcohol-related traffic fatalities resulted from crashes where the driver had a BAC below the current .10 limit.

Lowering the illegal BAC limit will save lives, reduce injuries and result in a substantial savings in related societal costs, including health and medical care.

The U.S. Department of Transportation has produced two reports to the U.S. Congress on the subject of BAC limits for drivers. In both reports, it is recommended that all states establish .08 BAC as the illegal limit for drivers aged 21 and older.

Also, a study published in the September 1996 *American Journal of Public Health* concludes that if every state passed an illegal .08 BAC limit, the proportion of fatal crashes caused by impaired drivers would decrease by approximately 16 percent, resulting in about 600 fewer deaths each year.

1. Drivers are substantially impaired at .08 BAC. Laboratory and test track research shows that the vast majority of drivers, even experienced drinking drivers, are impaired at .08 with regard to critical driving tasks. There are significant decrements in performance in braking, steering, lane changing, judgement and divided attention, among other measures at .08 BAC. All the skills a person needs to drive a car are affected at .08 and performance decrements in these tasks are as high as 60 to 70 percent at .08 BAC according to studies.

Testimony of Bill Bronrott / Advocates for Highway and Auto Safety

Page 3 of 3

Nor did it change in Utah and Oregon the year after .08 went into effect. There is evidence from Maine that restaurant sales actually increased 11 percent in 1988, the year .08 went into effect. Recently, the National Restaurant Association Foodservice Industry's 1996 sales projections reported \$312.9 billion in food and drink sales — an increase of \$74.1 million from 1990.

In summary, 13 states (AL, CA, FL, HI, KS, ME, NC, NH, OR, UT, VA and VT) have already passed .08 BAC per se laws, and more than 25 states are considering .08 BAC limits in legislative sessions this year. Maryland has long been a leader in highway traffic safety countermeasures. Maryland needs to resume its leadership role in highway safety. We can do that by becoming the 14th state with .08. The time is now.

.08 BAC is a level at which critical driving skills are impaired. It is a level at which the risk of a crash increases substantially. It is a level which most industrialized nations have adopted. It is a proven effective measure which will save lives and reduce injuries. And, it is not just a couple of drinks after work. We are talking about a substantial amount of alcohol when we talk about .08 BAC.

While tremendous progress has been made in the war on drunk driving over the past 16 years in Maryland, the fact that 234 people lost their lives in alcohol-related crashes in 1995 clearly indicates that the war has not been won.

234 people killed due to the combination of alcohol and driving is the equivalent of two 737 jetliners crashing in our state. Whenever a jetliner tragically crashes, there is a blizzard of media attention and a huge public outcry . . . justifiably so . . . demanding answers and action.

The drunk driving problem deserves comparable treatment, attention and action. A sudden violent death in one mode of transportation is just as tragic as in another.

Impaired driving remains the most frequently committed violent crime in our country. The FBI reports that the crime resulting in the most arrests of adults in the United States in 1995 was "driving under the influence." Arrests for DUI totaled 1.4 million last year. The U.S. Department of Transportation estimates that only one of every 1,000 DUI incidents results in an arrest, so it is mind-boggling to think of the tens of millions of criminal acts of impaired driving that flood our nation's highways.

There seems to be a false perception in many states that the war on drunk driving has been won. Clearly, the great progress of the 1980s and early 1990s is in serious jeopardy. We, as a nation and a state, can and must do better because it is truly a matter of life or death.

That is why Advocates for Highway and Auto Safety, MADD and other highway safety groups recently joined together with the U.S. Department of Transportation to set a new goal to reduce alcohol-related traffic deaths by at least one-third — down to 11,000 or less per year by the year 2005.

The front lines in this battle are drawn in each state capital and on the streets and highways in every local community. No one believes that .08 is THE answer. But, virtually the entire highway safety community feels strongly that .08 BAC is one essential law that every state should adopt to draw a safer, saner and more sensible line in the pavement against intoxicated driving.

We urge the House Judiciary Committee to consider the merits of this legislation and to pass HB 810 to lower the illegal BAC to .08 this year. Thank you very much.

ATTACHMENTS

## SENATE TESTIMONY

Distinguished Senators and others who have gathered to speak about this bill, my name is Dawn Richardson. I live in Providence. I am a homeowner, taxpayer and voter, and the mother of two school age boys. In spite of my looking like I just graduated from college, I am a 1988 graduate of the medical school at Brown University. I completed my residency at Rhode Island Hospital this past summer, specializing in Emergency Medicine. That's right, just like the television shows ER and Chicago Hope. I am an attending physician in the Emergency Care Center at Sturdy Memorial Hospital in Attleboro, Massachusetts, and part time at Rhode Island Hospital Emergency Department to keep my skills current. I have been recently appointed to the Medical Advisory Board of the Rhode Island Registry of Motor Vehicles, a position I sought because of my outrage about my daily experiences with the carnage of drunk driving.

The trauma rooms at Rhode Island Hospital are where the majority of serious drunk driving victims in Rhode Island end up. I have spent the last two years in those rooms, sometimes 115 hours a week. I have cared for hundreds of critically injured people in the trauma rooms and trauma intensive care. My time is spent fighting keeping them alive. What I am going to tell you is very graphic, but you must hear what the liquor and hospitality industry won't tell you. This is what happens in the trenches of the war against drunk driving.

If these critically injured people are at all conscious, I put them to sleep with powerful drugs. I then shove respirator tubes down their throats to put them on life support. If they have collapsed lungs, I put large tubes in their chests to empty the blood and air that has leaked from their lungs. If there is a sign of internal injury, I cut a 1 inch hole below their belly button to see if their abdomen is filled with blood from a burst spleen. If they are bleeding to death, I put large IV's in their arms or shoulders and pour blood or saline into their veins, sometimes a gallon or more before they go to the operating room. I put a tube in their penis to see if they are bleeding from a burst kidney, but not before putting my finger in their rectum to see if they have bled from torn intestines. I put a tube down their nose into their stomach to see if it is full of blood. Then my trauma surgery colleagues whisk them off to the operating room for emergency surgery. The photograph you see was taken just after the patient left the trauma room for surgery. If they have hit their head on the steering wheel or been thrown out of the car and damaged their brain, I call one of my brain surgery colleagues to drill a hole in their head to release the blood. If their bones are mangled, I call my orthopedic surgery colleagues to straighten or operate on them. If their faces are broken or cut beyond recognition, I call my plastic surgery colleagues to try to put their faces back together. The stitching that takes an hour or less I do myself. At 7 o'clock on Monday mornings we all meet to argue about how we managed the toughest cases the past week at Trauma Conference. The hardest part of my job is telling family members that their loved

This bill has died in committee six years in a row. I have come here today to put it on life support. It is the law in almost every other New England state and many foreign countries. We're not talking about the right to drink or the right of the hospitality and liquor industries to do business. Drunk people just have to find another way home. This is about public safety. I beg of you, please consider the public safety first, and put special interest pressure aside. You are the trauma surgeons of this law. I am turning the patient over to you, because I have done all I can do. Keep it alive. Send this bill to the floor for a general vote. Thank you.



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**TO: Rep. Kohring, Chair of House Transportation**  
**FROM: Kac'e McDowell, Executive Director Alaska CHARR**  
**DATE: April 10, 2001**  
**RE: HB 12**

### Memo

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#### **STOP DRUNK DRIVING WITHOUT THE FISCAL NOTE FOR .08**

1. Century Council is a non-profit organization dedicated to reducing drunk driving and underage drinking, as is CHARR. We work closely with Century Council on all of these issues. DISCUS, distilled spirits council of the united states, is the council that has taken the pro .08 BAC stand. This council is made up of many of America's distillers. Upon speaking to our representative from DISCUS, he made clear they do not support stand alone .08 BAC legislation.
2. CHARR is Alaska's Hospitality Association and we teach the TAM, Techniques of Alcohol Management, Program throughout the State of Alaska. We feel this has been one of the main programs helping to deter drunk driving and underage driving. This is at no cost to the state. I have enclosed some information about this program
3. CHARR is also involved in a program with Anchorage Against Drunk Driving called "Off the Road Program". A taxi will drive customers home and their car. We are working on HB 68 to exempt the Taxi companies from liability so we can initiate this program state-wide. This program will be fully funded by the Hospitality Industry and other concerned entities.

4. CHARR, with Century Council, would certainly be interested in putting together a program that could be used in the school system to help solve the under drinking problem.
5. CHARR believes that there are many other ways to help solve these major Problems without the government always having to pay the bill.
6. The big decision is does the government want to meet the fiscal note of .08 or use these funds in better areas. Do we want to be blackmailed to do it? Is it the most beneficial way to spend our available revenue? Will it really make a difference with the real problem of the chronic abuser?

## **Techniques of Alcohol Management Goals and Objectives**

Alaska CHARR is proud to be a part of one of the largest industries in the state, hospitality. The Hospitality industry is one of the largest employers in the State of Alaska. One of the first jobs young people will experience will most likely be in the hospitality industry in some form. Here they will begin to acquire the ethics and skills necessary to lead them in any career they may choose to pursue. We encourage those just starting in the industry to look at this as a career choice, one they can grow with and be proud to be a part of.

CHARR recognizes the concerns we face today in the Licensed Beverage Industry and is proud to administer the Techniques of Alcohol Management (TAM) program. This comprehensive class teaches responsible hospitality to servers and sellers of beverage alcohol in the State of Alaska. CHARR was the first to bring a program of this type to Alaska, before it became a state mandate. We currently have 23 instructors throughout the state, providing this valuable education in the rural areas of Alaska as well as our larger cities.

The National Licensed Beverage Association in cooperation with law enforcement, highway safety, substance abuse professionals and liquor control commission, developed the new TAM program and it is administered in Alaska through CHARR. The class is taught in five segments. The clinical effects of alcohol, SIR (size, interview, rate) & MAMM (move, assert, attitude, move on), False identification, customer disturbances and laws, rules and regulations.

Our main objectives through TAM are to reduce the number of alcohol related accidents on the highway through education and stop underage drinking. Our program places a great deal of emphasis on the moral, ethical and legal obligation we have in our industry towards this end.

Through our program participants learn how alcohol is absorbed into the blood stream, how to slow down the rate of intoxication, a method to estimate BAC, the effects of alcohol on the brain, how and when to discontinue service and effectively prevent and handle customer disturbances. Our segment on SIR and MAAM teaches participants how to effectively rate customers and make responsible decisions about serving or refusing service.

In our segment on BAC we teach students the difference between blood alcohol content and tolerance. Each individual's tolerance for alcohol is of course different and it is very important for students to know and recognize the signs of intoxication. I have included a chart on estimating BAC using the method we teach in our classes. The chart is broken down according to body type, as you will see, and is of course only used for estimation purposes.

We have a segment dedicated to false identification, and the problem of underage drinking. Participants learn what to look for in an I.D. and how to handle a situation when presented with a false I.D. card.

The last segment of our program is dedicated to State laws and regulations. Attached you will find the 16 points that we cover in the TAM program, as required by the ABC board, whom we work closely with to maintain the legal integrity of our program. In the last section of the participant's workbook, we have included a section specific to Alaska and the laws that pertain to serving alcohol in our state. As laws can and do often differ in each municipal location we require our instructors to become familiar with the laws that pertain specifically to the areas in which they are teaching and integrate this into the class program on laws and regulations.

Our program encourages considerable class participation and allows ample time for open discussion to further enhance and re-enforce the educational experience.

It is our hope that our students walk away with not only a much better understanding of the law, but of their moral and legal responsibilities as well.

Thanks for the information Mary. I appreciate it.

Vic

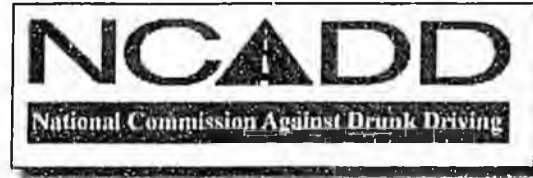
Mary Marshburn wrote:

Representative Kohring:

I am the director of DMV and was tied in to your committee hearing yesterday on HB 12, reducing the BAC from .10 to .08. You asked about its effect on fatality reduction. I am including a web site below which is a report done in 1996 that addresses your question. You can double-click on the link to access the report.

Mary Marshburn

<http://www.ncadd.com/tsra/abstracts/066.html>

[Go to Main Index](#)[Go](#)

## Lowering State Legal Blood Alcohol Limits to 0.08%: The Effect on Fatal Motor Vehicle Crashes

Research indicates that the impairing effects of alcohol begin at blood alcohol levels (BACs) well below .10 legal limit in most states. Laboratory studies have demonstrated that at .08 BAC, there is reduced peripheral vision, poorer recovery from glare, poor performance on complex visual tasks, and reduced performance on multiple tasks requiring a person's attention to be divided. Studies involving driving simulators and road courses have revealed impaired driver performance at slow speeds, steering inaccuracies, and poor parking performance. Roadside observational studies have identified speeding and deterioration of braking performance. As of 1996, 14 states had lowered their legal BAC limits from .10 to .08.

This study evaluated the effectiveness of .08 laws in the first five states which adopted them. Each state was compared pre- and post-law implementation with a neighboring state which still maintained a .10 BAC law. Comparisons were made with respect to the proportion of fatal crashes involving fatally injured alcohol-impaired drivers at BAC levels of .08 and greater and .15 and greater. The crash proportions for the higher BAC levels were examined to ascertain the effect of .08 laws on crashes involving severely intoxicated drivers.

Results indicated that four of the five states with .08 laws showed a reduction in the proportion of alcohol-impaired driver deaths to all driver deaths as compared to the control states. In one pairing, the comparison state also showed a decrease; however the matched .08 state showed twice as large a decrease. Overall, the states with .08 laws experienced a post-law reduction of 16% for drivers with BACs of .08 or greater. The .08 states also experienced a reduction of 18% for drivers with BACs of at least .15.

The authors note that they were able to obtain BAC results for 88% of fatally injured drivers from .08 states, and for 74% of such drivers in the comparison states, strengthening the validity of these results. However, they also note that .08 states were more likely to have other stringent drinking and driving laws (such as per se laws and administrative license revocation laws) which have been demonstrated to have an impact on the incidence of alcohol-related crashes and offenses. Few comparison states had similar laws in place, making it difficult to separate the effects of .08 laws from the effects of other legislation. They conclude, however, that .08 laws, especially when combined with other laws, can reduce the proportion of fatal crashes involving drivers and fatally injured drivers with BACs of .08 and greater and .15 and greater.

Published by: The American Journal of Public Health

volume 86, number 9, 1996. pp. 1297-1299

Authors:

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**FOR IMMEDIATE RELEASE**

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**\* MADD AND U.S. TRANSPORTATION SECRETARY MINETA  
APPLAUD DISTILLED SPIRITS INDUSTRY'S SUPPORT OF .08 BAC  
AND OTHER COMPREHENSIVE DRUNK DRIVING LAWS \***

Washington, D.C. (April 10, 2001) – Mothers Against Drunk Driving (MADD) along with U.S. Transportation Secretary Norman Y. Mineta, today applauded The Century Council and the distilled spirits industry's landmark announcement of support for lowering the drunk driving limit to .08 blood alcohol concentration (BAC) as part of a comprehensive approach to fight drunk driving. The industry unveiled a well-rounded package of legislation that they will promote in the states.

"MADD commends The Century Council and the distilled spirits industry's vowed commitment to fight for comprehensive drunk driving laws, in particular its support for legislation that includes lowering the drunk driving limit to .08 BAC," said MADD National President Millie I. Webb. "As preliminary Department of Transportation statistics show that alcohol-related traffic deaths increased in 2000 for the first time in five years, it is important that all Americans, including those in the alcohol beverage industry, do their part in the fight against drunk driving."

Although the percentage of alcohol-related traffic fatalities remained the same at 38 percent, the number of people who died in alcohol-related crashes increased from 15,786 in 1999 to 16,066 in 2000.

MADD recognized the distilled spirits industry and the Century Council, a not-for-profit organization founded by America's leading distillers to fight underage drinking and drunk driving

as taking an "important step to help fight drunk driving" by pushing individual states to promote effective, comprehensive legislation addressing several specific areas, including:

- A .08 BAC standard when accompanied by meaningful BAC education
- Administrative license revocation

- Enhanced penalties for high BAC drivers, repeat offenders and those who refuse tests
- Vehicle-based sanctions
- Mandatory treatment/aftercare

Currently, .08 BAC laws are pending in 19 states, and three other states have passed .08 BAC legislation that awaits Governors' signatures. Today, Governor Hull in Arizona is expected to sign the .08 bill into law. Many of these states have also introduced legislation to address higher-risk drivers.

MADD says the Century Council and distilled spirits industry's planned efforts will complement MADD's comprehensive legislative agenda to reduce drunk driving, addressing both higher risk drivers and drivers with a blood alcohol content of .08 BAC. Research shows that a minimum of 500 lives would be saved if every state passed .08 BAC laws.

"While we do not see 'eye-to-eye' with the distilled industry on all issues, this legislative effort is one that we can all agree on as a measure to help save lives and prevent injuries," said MADD National President Mille I. Webb. "We believe in giving credit where credit is due, however in this recognition, MADD is holding true to its long-standing policy to not accept monetary contributions from any segment of the alcohol industry."

"The distilled spirits industry has had a long standing commitment in the fight against drunk driving and we are very enthusiastic about the opportunity to work with MADD to effectively help states implement comprehensive legislation to combat this devastating problem. We know that the battle against drunk driving requires a comprehensive approach; in addition to the implementation of the .08 BAC limit passed by Congress in the fall, it must aggressively address the hardcore drunk driver and include BAC education," said Acting Chair of The Century Council, the Honorable Susan Molinari. "We hope our efforts will help save lives across this country," Molinari continued.

The mission of Mothers Against Drunk Driving is to stop drunk driving, support the victims of this violent crime, and prevent underage drinking. Mothers Against Drunk Driving is a 501(c)(3) non-profit grass roots organization with more than 600 chapters and approximately 2 million members and supporters nationwide. For more information, visit [www.madd.org](http://www.madd.org).

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Potential Q's & A's  
Century Council .08 Event

MADD RESPONSES

Internal Document

1. Why has MADD changed their mind and is suddenly standing beside the industry that they are normally so strongly opposed to?

For years MADD has called on all segments of the alcohol industry to "step up to the plate" in the war against driving. The Century Council, representing the distilled spirits industry, has done quite a bit of work in this area and we're willing to give credit where credit is due. The distilled spirits industry's decision to support and advocate for .08 BAC laws and education, in tandem with other comprehensive legislation, will save lives. We urge the rest of the alcohol and hospitality industries to step up to the plate and do the same.

We may not see "eye-to-eye" on all issues, but the distilled spirits industry is deserving of credit for taking this tough stance against drunk driving.

2. What's in it for MADD? Is MADD now accepting funding from the liquor industry?

No. MADD is and will continue to stand firm on its policy of not accepting funds from any segment of the alcohol industry. What we gain from this announcement is the opportunity to prevent death and injury.

MADD is here to recognize the distilled spirits industry's support of .08 laws as part of a comprehensive plan to fight drunk driving. We know their lobbying strength will help pass this important legislation in the states more swiftly, and more lives will be saved as a result.

3. What is MADD's stance on the Century Council's BAC estimator? Do you feel it is accurate?

MADD does not have a position on the BAC estimator. We believe it is important to pass .08 BAC laws in tandem with public information and education, but we believe each state must make their own decision on the best kind of public education efforts for their citizens. We want to make our message clear: We support a legal BAC limit of .08 percent. That's the level where it should be illegal to drink and drive. However, we encourage people to designate a non-drinking driver if they plan to drink alcohol. That's the safest way to get home after drinking.

4. So, does MADD really want an even lower limit or "zero tolerance" for drinking and driving?

No. MADD supports .08 BAC as the legal drunk driving limit. We support .08 BAC as the legal limit because of sound, scientific research showing that this is the level at which virtually every driver is impaired -- affecting all of the critical driving skills including: braking, steering, judgment and response time. Again, we feel .08 should be the legal limit, however do remind Americans that the best way to keep you and others safe is to never get behind the wheel after drinking.

5. **Would MADD be willing to join forces with the beer industry if they came out in support of .08 laws?**

Unfortunately, we haven't seen that happen however, we call on all segments of the alcohol industry to support .08 and other lifesaving legislation.

6. **How does MADD feel about distilled spirits ads on television? Didn't you oppose a Seagrams ad a few years ago?**

MADD has a position on alcohol advertising that outlines what we feel is unacceptable. For instance, we are concerned about alcohol ads that use animals or animated characters or ads that are placed at a time likely to be viewed by young people. Any ads that appeal to people under 21 are ads we oppose regardless of what type of alcohol the ad promotes. We encourage all segments of the alcohol industry to be responsible, including the distilled spirits industry. We may not agree on everything, however, we are willing to applaud the distilled industry's support for .08 BAC as part of a comprehensive approach to fight drunk driving.

7. **What exactly will MADD and the Century Council do to pass this legislation in the states?**

The Century Council will now use its lobbying power to help pass tough drunk driving laws in the states. Traditionally, MADD, a grassroots, non-profit organization, has had a tough time passing .08 due to the alcohol industry's opposition. We hope the Century Council's support will help pass this legislation, along with legislation to address the higher-risk driver.

8. **There are rumblings that the federal .08 law may be repealed. What will MADD do to prevent this from happening?**

We do not feel a repeal effort will be successful. We feel confident that in the not too distant future .08 will be the law in every state. Since the federal .08 BAC law passed last year, there has been a tremendous amount of movement to pass .08 laws in the states. There was strong bi-partisan support in Congress to enact the federal standard and we know that lives will be saved as a result.

9. **Why don't you accept funding from the alcohol industry?**

MADD is focused on saving lives, preventing injuries and helping victims, and we are dedicated to this mission. Although we sometimes agree with segments of the alcohol industry on issues, we often do not see "eye-to-eye." By remaining "independent" MADD will always represent the grassroots fight against drunk driving and underage drinking, and will continue to speak out about issues related to our cause.

# **.08 BAC: THE FACTS**

## **.08 Means Dangerous Impairment**

- An average 170-pound man must have four drinks in one hour on an empty stomach to reach a .08 percent blood alcohol concentration (BAC) level. A 137-pound woman would reach .08 BAC after about three drinks in an hour on an empty stomach (National Highway Traffic Safety Administration) – a level that exceeds what is commonly accepted as social drinking.
- Regardless of how much alcohol it takes to get to this level, at .08 BAC any driver is a dangerous threat on the road. .08 BAC is the level at which the fatal crash risk significantly increases and virtually everyone is seriously impaired, affecting all of the basic critical driving skills including: braking, steering, lane changing, judgment and response time (NHTSA).
- The risk of a driver being killed in a crash at .08 BAC is at least 11 times that of drivers without alcohol in their system. At .10 BAC the risk is at least 29 times higher (Zador).
- More than 20 percent of alcohol-related traffic deaths involve BAC levels below .10 percent (NHTSA).

## **.08 Saves Lives**







- If every state passed a .08 BAC law, about 500 lives would be saved each year (Hingson, et al).
- .08 BAC is a proven effective measure to reduce alcohol-related traffic deaths. Studies have shown a 6 to 8 percent reduction in alcohol-related traffic deaths in states following the passage of .08 BAC (MADD).

## **.08 Needed in Every State**

- 30 states still define intoxicated driving as .10 BAC – the most lenient definition of drunk driving in the industrialized world.
- 20 states and the District of Columbia comply with the federal law (AL, AR, CA, FL, HI, ID, IL, KS, KY, ME, NE, NH, NM, NC, OR, TX, UT, VT, VA and WA).
- 19 states have .08 BAC legislation pending (AK, CT, DE, IN, LA, MA, MI, MN, MO, NV, NJ, NY, OH, OK, PA, RI, TN, WV, WI). 3 States have bills that have passed the

legislature but await the Governor's signature (AZ, GA, MD). Arizona Governor Hull is expected to sign the .08 BAC bill into law today, Tuesday April 10, 2001.

- The BAC level is .08 in Canada, Austria, Great Britain and Switzerland.
- Seventy-two (72) percent of Americans support lowering the drunk driving limit to .08 blood alcohol concentration (BAC) as an initiative to reduce drunk driving. (Independent Gallup Survey sponsored by MADD and General Motors).

					
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## States with Complying

### .08 BAC Per Se

Updated August 1, 2000

State	Enactment Date	Effective Date
Alabama	7/31/95	10/1/95
California	1989	1/1/90
District of Columbia	12/1/98	4/13/99
Florida	4/27/93	1/1/94
Hawaii	6/30/95	6/30/95
Idaho	3/17/97	7/1/97
Illinois	7/2/97	7/2/97
Kansas	4/22/93	7/1/93
Kentucky*	4/21/00	10/1/00
Maine	4/28/88	8/4/88
New Hampshire	4/15/93	1/1/94
New Mexico	3/19/93	1/1/94
North Carolina	7/5/93	10/1/93
Oregon	8/4/83	10/15/83
Puerto Rico*	1/10/00	1/10/01
Rhode Island*	7/13/00	7/13/00
Texas	5/28/99	9/1/99
Utah	3/19/83	8/1/83
Vermont	6/6/91	7/1/91

Virginia	4/6/94	7/1/94
Washington	03/30/98	1/1/99

**Total : 19 States, DC and Puerto Rico**

**Note:**

NHTSA and the FHWA administer an incentive grant program, which was authorized under the Transportation Equity Act for the 21st Century (TEA 21), 23 U.S.C. Section 163, under which States can qualify for grant funds if they enact and enforce a conforming .08 BAC per se law. To conform, a law must meet the requirements of the Section 163 statute and the agencies' implementing regulations. The States listed above have laws that comply with the Section 163 requirements and will receive funding in FY 2000, with the following exceptions: Kentucky and Puerto Rico have laws that will comply with the Section 163 requirements in FY 2001, and Rhode Island's ".08 BAC per se" law does not fully comply with the Section 163 requirements. Accordingly, Rhode Island does not qualify for grant funds, based on this law.

**Source:**

U.S. Department of Transportation, Washington, DC 20590  
**NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION**  
 Traffic Safety Programs (202) 366-4892

National Conference of State Legislatures  
 INFO@NCSL.ORG (autoresponse directory)

Denver Office:  
 1560 Broadway, Suite 700  
 Denver, CO 80202  
 Tel: 303-830-2200  
 Fax: 303-863-8003

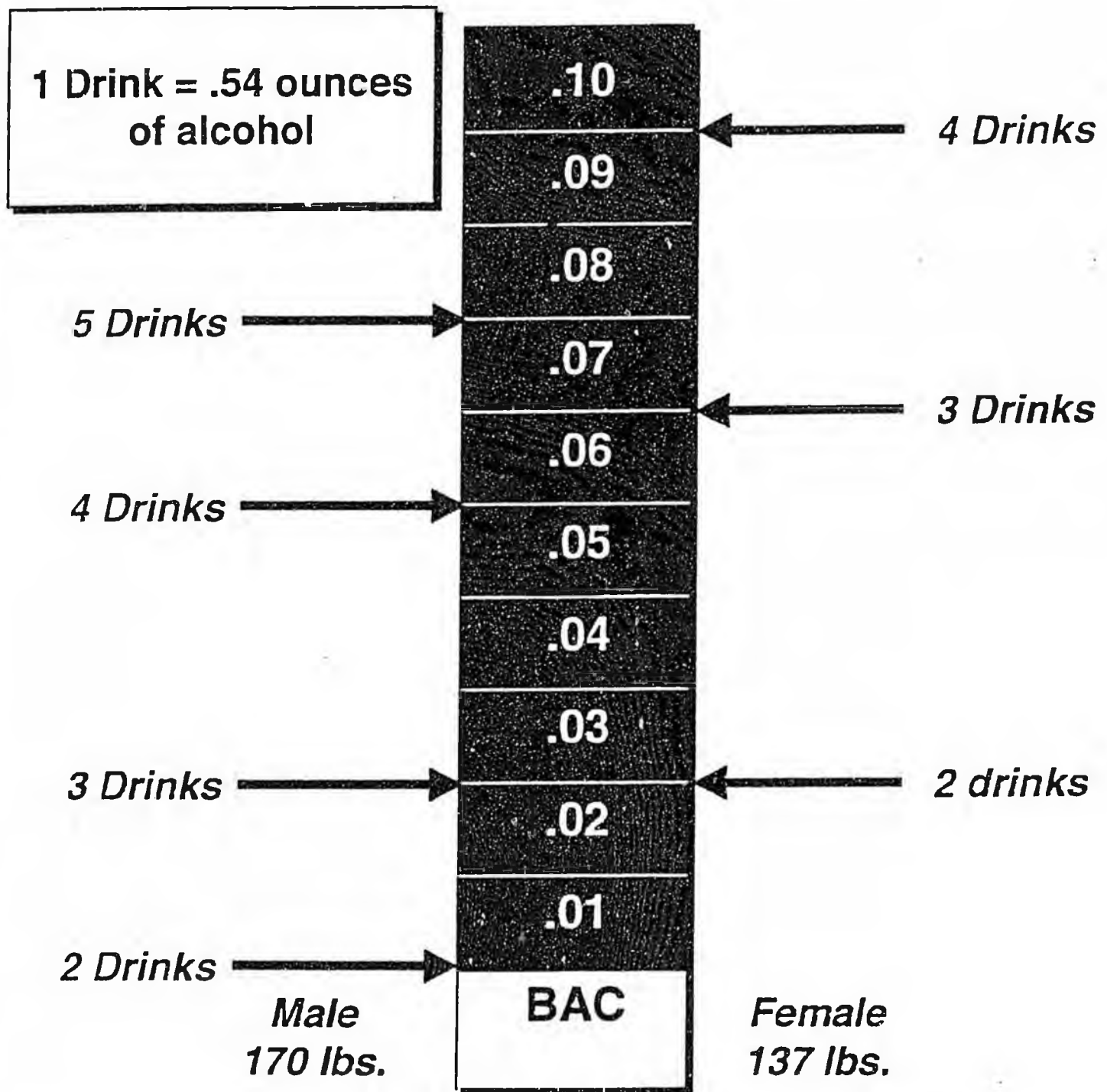
Washington Office:  
 444 North Capitol Street, N.W., Suite 515  
 Washington, D.C. 20001  
 Tel: 202-624-5400  
 Fax: 202-737-1069

States Considering/Not Considering  
.08 BAC  
2000-2001 Session

AK	HB 12, HB 4
AR	HB1717, HB 1122
AZ	Passed
CO	Not Considering
CT	Not Considering
DE	Not Considering
GA	SB 73
IN	Indeterminate
IA	Indeterminate
LA	Not Considering
MD	Not Considering
MA	Not Considering
MI	Not Considering
MN	Not Considering
MS	Indeterminate
MO	SB 36, HB 38, HB 302
MT	Not Considering
NE	Passed
NV	AB 166
NJ	ACR 121, SCR 73 (Jun 29,2000) S 1896 (Nov13, 2000) A 1041 (Jan 11, 2000)
NY	Not Considering
ND	Not Considering
OH	Not Considering
OK	Not Considering
PA	Not Considering
SC	Not Considering
SD	Not Considering
TN	HB 138, HB 0223, HB 0261, HB 1924, SB 0189, SB 1131, SB 1392, SB 1471
WV	SB 120, HB 2197
WI	Not Considering
WY	Not Considering

Note: Information derived from individual States web-pages (30 March and 2 April 2001)

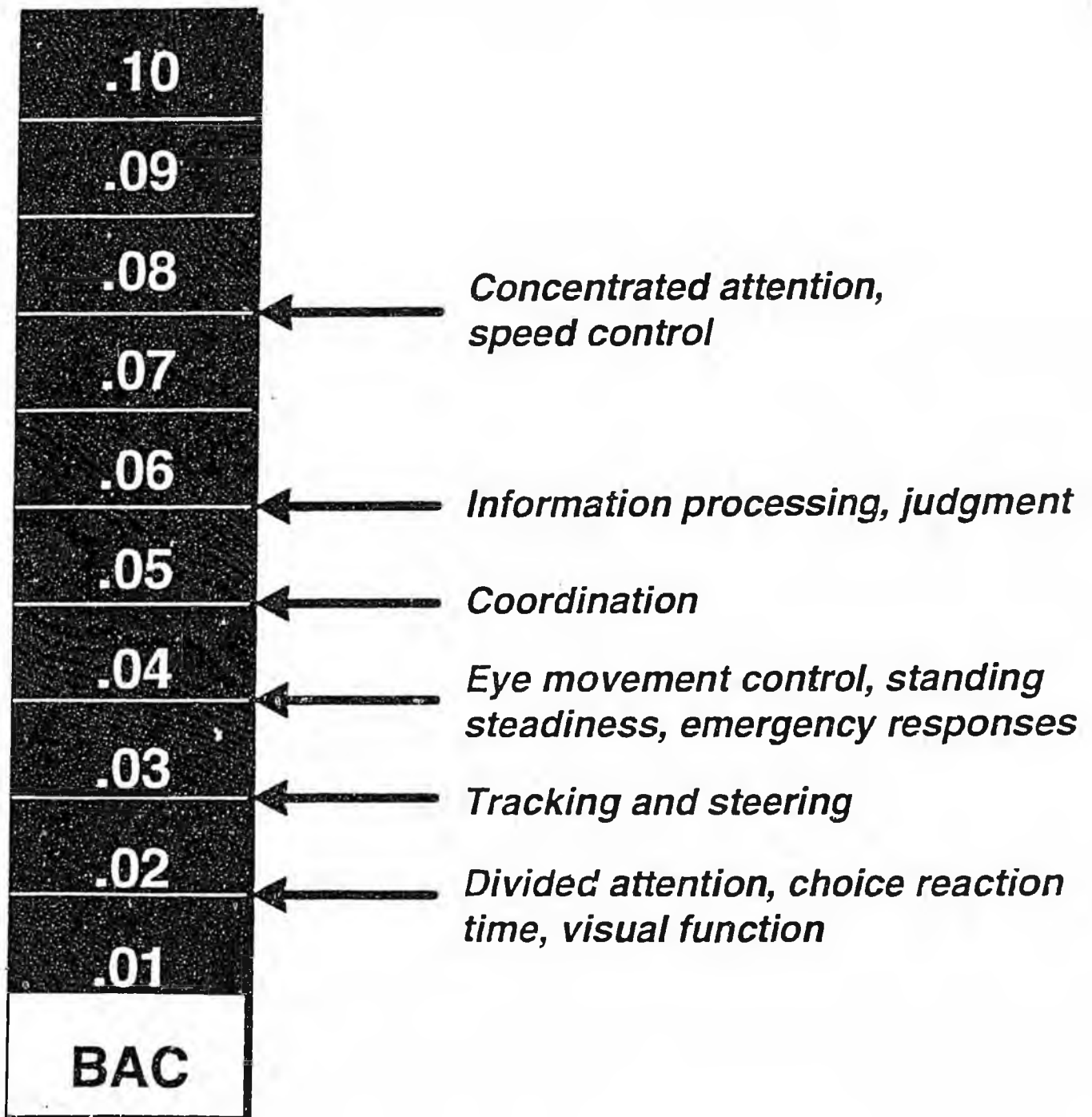
# *Number of Drinks and BAC in Two Hours of Drinking*



## *.08 Illegal Per Se*

- **Driving at .08 BAC or above constitutes the violation in and of itself (no other factors are needed as evidence).**
- ***Articulable suspicion* for making the stop and “probable cause” for making the arrest must still be demonstrated.**
- ***Burden of proof* is less for the prosecutor.**

# *BAC and Impairment*



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# *Alcohol Limits for Drivers*

## *A Report to Congress*

*NHTSA-USDOT February 1991*

- **No “safe” BAC level**
  - **All States should have “Per Se” laws**
  - **.08 should be adopted**
  - **Multilevel system of administrative, civil, and criminal penalties should be considered**
-

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*Driving Under the Influence:  
A Report to Congress on  
Alcohol Limits*

- **Enact .08 BAC as per se criminal offense**
- **Accompany lower limits with PI&E**
- **Repeal laws that create presumption drivers *not* under influence at any BAC above .00**
- **“Don’t drink and drive”**
- **“Don’t drive if you have been drinking”**

*National Highway Traffic Safety Administration  
United States Department of Transportation*

*July 1992*

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## *Effectiveness of .08 Laws*

- **Impact of .08 in five states,  
NHTSA, 1995**
    - ▶ **Significant reductions in A/R fatal  
crashes in 4 out of 5 states ranging  
from 4% (CA) to 40% (VT)**
  - **Effect of .08 in 5 states,  
Boston University, 1996**
    - ▶ **5 States with .08 matched to 5 states  
with .10 showed 16% reduction in  
driver fatalities at .08+ and an 18%  
reduction in driver fatalities at .15+  
due to .08 laws.**
- 
-

## *Effectiveness of .08 Per Se*

- NHTSA evaluated effects of .08 in California
- Results:
  - ▶ 81% knew BAC limit was stricter
  - ▶ Increase in DUI arrests
  - ▶ 12% reduction in A/R fatalities
  - ▶ Some of effects due to ALR



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## *BAC Limits in Other Countries*

<u>Country</u>	<u>Illegal Per Se</u>
Canada	.08
Great Britain	.08
Australia	.05
Austria	.08
Switzerland	.08
Netherlands	.05
Norway	.05
Finland	.05
Sweden	.02

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## *Who Supports Lower BAC Levels?*

- **AMA**      **American Medical Association**
- **NSC**      **National Safety Council**
- **NCUTLO** **National Committee on Uniform Traffic Laws and Ordinances**
- **AAAM**    **Association for the Advancement of Automotive Medicine**
- **NIAAA**    **National Institute for Alcohol Abuse and Alcoholism**
- **NHTSA**    **National Highway Traffic Safety Administration**

## *.08 Per Se*

- **Will .08 affect problem drinker drivers (BACs  $\geq$  .15)?**
  - ▶ **Significant reductions in the proportion of fatally injured drivers with BACs  $\geq$  .20 occurred in California after .08 went into effect**
  - ▶ **Significant reductions in the proportion of fatally injured drivers with BACs  $\geq$  .15 occurred in Boston University 5 state study due to .08 law**
  - ▶ **.08 serves as a general deterrent, if accompanied with PI&E even for drinkers who reach high BACs**

## *The .08 Per Se Law Will:*

- Increase the arrest and conviction rates for impaired drivers at .10 and above
- Raise the perceived risk of arrest for driving after drinking
- Improve public awareness about how much alcohol it takes to be dangerously impaired
- Bring the U.S. closer to per se limits of most industrialized nations

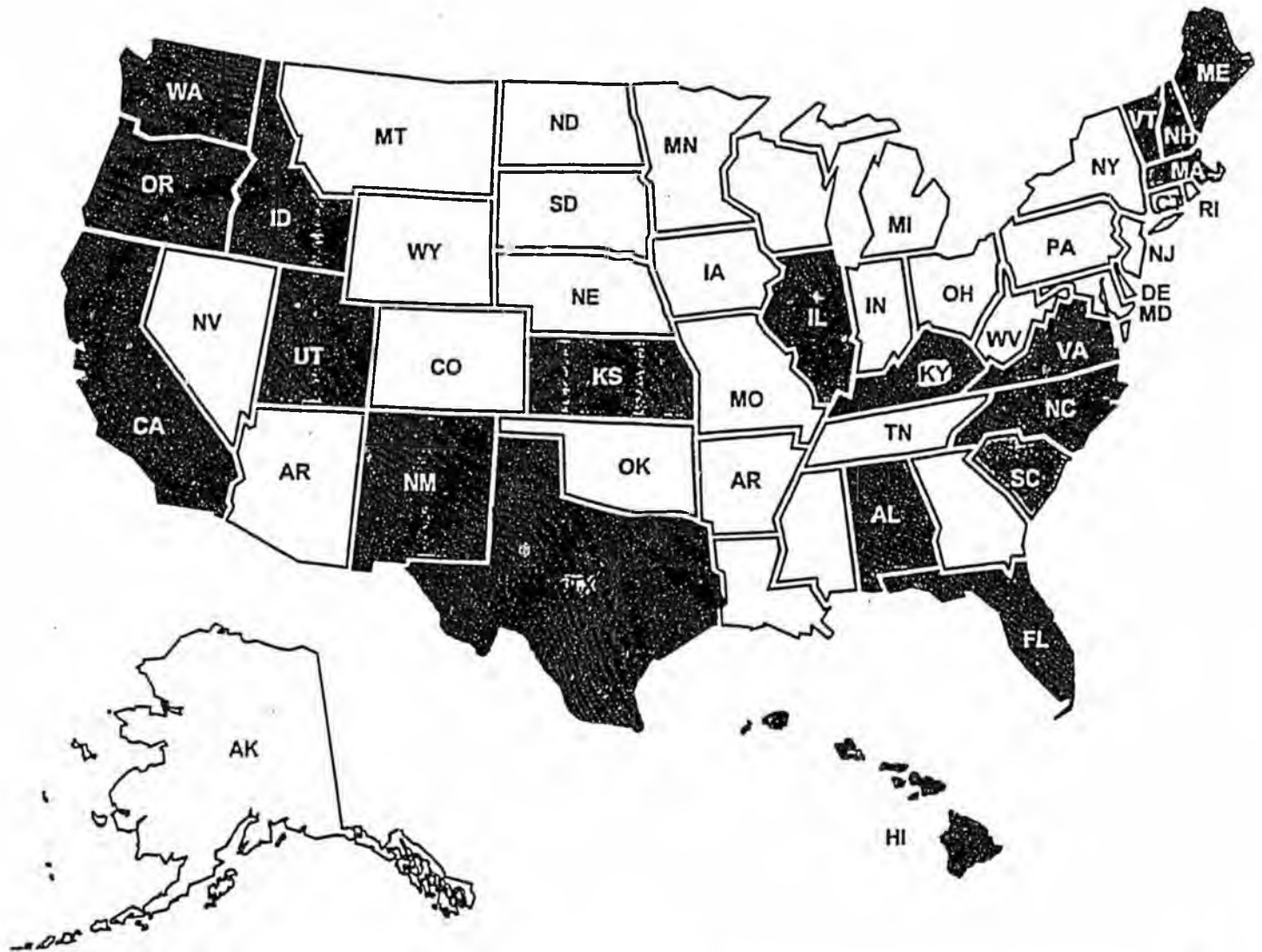
## *Cost/Benefit of .08 Laws*




- Minimal costs to implement
- Small increase in arrests, but not enough to overburden the courts
- Same rules of enforcement apply (articulable suspicion; probable cause)
- Law sends a message to the public that the State is getting tougher on impaired driving
- Potential benefits far outweigh any costs

## *.08 In Summary ...*

- Is not just a couple of drinks after work
- Is a level at which critical driving skills are impaired
- Is a level above which the risk of crash is increased substantially
- Is a level which most industrialized countries have adopted
- Is a proven effective measure which will reduce alcohol-related fatalities

# States With BAC Per Se Laws



-  .08 BAC (AL, CA, FL, HI, ID, IL, KS, ME, NC, NH, NM, OR, UT, VA, VT, WA)
-  .10
-  No Per Se Law (MA, SC)

# Alcohol-Related Relative Risk of Driver Fatalities and Driver Involvement in Fatal Crashes in Relation to Driver Age and Gender: An Update Using 1996 Data\*

PAUL L. ZADOR, PH.D., SHEILA A. KRAWCHUK AND ROBERT B. VOAS†

Westat, Inc., 1650 Research Boulevard, Rockville, Maryland 20850

**ABSTRACT.** *Objective:* To re-examine and refine estimates for alcohol-related relative risk of driver involvement in fatal crashes by age and gender as a function of blood alcohol concentration (BAC) using recent data. *Method:* Logistic regression was used to estimate age/gender specific relative risk of fatal crash involvement as a function of the BAC for drivers involved in a fatal crash and for drivers fatally injured in a crash, by combining crash data from the Fatality Analysis Reporting System with exposure data from the 1996 National Roadside Survey of Drivers. *Results:* In general, the relative risk of involvement in a fatal vehicle crash increased steadily with increasing driver BAC in every age/gender group among both fatally injured and surviving drivers. Among 16-20 year old male drivers, a BAC increase of 0.02% was estimated to more than double the relative risk of fatal single-

vehicle crash injury. At the midpoint of the 0.08% - 0.10% BAC range, the relative risk of a fatal single-vehicle crash injury varied between 11.4 (drivers 35 and older) and 51.9 (male drivers, 16-20). With only very few exceptions, older drivers had lower risk of being fatally injured in a single-vehicle crash than younger drivers, as did women compared with men in the same age range. When comparable, results largely confirmed existing prior estimates. *Conclusions:* This is the first study that systematically estimated relative risk for drink-drivers with BACs between 0.08% and 0.10% (these relative risk estimates apply to BAC range midpoints at 0.09%.) The results clearly show that drivers with a BAC under 0.10% pose highly elevated risk both to themselves, and to other road users. (*J. Stud. Alcohol* 61: 387-395, 2000)

**B**ASED ON extensive research over several decades, we now have overwhelming evidence showing that even blood alcohol concentration (BAC) levels as low as 0.02% impair driving-related skills. One such line of evidence grows out of laboratory research with dosed subjects (Moskowitz and Robinson, 1987; see also National Institute on Alcohol Abuse and Alcoholism, 1997, chapter 7). Confirming evidence also comes from field research that compares the BACs of crash-involved with noncrash-involved drivers to determine the relative risk of crash involvement (for a review, see Perrine et al., 1989; Zador, 1991).

According to National Highway Traffic Safety Administration (NHTSA) information, as of September 1999, 31 states defined driving with a BAC above 0.10% as a crime per se, while another 17 states plus the District of Columbia set their per se limit at 0.08%. (Under a per se law it is a crime to drive with a BAC at or above the proscribed level; two states, Maryland and South Carolina, do not have a per se law but a presumptive limit.) Due to a combination of legal measures, enforcement actions and changes in voluntary behavior patterns, alcohol-related fatalities have been declining for

nearly 2 decades, both in absolute numbers and as a proportion of all fatalities. Nonetheless, there were still 15,936 alcohol-related traffic fatalities in the United States that accounted for nearly 38% of total traffic fatalities in 1996 (NHTSA, 1999), indicating that much more needs to be done.

The objective of the present research is to re-examine and refine relative fatal crash risk estimates, in a systematic fashion using more recent data. It extends similar prior work by the first author, in three important ways. First, we estimate relative risk for the policy-relevant BAC range of 0.08% to 0.10%. Second, we estimate relative risk for six driver groups: (1) driver fatalities in single-vehicle crashes, (2) driver involvements in single-vehicle fatal crashes, (3) driver fatalities in two-vehicle crashes, (4) driver involvements in two-vehicle fatal crashes, (5) driver fatalities in all crashes and (6) driver involvement in all fatal crashes. Third, we employ statistical methods to estimate both the effect of sampling roadside exposure and the effect of multiple imputation of missing BACs on the uncertainty of relative risk estimates.

## Method

### Data sources

*Driver exposure data: the 1996 Roadside Survey.* The 1996 National Roadside Survey (96NRS) of weekend nighttime drivers in the 48 contiguous states followed the same principles as its two predecessors (in 1973 and 1986). A

Received: March 29, 1999. Revision: June 16, 1999

\*This research was funded by the National Highway Traffic Safety Administration under purchase order DTNH22-97-P-02174.

†Robert B. Voas is with the Pacific Institute, Landover, MD.

sample of noncommercial operators of four-wheel motor vehicles was interviewed and breath-tested during a roughly 1-month period in the fall of 1996. Counties with a population of less than 20,000 were not sampled, and in counties with larger populations, roadways with average daily traffic below 2,000 were excluded from the surveys (for details, see Lestina et al., 1999). Using a geographically stratified multi-stage cluster sample, drivers were selected for interviews and breath tests. This survey was designed based on the National Automotive Sampling System/Crashworthiness Data System (NASS/CDS) (NHTSA, 1995). The first stage of the design comprised 24 primary sampling units (PSUs) employed by NASS/CDS, six each in the Northeast, South, West and Midwest regions. The second stage comprised a total of 46 police jurisdictions: 11-12 per region. At the third stage, square grids with sides roughly equal to 1 mile were superimposed on the sampled jurisdictions and then randomly sampled to obtain the requisite number of squares (this procedure was modified for areas with low road density). Once a square was chosen, the survey was conducted at the first safe area found in it by the survey team leader. Driver selection represented the final stage: the first driver who approached the site after an interviewer became available was stopped for the next interview. Field operations were conducted on Friday and Saturday nights during two 2-hour periods at separate sites: at one site between 10 pm and midnight, and at the other between 1 am and 3 am. Data from the 96NRS is only representative of locations and periods when drinking and driving is most prevalent (i.e., not of all times or roadways in the 48 contiguous states).

We adjusted driver sampling weights from the 96NRS for nonrespondents, and used the adjusted weights to approximate the statistical distribution of drivers on weekend nights (exposure), by gender, age (16-20, 21-34 and  $\geq 35$ ) and % BAC (0.000, 0.001-0.019, 0.020-0.049, 0.050-0.079, 0.080-0.099, 0.100-0.149 and 0.150+). For details on nonresponse adjustments, see Lestina et al. (1999) and Zador et al. (in press).

*Data on drivers in fatal crashes.* The Fatality Analysis Reporting System (FARS) is a census of all fatal motor vehicle crashes that occur on public trafficways in the United States and result in a fatality within 30 days. Although FARS is maintained by NHTSA of the U.S. Department of Transportation, the data in FARS are obtained through cooperative agreements with agencies in each state's government and are managed by regional contracting officer's technical representatives located in the 10 NHTSA regional offices. For basic data elements associated with a fatal vehicle crash, reporting is usually of very high quality with relatively few missing values, however, there is one exception: even in recent years, BACs were not available for many drivers involved in fatal crashes. To deal with this problem, NHTSA has employed a statistical method since the early 1980s for imputing missing BACs (Klein, 1986). More recently, the method of multiple imputation (Rubin, 1987) was adopted to handle the problem of missing BACs on FARS (Rubin et al.,

1999). Under multiple imputation, each missing value is replaced by a small number of imputed values (10, in the present case) that are generated by a statistical procedure designed to reflect the statistical properties of the missing driver BACs. We used the 10 complete-data versions of FARS in our statistical analyses. Note that, although the data files for the multiple imputation method are available, NHTSA is not yet using the multiple imputation method for its published alcohol estimates. The same method used in previous years is to be used for the 1998 FARS estimates.

We selected drivers of four-wheel passenger vehicles who were 16 years of age and over and were involved in fatal crashes during 1995 or 1996 in 1 of the 48 contiguous states (NHTSA, 1995-96). The crash had to have occurred on a weekend night in a county with a 1990 population of at least 20,000; outside of special jurisdictions; and on a paved road that was not classed as an interstate, other urban freeway or expressway. There were only two notable differences between the exposure and the crash screening criteria, and both were disregarded to increase the sample size for drivers retained for the analyses. First, we accepted crashes that occurred between midnight and 1 am, since those crashes were excluded from the exposure sample only to permit the survey team to change location, and not because BAC distribution between midnight and 1 am was thought to be different. Second, we did not restrict crashes to the weekend nights during which the surveys were conducted. Including weekend nights for the whole year increased sample sizes almost 12-fold and introduced no substantial difference in the distribution of driver BACs since driver BACs varied little between the survey period and the rest of the year. We classified the drivers meeting these selection criteria by the number of crash-involved vehicles (one, two, and any number of vehicles) and by whether the driver was just involved in the crash or was also fatally injured in the crash. We thus defined six driver groups for analysis: drivers fatally injured in single-vehicle crashes, drivers involved in fatal single-vehicle crashes, drivers fatally injured in two-vehicle crashes, drivers involved in fatal two-vehicle crashes, drivers fatally injured in a motor-vehicle crash and drivers involved in a fatal motor-vehicle crash. We classified the six groups of driver fatalities and involvements by gender, age group and BAC, in the same way we classified the exposure sample.

#### *Statistical methods*

*Using odds ratios and logistic regression to estimate relative risk.* Following Zador (1991), we base our methods on the intuitive notion that comparisons between the frequency distribution of fatal-crash involvement by gender, age and BAC, and the frequency distribution of roadside exposure by gender, age and BAC, can provide a good yardstick for measuring the effect of these factors on the relative likelihood of fatal-crash involvement per unit of driving exposure. Since the 96NRS did not provide a national estimate for total miles

TABLE 2. Logistic regression coefficients in models for risk of driver fatalities and driver involvement in single-vehicle crashes, in two-vehicle crashes and in all crashes as a function of variables for age, gender and interactions of age, gender and BAC. Data from the 96NRS and the 1995-96 FARS.

Variable	Parameter	Single-vehicle crashes		Two-vehicle crashes		All crashes	
		Fatalities	Involvements	Fatalities	Involvements	Fatalities	Involvements
Age 16-20	Coefficient <sup>a</sup>	-1.547	-0.572	-2.184	-0.873	-1.077	0.085
	SE	0.072	0.063	0.060	0.057	0.065	0.057
Age 21-34	Coefficient	-2.352	-1.205	-2.643	-1.187	-1.654	-0.331
	SE	0.042	0.028	0.051	0.034	0.036	0.025
Age 35+	Coefficient	-2.540	-1.656	-2.425	-1.291	-1.672	-0.591
	SE	0.043	0.039	0.037	0.036	0.036	0.039
Female	Coefficient	-0.580	-0.509	-0.065	-0.265	-0.351	-0.356
	SE	0.069	0.053	0.054	0.043	0.053	0.042
BAC < .019, age 21+	Coefficient	-2.861	-1.889	-1.593	-2.004	-2.031	-1.925
	SE	0.375	0.126	0.121	0.134	0.137	0.106
BAC <sup>a</sup> , age 16-20	Coefficient	0.044	0.039	0.033	0.031	0.041	0.035
	SE	0.007	0.006	0.005	0.005	0.006	0.005
BAC, age 16-20, female	Coefficient	-0.014	-0.015	-0.006	-0.015	-0.016	-0.016
	SE	0.006	0.005	0.006	0.005	0.006	0.005
BAC, age 21-34	Coefficient	0.029	0.024	0.023	0.019	0.026	0.020
	SE	0.001	0.001	0.001	0.001	0.001	0.001
BAC, age 35+	Coefficient	0.027	0.024	0.020	0.018	0.023	0.020
	SE	0.001	0.001	0.001	0.001	0.001	0.001
Model diagnostic							
Heterogeneity factor		1.6979	1.7774	1.8783	3.3159	2.0918	3.7070
Max-rescaled R <sup>2</sup>		0.6844	0.4935	0.6524	0.3142	0.5297	0.3171
H-L goodness-of-fit, <i>p</i>		0.1998	0.6806	0.0317	0.0001	0.4008	0.0002
Normality of residuals, <i>p</i>		0.2813	0.0606	0.5701	0.4175	0.2189	0.0165

<sup>a</sup>BAC represents driver BAC as a continuous variable.

<sup>b</sup>A positive (negative) parameter indicates that variable and risk change in the same (opposite) direction.

was adequately represented by the models in Table 2 for three of the driver groups: drivers involved in a fatal single-vehicle crash, drivers killed in a single-vehicle crash and drivers killed in any vehicle fatal crashes. While the Hosmer-Lemeshow test statistic ( $p = .032$ ) rejected the hypothesis of model fit for fatally injured drivers in two-vehicle crashes, the regression model explained 65% of all explainable relative risk variation, and the standardized Pearson residuals were normally distributed. Overall, we deem model fit acceptable for driver fatalities in two-vehicle crashes. In contrast, the models performed poorly for the two remaining driver groups—drivers in fatal crashes involving two vehicles or drivers in fatal crashes involving any number of vehicles.

We explored, in considerable detail, the way our models broke down for fatal two-vehicle crashes. We examined model fit statistics for the models in Table 2 and for several other model specifications, including specifications obtained by stepwise regression (for a summary of results for a few of the dozens of models that were examined, see the Appendix). The results showed clearly that sober driver involvement in two-vehicle crashes is not closely related to driver involvement at positive BACs, and we discovered that only the inclusion of indicator variables representing overall sober driver risk, and sober driver risk by age and gender, would produce acceptable model fit. This result was, in fact, not too surprising—for two reasons. First, in crashes involving more than a single vehicle, some drivers may be innocent (and

probably sober) victims whose vehicles were struck by a high BAC at-fault driver. Second, in multivehicle crashes, crash configuration and vehicle occupancy become important determinants of relative risk. However, we decided not to use regression models that included sober driver risk variables (e.g., main effect for zero BAC, zero BAC by age interaction, etc.; see Appendix) because it was not clear how these models can be used to estimate relative risk with BAC = 0 as the baseline. Therefore, relatively poor model fit notwithstanding, we believe that the relative risk estimates presented from the model parameter estimates in Table 2 provide reasonable, albeit conservative, approximations of the true relative risk, even for driver involvement in multivehicle fatal crashes. Additional research will be needed to improve model fit for these driver groups.

Table 3 shows model-based estimates for factor of proportionate increase in relative risk associated with an increase of 0.02% in BAC level for each driver group, by age and gender. Of noteworthy mention, it was estimated that each 0.02 percentage point increase in the BAC of a driver with a nonzero BAC more than doubled the risk of receiving a fatal injury in a single-vehicle crash among male drivers aged 16-20, and nearly doubled the comparable risk among the other driver groups. Proportionality factors were estimated from age-specific regression coefficients of BAC in Table 2, except that for female drivers aged 16-20 the estimates were adjusted for the effect of being female. For the relative risk estimates in subsequent tables, relative risk was

In general, the pattern of results for the other driver groups was quite similar to the pattern described above (see Zador et al., in press). There are two major differences among the other driver groups: (1) For fatally injured drivers, relative risk increased more slowly with increasing BAC in two-vehicle than in single-vehicle crashes. As indicated earlier, this was to be expected since in multivehicle fatal crashes some involved drivers were likely to be no more than marginally at-fault. (2) Since most fatally injured drivers were killed in a single-vehicle or in a two-vehicle crash, the overall rate of increase in relative risk was bracketed by the rates of increase for single-vehicle and two-vehicle crashes.

## Discussion

### Confirmatory findings

This study generally confirmed that the relative risks of fatal injury and fatal crash involvement increase steadily with increasing driver BAC within each of the six driver age and gender groups studied. The only exception was that among drivers 21 and over, relative risk was lower at near-zero positive BAC than at zero BAC. The classic Grand Rapids study by Borkenstein et al. (1974) found a similar "dip" in the risk curve. Hurst (1973) showed that controlling self-reported drinking frequency eliminates the Grand Rapids dip. The customary interpretation of these results is that the anomalous dip probably results from differing alcohol tolerance between crash-involved and noncrash-involved drivers. Since drinking frequency data were not available in our study, we were unable to estimate risk curves by drinking frequency. With few exceptions, relative risk was found to decrease with increasing driver age at every BAC level, for both men and women—a finding that extends similar age trends reported for more moderate BACs by Zador (1991).

The current study also confirms the substantially higher relative risk for involvement in a single-vehicle crash of young drivers at a zero BAC as previously reported by Mayhew et al. (1986). In addition, female drivers exhibited substantially lower relative risk than male drivers of the same age. To a somewhat lesser extent, both sets of findings were also true for most of the other five driver groups studied.

In this study, lower and upper 95% confidence bound estimates for relative risk as a function of driver BAC take into account both the sampling variation of the roadside driver exposure sample and the effect of multiple BAC imputations performed by Rubin and Schaller (1998) for NHTSA. Not surprisingly, relative risk confidence intervals are wide (e.g., lower and upper confidence bounds were 16.5 and 164 for male drivers ages 16-20 killed in single-vehicle crashes with a BAC between 0.08% and 0.10%; these relative risk estimates apply to BAC range midpoints at 0.09%). We note that the width of 95% confidence intervals increases with increasing BACs for mathematical reasons (both relative risk and its confidence bounds depend exponentially on the cor-

responding logistic regression parameters). We also note that, allowing for comparable variation in prior estimates, the relative risk estimates presented here are largely in line with estimates published elsewhere. (Relative risk estimates presented in this article differ in several ways from similar estimates in Zador [1991]. In the earlier study, the baseline BAC group was defined to include drivers at or below a BAC of 0.01%, age groups and BAC groups were defined differently, driver fatalities were included from only 29 states with low rates of missing BACs, missing BACs were not imputed, and the numeric BAC values were not used in analyses except to classify drivers.)

### New findings

This is the first study that estimated relative risk from compatible data sources using the same methods for six groups of drivers involved in fatal crashes that were defined by the number of crash-involved vehicles and by whether the driver was only involved or also fatally injured in the crash. Drivers killed in single-vehicle crashes are of particular interest for assessing the *pure* effect of drink-driving because in single-vehicle crashes: (1) driver fault is not shared, (2) crash configuration is less of a factor, (3) vehicle occupancy is not relevant and (4) the seating position of the fatally injured occupant is fixed. In two-vehicle crashes, the possibility that fault may be split between two drivers, one or both of whom may have a (possibly different) positive BAC, would seem to make it difficult to estimate the pure effect of BAC on crash risk. It was all the more gratifying to find that the relative risk of a fatal driver injury depends on driver BAC in almost the same way for single-vehicle crashes and two-vehicle crashes, provided that the relative risk model of two-vehicle crashes statistically accounted for the possible roles of not-at-fault sober drivers (see Appendix). In this study, we focused on the general effect on relative risk of a positive driver BAC, rather than on its pure effect. Our main statistical model for estimating relative risk did not, therefore, adjust relative risk estimates for the overrepresentation of sober (probably not-at-fault) drivers. Consequently, the model we used in this study appears to have generally underestimated the pure effect of positive driver BAC on relative risk, except for drivers in single-vehicle crashes.

As noted earlier, this study confirmed that relative risk and driver age are inversely related at every BAC. However, somewhat surprisingly and in part contrary to Zador (1991), we also found that for the 16-20 age group, women had lower relative risk than men at every BAC. For BACs of 0.02% and over, this lower relative risk was roughly comparable to relative risk among adult drivers aged 21 to 34—an important finding because of the increasing nighttime presence of young female drinking drivers observed in the 96NRS. That most recent survey found more, although not significantly more female than male drinking drivers in the 16-20 age group. Perhaps the lower relative risk could be attributed to

surprising that, in every age group, the regression coefficients of BAC for driver involvement in fatal two-vehicle crashes are substantially higher in the model that incorporates a zero-BAC term than in the corresponding model that does not (this finding is actually a mathematical consequence of the fact that zero-BAC coefficients are always positive). It is surprising, however, that in every age group the regression coefficients of BAC in the model for driver involvement in fatal two-vehicle crashes that incorporates a zero-BAC term are only slightly smaller than similar age-group regression coefficients for fatally injured drivers in single-vehicle crashes. This suggests that positive BAC affects single-vehicle fatalities and two-vehicle crash involvement to roughly the same extent, provided that not-at-fault sober drivers are suitably accounted for. However, until confirmed by additional research, this finding must be considered more as a hypothesis than a definitive conclusion. Note, however, that similar suggestions were also made in Zador (1991).

#### Acknowledgments

The authors would like to express their thanks to JoAnn Wells and Chuck Farmer, from the Insurance Institute for Highway Safety, for assistance with the roadside survey data, and to Doug Duncan, consultant to Westat, Inc., for data processing. Paul J. Tremont, Ph.D., was the contracting officer's technical representative for this project.

#### References

- BORKENSTEIN, R.P., CROWTHER, R.P., SHUMATE, R.P., ZIEL, W.B. AND ZYLMAN, R. The role of the drinking driver in traffic accidents (The Grand Rapids Study). 2nd Edition. *Blood Alcohol 11* (Suppl. No. 1): 1-132, 1974.
- HINDSON, R., HEBBEN, T. AND WINTER, M. Lowering state legal blood alcohol limits to 0.08%: The effect on fatal motor vehicle crashes. *Amer. J. Publ. Hlth 86*: 1297-1299, 1996.
- HOSMER, D.W., JR. AND LEMESHOW, S. *Applied Logistic Regression*, New York: John Wiley & Sons, 1989.
- HURST, P.M. Epidemiological aspects of alcohol in driver crashes and citations. *J. Safety Res. 5*: 130-148, 1973.
- KLEIN, T.M. A Method for Estimating Posterior BAC Distributions for Persons Involved in Fatal Traffic Accidents, DOT HS-807-094, Washington: Department of Transportation, 1986.
- LESTINA, D.C., GREENE, M., VOAS, R.B. AND WELLS, J. Sampling procedures and survey methodologies for the 1996 survey with comparisons to earlier national roadside surveys. *Eval. Rev. 23*: 28-46, 1999.
- MAYHEW, D.R., DONELSON, A.C., BEIRNESS, D.J. AND SIMPSON, H.M. Youth, alcohol and relative risk of crash involvement. *Accid. Anal. Prev. 18*: 273-287, 1986.
- MOSEKOWITZ, H. AND ROBINSON, C. Driving-related skills impaired at low blood alcohol levels. In: NOORDZU, P.C. AND ROSZBACH, R. (Eds.) *Alcohol, Drugs and Traffic Safety*, T86. New York: Elsevier, 1987, pp. 79-86.
- NAGELKERKE, N.J.D. A note on the general definition of the coefficient of determination. *Biometrika 78*: 691-692, 1991.
- NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION. *NASS/CDS Analytical User's Manual 1988-1997*, Washington: National Center for Statistics and Analysis, Department of Transportation, 1995, pp. 67-68.
- NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION. *Fatality Analysis Reporting System*, Washington: Department of Transportation, 1995-96.
- NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION. *Saving Teenage Lives: The Case for Graduated Driver Licensing*, Technical Report No. DOT HS-808-801, Washington: Department of Transportation, 1998.
- NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION. *1998 Traffic Fatalities Decline: Alcohol-Related Deaths Reach Record Low*, Press Release No. 23-99, Washington: Department of Transportation, 1999.
- NATIONAL INSTITUTE ON ALCOHOL ABUSE AND ALCOHOLISM. *Alcohol and Health: Ninth Special Report to the U.S. Congress*, NIH Publication No. 97-4017, Rockville, MD: Department of Health and Human Services, 1997.
- FERRINE, M.W., PUCK, R.C. AND FELL, J.C. Epidemiologic perspectives on drunk driving. In: *Surgeon General's Workshop on Drunk Driving: Background Papers*, Rockville, MD: Department of Health and Human Services, 1989, pp. 35-76.
- RUBIN, D.B. *Multiple Imputation for Nonresponse in Surveys*, New York: John Wiley & Sons, 1987.
- RUBIN, D.B., SCHAFER, J.L. AND SUBRAMANIAN, R. Multiple imputation of missing blood alcohol concentration (BAC) values in FARS. Report No. DOT HS-808-816, Washington: National Highway Traffic Safety Administration, Department of Transportation, 1999.
- SAS INSTITUTE, INC. *SAS/STAT Software: Changes and Enhancements*, Release 6.11, Cary, NC: SAS Institute, 1996.
- SCHLESSELMAN, J.J. *Case-Control Studies: Design, Conduct and Analysis*, New York: Oxford University Press, 1982.
- SPSS, Inc. *WesVarPC Complex Samples Software: Version 3.0, User's Guide*, Chicago, IL: SPSS, 1998.
- VOAS, R.B., AND TOFFETS, A.S. The Relationship of Alcohol Safety Laws to Drinking Drivers in Fatal Crashes, DOT-HS-808-980, Washington: National Highway Traffic Safety Administration, Department of Transportation, 1999.
- VOAS, R.B., WELLS, J., LESTINA, D., WILLIAMS, A. AND GREENE, M. Drinking and driving in the US: The 1996 National Roadside Survey. In: MERTER-GUYON, C. (Ed.) *Alcohol, Drugs and Traffic Safety*, T97, Vol 3, Annecy, France: Centre d'Etudes et de Recherches en Médecine du Trafic, 1997, pp. 1159-1166.
- ZADOR, P.L. Alcohol-related relative risk and fatal driver injuries in relation to driver age and sex. *J. Stud. Alcohol 52*: 302-310, 1991.
- ZADOR, P.L., KRAWCHUK, S.A. AND VOAS, R.B. Alcohol-related relative risk and fatal driver injuries in relation to driver age and sex: An update using 1996 data, National Highway Traffic Safety Administration, in press.

## Public Health Briefs

### Lowering State Legal Blood Alcohol Limits to 0.08%: The Effect on Fatal Motor Vehicle Crashes

Ralph Hingson, ScD, Timothy Heeren, PhD, and Michael Winter, MPH

#### ABSTRACT

**Objectives.** This study was undertaken to determine whether reductions in alcohol-related fatal crashes following adoption of 0.08% legal blood alcohol limits were independent of general regional trends.

**Methods.** The first five states that lowered legal blood alcohol limits to 0.08% were paired with five nearby states that retained a 0.10% legal standard. Within each pair, comparisons were made for the maximum equal available number of pre- and postlaw years.

**Results.** States adopting 0.08% laws experienced 16% and 18% relative postlaw declines in the proportions of fatal crashes involving fatally injured drivers whose blood alcohol levels were 0.08% or higher and 0.15% or higher.

**Conclusions.** If all states adopted 0.08% legal blood alcohol limits, at least 500 to 600 fewer fatal crashes would occur annually. (*Am J Public Health*. 1996;86:1297-1299)

#### Introduction

In 1994, 16 589 people died and nearly 297 000 persons were injured in alcohol-related traffic crashes.<sup>1</sup> Several different types of studies have reported that driver impairments begin at blood alcohol levels well below the 0.10% legal standard in most states. Experimental laboratory studies have shown that at 0.08%, a level reached by a 150-lb person consuming four drinks an hour on an empty stomach, there is reduced peripheral vision, poorer recovery from glare, poor performance on complex visual tracking, and reduced divided attention performance.<sup>2</sup> Driver simulation and road course studies have revealed poor parking performance, impaired driver performance at slow speeds, and steering inaccuracies<sup>3</sup>; roadside observational studies have identified speeding and breaking performance deterioration.<sup>4</sup> A national comparison of drivers in single-vehicle fatal crashes with drivers not in fatal crashes but stopped at roadside surveys indicated that each 0.02% increase in blood alcohol level nearly doubles the risk of fatal crash involvement. In all age and sex groupings, the fatal crash risk at a blood alcohol level of 0.05% to 0.09% was at least nine times greater than that at zero blood alcohol.<sup>5</sup>

To reduce alcohol-related fatal traffic crashes, 14 states have lowered the legal blood alcohol limit from 0.10% to 0.08%. Johnson and Walz<sup>6</sup> monitored six different measures of driver involvement in alcohol-related fatal crashes in the first five states to adopt 0.08% laws. Nine of the 30 pre- to postlaw comparisons identified statistically significant decreases. However, comparison areas were not included to assess whether the postlaw declines were independent of general regional trends. Thus, this study was undertaken to

assess whether, relative to nearby states, states adopting a 0.08% legal limit experienced a reduction in the proportion of fatal crashes involving (1) fatally injured drivers with blood alcohol levels of 0.08% or higher and 0.15% or higher, and (2) any driver with a blood alcohol level at 0.08% or higher and 0.15% or higher.

#### Methods

Prior to 1992, five states had lowered the legal blood alcohol limit from 0.10% to 0.08%: Utah (August 1983), Oregon (November 1983), Maine (August 1988), California (January 1990), and Vermont (July 1991). Each of these states was paired with a nearby state that retained a 0.10% legal limit. Within each pair, comparisons were made for the maximum equal number of available pre- and postlaw years. Thus, Utah was compared with Idaho from August 1976 to July 1991, Oregon with Washington from November 1976 to October 1991, Maine with Massachusetts from August 1984 to July 1993, California with Texas from January 1986 to December 1993, and Vermont with New Hampshire from July 1990 to June 1993.

To minimize potential bias resulting from variation in testing policies, the analysis initially focused on fatally injured drivers with blood alcohol levels of 0.08% or greater. During the analysis period, blood alcohol test results were available from the US Fatal Accident Reporting System for 81% of fatally injured drivers

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This paper was accepted April 12, 1996.

TABLE 2—Proportion of Fatal Crashes with a Fatally Injured Driver Whose Blood Alcohol Was 0.15% or More, Before and After the Passage of 0.08% Legal Blood Alcohol Limits in 5 States

0.08% Law States and Comparison States	Proportion before 0.08% Law (n)	Proportion after 0.08% Law (n)	% Change in Proportion (RR - 1)	Ratio of RRs (95% CI)
Oregon (0.08%)	0.22 (992/4455)	0.18 (769/4186)	-17% (0.83)	0.79 (0.70, 0.88)
Washington	0.20 (1266/6184)	0.21 (1158/5390)	+5% (1.05)	
Utah (0.08%)	0.10 (220/2252)	0.12 (245/2085)	+20% (1.20)	0.91 (0.72, 1.15)
Idaho	0.11 (232/2057)	0.15 (265/1773)	+33% (1.33)	
Maine (0.08%)	0.19 (198/1024)	0.15 (143/942)	-21% (0.79)	0.77 (0.61, 0.97)
Massachusetts	0.15 (493/3241)	0.15 (418/2703)	+2% (1.02)	
California (0.08%)	0.16 (3009/19370)	0.14 (2291/16278)	-9% (0.91)	0.82 (0.76, 0.89)
Texas	0.15 (1780/11924)	0.16 (1804/10961)	+10% (1.10)	
Vermont (0.08%)	0.19 (36/186)	0.19 (34/181)	-3% (0.97)	1.23 (0.68, 2.23)
New Hampshire	0.17 (48/280)	0.14 (30/222)	-21% (0.79)	
Overall law effect				0.82 (0.77, 0.87)

Note. RR = relative risk; CI = confidence interval.

Second, unlike previous studies, this analysis included comparison states to control for regional fatal crash trends.

Third, 0.08% law states may have been more concerned about alcohol-impaired driving and more responsive to legislative initiatives to reduce the problem. They were more likely to have other stringent laws that have been shown to reduce alcohol-related fatal crashes. All 0.08% law states had criminal per se laws in effect prior to the study, compared with only two comparison states: Texas and Vermont. The comparison states of Idaho and Washington introduced criminal per se laws during the study. It is likely that the 0.08% law effects were independent of criminal per se laws. Before the 0.08% law, reductions in alcohol-involved fatal crashes were seen both in pairs of states where both 0.08% law states and comparison states had criminal per se legislation throughout the study and in pairs where comparison states adopted the law during the study period.

All five 0.08% law states also had administrative licence revocation laws during the study, three of which were implemented within 1 year of the state's 0.08% law. Administrative licence revocation laws have been associated with 5% declines in fatal crashes.<sup>9</sup> Among the control states, only New Hampshire had this law during the study period. This restricted our ability to separate the effects of 0.08% legislation from administrative licence revocation laws. Maine was the only 0.08% law state to implement an administrative licence revocation law prior to the study period and hence the only state where post-0.08% law reductions in alcohol-involved fatal crashes could be

clearly separated from the effects of administrative licence revocation laws passed during the study period.

Finally, this analysis focused only on fatal crashes. Studies of other traffic laws indicate that the magnitude of their impact can be influenced by accompanying educational and enforcement efforts.<sup>10-12</sup> Studies of 0.08% laws are needed that not only assess the laws' impact on fatal crashes but also measure how effectively the laws are implemented.

On balance, the results of this study suggest that 0.08% laws, particularly in combination with administrative licence revocation, reduce the proportion of fatal crashes involving drivers and fatally injured drivers with blood alcohol levels of 0.08% or higher and 0.15% or higher. This legislation warrants consideration in other states. □

### Acknowledgments

This study was supported by grants from the National Institute on Alcohol Abuse and Alcoholism, the US Centers for Disease Control and Prevention, and the Massachusetts Governor's Highway Safety Bureau.

The study is dedicated to Lori Lynn Webb and Mitch Pewitt, both of whom died, and Kara Webb Hensel and Millie and Roy Webb, who were seriously injured, in a crash involving a driver with a 0.08% blood alcohol level.

### References

1. *The Costs of Alcohol-Related Traffic Crash Injuries*. Washington, DC: US Dept of Transportation, National Highway Traffic Safety Administration; 1994. DOT HS 808 021.
2. Moskowitz H, Burns M. Effects of alcohol on driving performance. *Alcohol Health Res World*. 1990;14:12-14.
3. Mortimer RG, Sturgis SP. Effects of low and moderate levels of alcohol on steering performance. In: Israelstam S, Lambert S, eds. *Alcohol Drugs and Traffic Safety*. Toronto, Canada: Addiction Research Foundation; 1975:329-345.
4. Damkot DK, Perrine MW, Whitmore DG, Todissie SR, Geller HA. *On the Road: Driving Behavior and Breath Alcohol Concentration*. Vols I and II. Washington, DC: Dept of Transportation; 1975. Technical Report DOT HS 364 37567.
5. Zador P. Alcohol-related relative risk of fatal driver injuries in relation to driver age and sex. *J Stud Alcohol*. 1991;53:301-310.
6. Johnson D, Walz M. *A Preliminary Assessment of the Impact of Lowering the Illegal Per Se Limit to .08% in Five States*. Washington, DC: US Dept of Transportation, National Highway Traffic Safety Administration; 1994. Technical Report 1-8. DOT HS 808 207.
7. *Traffic Safety Facts, 1994*. Washington, DC: US Dept of Transportation, National Highway Traffic Safety Administration; 1995. DOT HS 808 292.
8. DerSimonian R, Laird N. Meta-analysis in clinical trials. *Controlled Clin Trials*. 1986;7:177-188.
9. Zador P, Land A, Fields M, Weinberg K. Fatal crash involvement and laws against alcohol impaired driving. *J Public Health Policy*. 1989;10:467-485.
10. Blomberg R. *Lower BAC Limits for Youth: Evaluation of the Maryland .02 Law*. Washington, DC: US Dept of Transportation; 1992. DOT HS 806 807.
11. Voas RB, Lacey JH. Issues in the enforcement of impaired driving laws in the United States. In: *Surgeon General's Workshop on Drunk Driving Background Papers*. Rockville, Md: US Dept of Health and Human Services, Office of the Surgeon General; 1989:136-156.
12. Ross HL. *The Deterrent Capability of Sobriety Checkpoints: Summary of the American Experience*. Washington, DC: National Highway Traffic Safety Administration; 1992. NHTSA Technology Transfer Series 28.

## *Lowering State Legal Blood Alcohol Limits to .08%: The Effect on Fatal Motor Vehicle Crashes*

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### **DISCUSSION**

- ◆ High levels of blood alcohol testing of fatally injured drivers favors accuracy of the results:
  - 88% of fatally injured drivers in .08% states
  - 75% in comparison states
- ◆ Testing levels were the same in pre and post law years

## *Lowering State Legal Blood Alcohol Limits to .08%: The Effect on Fatal Motor Vehicle Crashes*

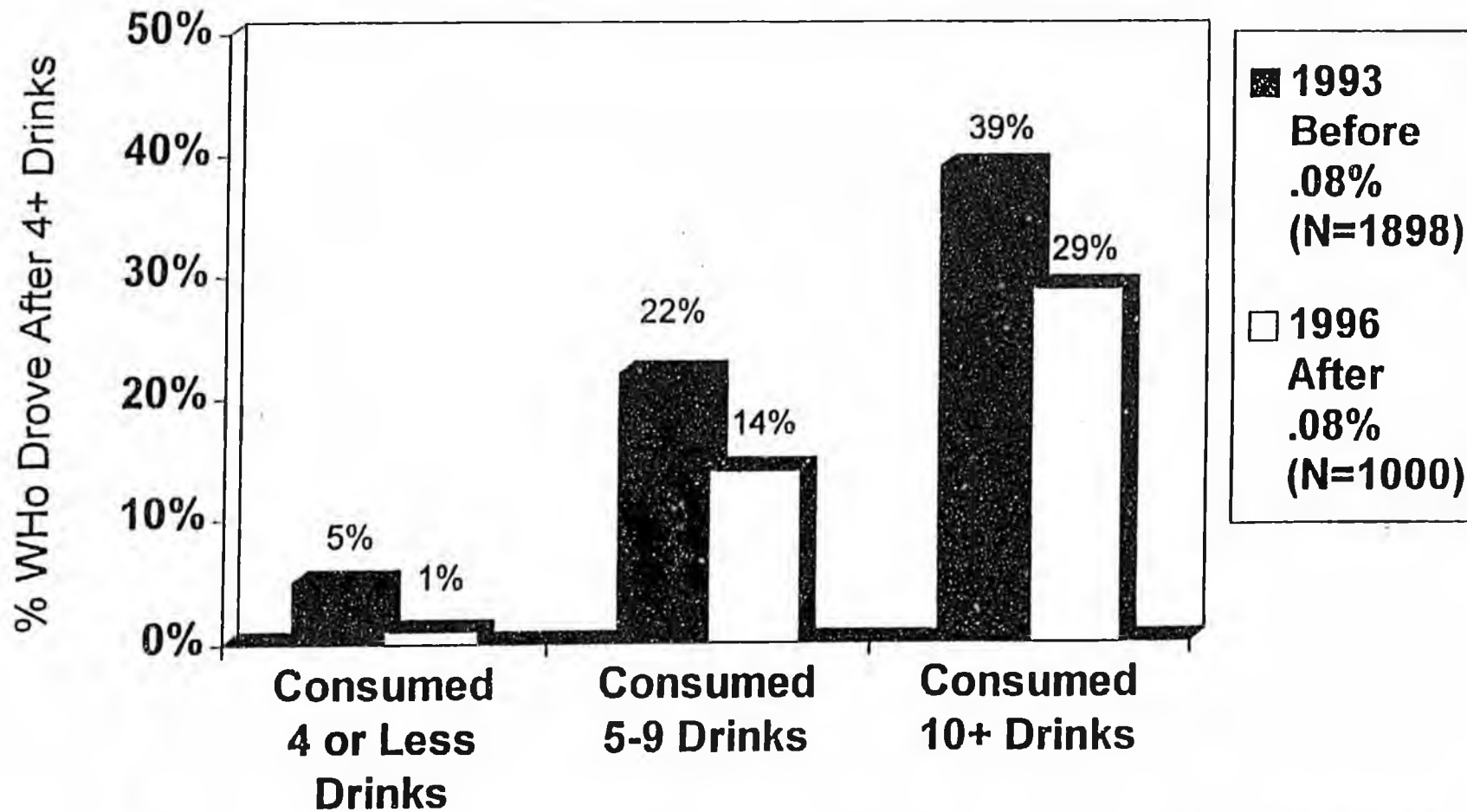
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### **RESULTS**

- ◆ Overall .08% Law states experienced a statistically significant 16% relative post-law reduction in the proportion of fatal crashes involving fatally injured drivers at .08% or higher and at .15% and higher
- ◆ Four out of five .08% Law states showed a reduction relative to control states in the proportion of fatal crashes with fatally injured drivers at BAC's .08% or higher and .15% or higher

# Perceptions of Massachusetts Adults Age 21+

## % Who Drove after 4 or More Drinks According to Single Days Highest Alcohol Consumption in the Past Month

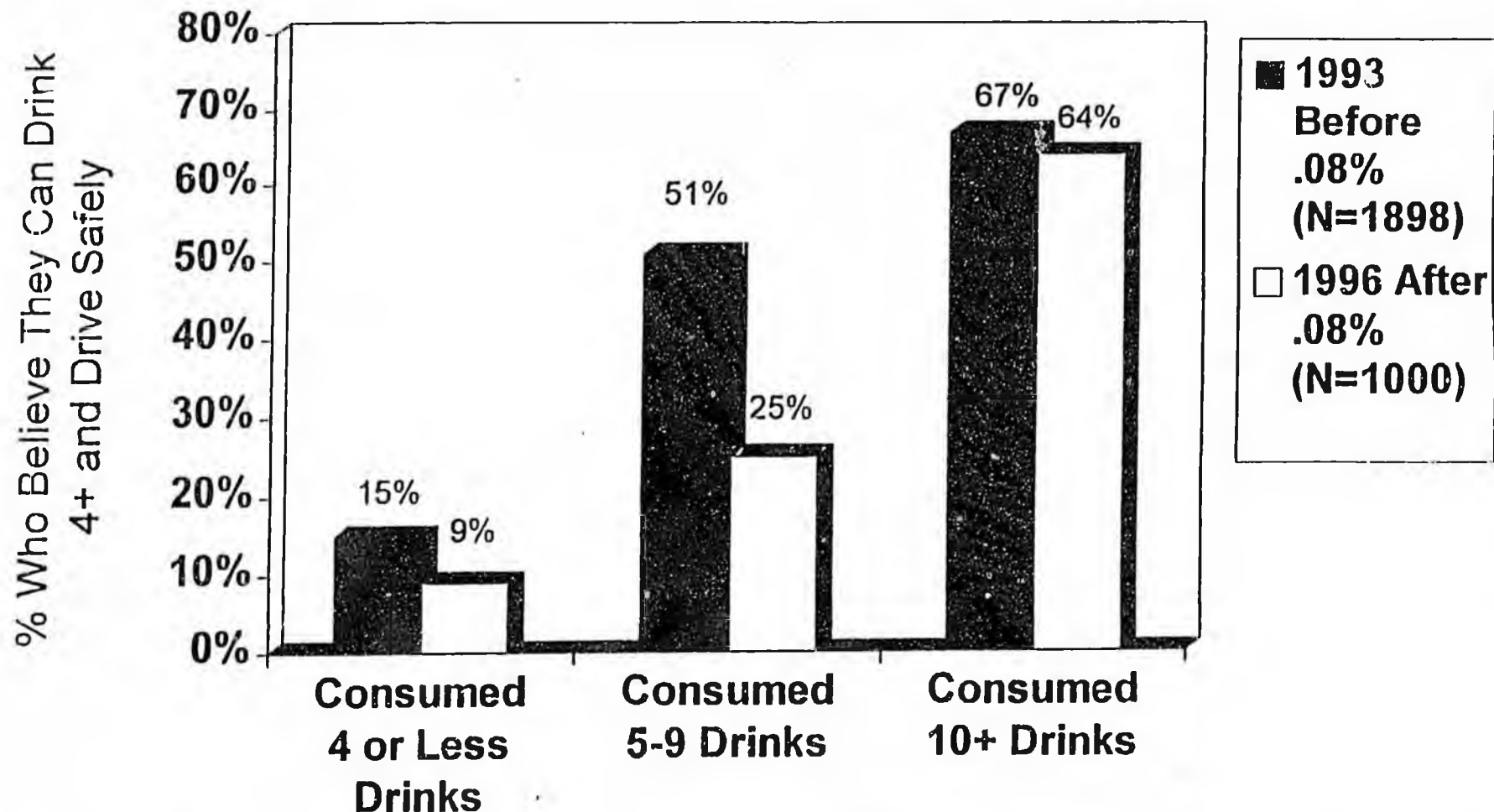


- After the .08% law there were declines in the proportions of persons who drove after 4+ drinks among light and heavy drinkers.

Source: Massachusetts Governor's Highway Safety Bureau 1993 and 1996 Statewide Telephone Survey

# Perceptions of Massachusetts Adults Age 21+

One Can Drink 4 or More Drinks and Drive *Safely* According to Single Days Highest Alcohol Consumption in the Past Month

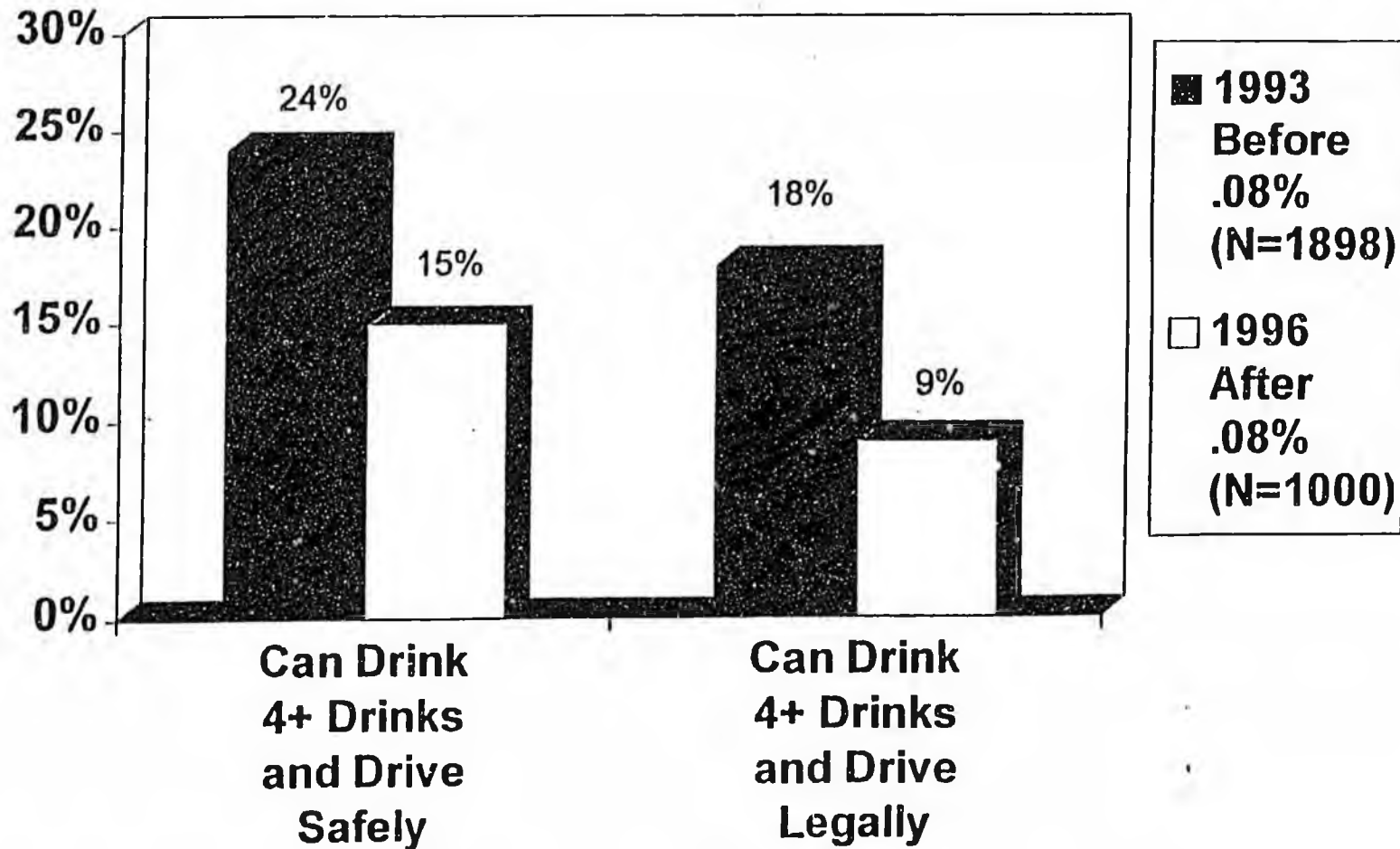


- The proportion of drivers who believed they could drink 4+ drinks and drive safely declined after the .08% law in all but the very heaviest drinkers

Source: Massachusetts Governor's Highway Safety Bureau 1993 and 1996 Statewide Telephone Surveys

# Beliefs of Massachusetts Adults Age 21+

Before and After the legal BAL was Lowered  
from .10 to .08%



• After the .08% law, there were declines in the proportion of drivers who believed they could drive safely and legally after 4 or more drinks.

Source: Massachusetts Governor's Highway Safety Bureau 1993 and 1996 Statewide Telephone Surveys

Point: There could have been other reasons than the .08 law for the declines in fatally injured drivers with BACs  $\geq$  .08 and .15 in these five .08 states. Were these other factors controlled for?

Counterpoint: All factors that could have accounted for the .08 effects were not controlled for. This is impossible to do in real world evaluations of this kind. For example, all .08 states had ALR laws in effect during the study while only one of the comparison states had ALR. Indeed, there may have been other factors that contributed to the decline in the .08 states other than the law itself.

On the other hand, some things were controlled: any regional effects (economy, etc) by using neighboring states; any urban/rural/population effects by using states with similar populations; any BAC testing rate effects by using states with high BAC testing rates.

Point: Two .08 states (UT and VT) actually had increases in the proportion of fatally injured drivers with BACs  $\geq$  .08 in the before and after analyses. If .08 is so effective, why did this happen in two out of five states?

Counterpoint: It could be stated that if it weren't for the .08 law, those increases may have been greater. In most analyses of this nature, there will be states that do not show the desired effect (e.g. it happened in all of our MDA 21 studies) for one reason or another. The .08 law may not have been publicized or enforced as much. What is important is the cumulative effect of the five states, and that was a significant decrease. Similar findings occurred in NHTSA's analyses of ALR states and MDA 21 states in determining their effects. The overall effect in those studies, however, was also positive.

#### ABI Criticisms

ABI: "According to their research, in 1992 blood alcohol tests were available in 81% of all fatal accidents. We find that number to be unusually high because according to NHTSA, the BAC testing levels were nearly half of what MADD Incorporated claims they were."

Answer: The Hingson study states that "During the analysis period, blood alcohol test results were available from the US Fatal Accident Reporting System for 81% of fatally injured drivers in the study states."

Hingson's statement is correct. ABI is talking about BAC tests on all drivers in all states being less than 50%. Hingson is talking about BAC tests on fatally injured drivers from the 10 states during the study period.

## WHY .08 BAC ?

"Safe alcohol levels should be set by health experts, not the lobby for Hooter's and Harrah's. The Lautenberg-[DeWine]-Lowey amendment isn't a drive toward prohibition, but an uphill push toward health consensus." — *The Wall Street Journal*, September 9, 1997

"Legislation to lower the BAC definition of intoxication to 0.08 percent would be an important contribution toward reducing impaired driving on our highways." — James Hall, National Transportation Safety Board

"What this bill will do is send a strong signal that excessive drinking and driving do not mix. They are unacceptable and will not be tolerated by society. So I am delighted, on behalf of the Clinton Administration, to endorse this legislation. And I urge swift passage by the Congress. President Clinton is ready to sign it today." — U.S. Secretary of Transportation Rodney E. Slater, October 23, 1997

"We know that drinking, plus driving, spell death and disaster...The problem is bigger than the individual states...It's a grave national problem, and it touches all our lives. With the problem so clear-cut and the proven solution at hand, we have no misgivings about this judicious use of federal power." — President Ronald Reagan, July 18, 1984, upon signing the National Minimum Drinking Age bill

"Drunk drivers are deadly threats no matter where they speed or weave in this country. Yet a driver who is certifiably drunk in Virginia can roll to a "sobriety" of sorts merely by crossing into Maryland. That is a life-threatening inconsistency that exists around the country because there is no uniform standard of drunkenness on the roads. There ought to be a national standard [of drunk driving], and such a proposition is now before Congress, with support from across the political spectrum...Congress can bring still better sense to highways by approving a uniform, nationally understood definition of a dangerous driver." — *The Washington Post* editorial, November 8, 1997

"Lower Threshold for Drunken Driving — the force of law nudges people to drink more responsibly. That's a critical and little recognized benefit of a .08 law. Four drinks in one state makes you no less drunk than four drinks in another. The abundant evidence justifies a national response." — *The Baltimore Sun* editorial, October 25, 1997

"A .08 blood-alcohol concentration is more than enough to make you a hazard on the road, and making it the threshold for DWI would strengthen the hand of the police once they pull over erratic drivers. And that would make Maryland roads safer...The national trend is clear enough — sooner or later Maryland will have the tougher DWI standard. We might as well make it sooner, and make our roads that much safer." — *Annapolis Capital* editorial, November 7, 1997

"Drunk Driving remains a national shame. Despite progress over the years, 41% of all motor vehicle fatalities — more than 17,000 lives lost — involve alcohol. Yet the current legal BAC in most states is .10, the highest in the industrial world...[We] believe enactment of S.412...is a necessary and important step. Laws which set the legal BAC limit at .08 are a needed part of the combination of programs and policies which must be in place if we are to win the fight against drunk driving." — Gerald Scannell, President, National Safety Council

"The drunk driving problem has not been solved and will not be solved until safety becomes a top priority, not only in Washington, but in every state." — Katherine P. Prescott, President, Mothers Against Drunk Driving

confident of our company's wholehearted support of your joint initiative." — Michael Dineen, Vice President, Kemper Insurance

Why .08 BAC?

page three

"Too many innocent victims have fallen prey to the irresponsibility of drivers who have gotten behind the wheel when impaired...[S. 412] should be included in the ISTEA reauthorization bill." — Stephen Brobeck, Chairman, The Coalition for Consumer Health and Safety

"Yes to National Drunken Driving Law — Congress uses the threat of withheld funds too often, in our opinion, to focus its will upon states. In this case, however, the states would merely be required to set an intoxication standard that reflects research on how alcohol affects driving." — *Omaha World-Herald* editorial, October 29, 1997

"The Safe and Sober Streets Act of 1997' would encourage American drinkers to be more careful about drinking when they drive. It would help reduce the number of intoxicated drivers on the highways and decrease the carnage from drunk driving." — George A. Hacker, Alcohol Policies Project, Center for Science in the Public Interest

"We already know that more than 17,000 lives were lost in 1997 on our nation's highways due to drunk driving. And we know that laws which allow less BAC will save lives." — Mary Jac Rauh, M.P.H., Assistant Director, Rural Health Projects, Inc., Oklahoma

"Complaints from the beverage industry that the new limits would target social drinkers and not alcoholics are ridiculous and dangerous. All that matters is whether the person behind the wheel has had too much to drink. Whether he or she is a social drinker is irrelevant." — *The Toledo [OH] Blade* editorial, November 30, 1997

"NHTSA has, for many years recommended that states adopt a .08 BAC standard. The Alliance has strongly supported this recommendation. Medical evidence clearly indicates that at .08 BAC an individual is seriously impaired and should not operate a motor vehicle." — David Farmer, Senior Vice President, Alliance of American Insurers

"The NFPA supports your initiative to provide for a national standard to prohibit the operation of motor vehicles by intoxicated individuals. According to NFPA statistics, an estimated 550 civilian fire deaths occurred last year in highway vehicles. Many of these are caused by motor vehicle operators who are intoxicated. There must be a stop to the irresponsibility that kills thousands of Americans each year." — George Miller, President & CEO, National Fire Protection Association

"S. 412 represents a necessary step forward in the campaign to educate and successfully deter people from drinking and driving and to secure the safety of motorists, bicyclists, and pedestrians on our highways and streets. As a society, we must make very clear that there is 'no such thing as a drunk driving accident'" — Patrick Schultz, Tri State Transportation Campaign

"When confronted with a controversial issue, it's sometimes enlightening to consider the markup of the two sides in the controversy...On one side are the people who make and sell booze...On the other side are governmental, safety and business organizations whose interest lies in reducing the number of deaths and injuries on the highways...[they] favor cutting the legal BAC to .08...Their interest also happens to be the public interest, and the public policy they advocate is the right one." — *The Times of Trenton* (NJ) editorial, August 21, 1997

## FACTS AND MYTHS SURROUNDING THE .08 BAC ISSUE

**MYTH:** "If you do have one or two beers with a slice of pizza prior to driving home, MADD wants you arrested. Social drinking at a tavern would be made nearly impossible for most customers, save those with chauffeurs." -- ABI, *Chicago Tribune*, April 27, 1997

**FACT:** This claim is completely unfounded and untrue. According to the National Highway Traffic Safety Administration, a 170 pound male can drink at least four 12-ounce cans of beer, four five-ounce glasses of wine, or four mixed drinks within one hour on an empty stomach before reaching .08 BAC. A 137 pound female can drink three to four drinks of the same size on an empty stomach before reaching that same level, a level at which all driving skills are affected. This is hardly social drinking or just a few beers with pizza.

**MYTH:** "Want to know the difference between .07 and .08? Pardon my language, but if I spit in this glass, that would be the amount of liquid needed to go from legal to illegal." -- Rick Berman, ABI General Counsel, *testimony given at New Jersey Senate Task Force*, August 19, 1997.

**FACT:** .08 is four to five drinks in an hour for a 170 pound man and three to four drinks in an hour for a 137 pound woman. That's not social drinking, nor is it a drop of spit in a wine glass. With these types of comments, Mr. Berman spits in the face of drunk driving victims. His continuing ludicrous comments and increasingly outrageous behavior on behalf of a narrow self serving special interest show not only his lack of knowledge about the drunk driving issue but a complete lack of sensitivity for victims.

The real issue is one of intoxication. No matter how many drinks it takes for a person to reach .08 BAC, when that person reaches .08, he or she is dangerously impaired and is 16 times more likely to be involved in a single-vehicle alcohol-related fatal crash than a person with a .00 BAC level. At .10, a person is 32 times more likely to be involved in such a crash. The real issue isn't how much alcohol it takes to reach .08. The real and more important issue is, at .08 BAC, people are too impaired to be driving safely.

**MYTH:** "MADD's proposal to lower the threshold for drunk driving arrests to .08 BAC attacks social drinkers and completely ignores the real problem -- drunk drivers." -- ABI, PR Newswire article, May 7, 1997

**FACT:** MADD is concerned about the hard-core or habitual drinking driver, but the truth is that approximately 85 percent of all alcohol-related traffic fatalities are caused by first-time offenders or people who have not re-offended in the past three years.

Our volunteers throughout the nation spend hours trying to pass laws, educate the public, support victims, and monitor DUI court cases. Money does not drive our mission, saving lives does.

**MYTH:** "MADD insists drunk driving is on the rise but fails to point out all highway traffic fatalities increased by 4 percent. Alcohol-related fatalities as a percentage of all fatalities stayed virtually the same." – ABI, *USA Today*, June 19, 1997

**FACT:** In the past, even as all traffic fatalities and miles travelled increased, alcohol-related traffic fatalities decreased. In 1995, there were 17,274 alcohol-related traffic deaths compared with 16,589 in 1994. This represented the first increase in a decade. In 1996, 17,126 people were killed in alcohol-related traffic crashes. There was no statistically significant change in the percentage of alcohol-related traffic fatalities. Alcohol-related traffic fatalities among people ages 15-20 increased for the first time since 1990. The nation has reached a plateau in the fight against drunk driving.

Nearly one quarter (3,732) of the 17,126 alcohol-related traffic deaths in 1996 involved drivers with BAC levels below .10. That's 3,732 lives. MADD thinks that's a problem worth solving. A .08 BAC law in every state would save an estimated 500 to 600 lives each year.

**MYTH:** "MADD foments fear by claiming every person killed in a drunk driving accident is a victim. Yet, according to the Transportation Department, drunken drivers themselves account for more than half the fatalities." – ABI, *USA Today*, June 19, 1997

**FACT:** First of all, drunk driving is not an accident – it is a violent crime. A person makes the conscious decision to drink alcohol and then drive. It is no accident. Second, this outrageous statement is infuriating. The family members and friends of people who died while drinking and driving are also victims of this preventable and tragic crime. Their lives are also shattered and forever altered by the death of a loved one. They too have lost a precious family member. The ABI's discount of these grieving victims of the drunk driving problem further demonstrates its total lack of compassion. But then, saving lives is not the ABI's goal – selling alcohol is.

**MYTH:** "A couple of drinks steadies a person, and might improve someone's driving ability." – Richard Bellshot, Camden County, New Jersey tavern owner, *New Jersey Senate Task Force Hearing*, August 19, 1997

**FACT:** Impairment begins at levels as low as .02. By the time a person reaches a BAC level of .08, critical driving skills such as steering, braking, lane changing, judgement, and emergency response are definitely impaired.

**MYTH:** ".08 BAC laws do not save lives. Lowering the legal BAC limit will have no effect on drivers who already ignore the current law." – *ABI web page, August 1997*

**FACT:** In Dr. Ralph Hingson's study published last year in the *American Journal of Public Health*, .08 BAC laws were proven to reduce the proportion of fatal crashes involving fatally injured drivers whose BAC levels were .15% and higher by 18 percent. Clearly, .08 BAC laws are a deterrent to all drinking drivers, regardless of BAC level.

**MYTH:** "By threatening to revoke highway funds, the proposed .08% federal legislation would force these states to implement policy changes already turned down by their own legislatures." – *ABI web page, August 1997*

**FACT:** The Safe and Sober Streets Act of 1997 aims to set an illegal BAC limit that is safe and sane. Science has proven that drivers at .08% are critically impaired.

In many states where .08 BAC legislation has been proposed and defeated, the bills have gained strong support from the public, the media and a majority of legislators. A small handful of legislators, under pressure from the alcohol and hospitality industries, have succeeded in defeating this lifesaving legislation.

**MYTH:** "To study the effect of .08% states, Hingson paired .08% states with what he termed "nearby" .10% states. Inexplicably, one of these "nearby" pairs consisted of California and Texas...In short, Hingson's method is flawed, the results do not replicate, and there is no evidence to suggest that .08% laws have had any effect." – *ABI web page, August 1997*

**FACT:** "Texas was compared with California because it is the closest state to California of comparable population and number of large urban centers. In addition, the demographics are comparable." – Dr. Ralph Hingson, 1997

"The comparison states were selected on the basis of geographic closeness, size and BAC testing rates. These were about the only five states (the five states studied in the survey) that could have been selected as comparisons based upon the study criteria for matching." – NHTSA, 1997

**MYTH:** "A driver who exceeds the legal limit by a one-hundredth of a percent of blood alcohol receives the same penalty as someone driving at two or three times the maximum BAC!...The ABI has consistently supported an escalated penalty system." – *ABI web page, August 1997*

**FACT:** Whether a drunk driver kills someone while driving impaired at .08% BAC or at .15% BAC the victim is still just as dead. Driving at BAC levels of .08% and higher is unsafe and threatens the lives of America's motorists. It should be illegal to drive at .08

United States General Accounting Office

GAO

Report to Congressional Committees

June 1999

# HIGHWAY SAFETY

## Effectiveness of State .08 Blood Alcohol Laws



GAO

Accountability • Integrity • Reliability

Resources, Community, and  
Economic Development Division

B-280883

June 23, 1999

The Honorable John McCain  
Chairman  
The Honorable Ernest F. Hollings  
Ranking Minority Member  
Committee on Commerce, Science,  
and Transportation  
United States Senate

The Honorable Bud Shuster  
Chairman  
The Honorable James L. Oberstar  
Ranking Democratic Member  
Committee on Transportation and Infrastructure  
House of Representatives

In 1997, someone in the United States died in an alcohol-related motor vehicle crash every 32 minutes. For years, the Congress and the states have grappled with and sought solutions to the problem of drunk driving. Most states have laws making it illegal for people to drive with a specified level of alcohol in their blood, usually set at .10 blood alcohol concentration (BAC)—the level at which a person's blood contains 1/10th of 1 percent alcohol. However, 16 states have more stringent laws setting the limit at .08 BAC. In 1998, the Clinton administration endorsed a bill that would have required all states to enact and enforce .08 BAC laws or face reductions in federal highway funds. The Senate approved this bill; the House took no action.

The Transportation Equity Act for the 21st Century directed GAO to evaluate the effectiveness of state .08 BAC laws in reducing the number and severity of crashes involving alcohol.<sup>1</sup> To accomplish this objective, we reviewed (1) the policies and positions of the Department of Transportation's (DOT) National Highway Traffic Safety Administration (NHTSA) on .08 BAC laws and other drunk driving countermeasures and (2) seven published studies on the effect of .08 BAC laws on the number and severity of crashes involving alcohol, including three studies released on April 28, 1999.

<sup>1</sup>The Transportation Equity Act for the 21st Century also directed us to study the effectiveness of .02 BAC laws for drivers under 21 in reducing the number and severity of crashes involving alcohol. The National Highway System Designation Act of 1995 required all states to enact and enforce such laws or face reductions in federal highway funds. However, as agreed to by your staff, we will not address the impact of .02 BAC laws, since all 50 states and the District of Columbia now have laws establishing BAC levels of .02 or less for drivers under 21.

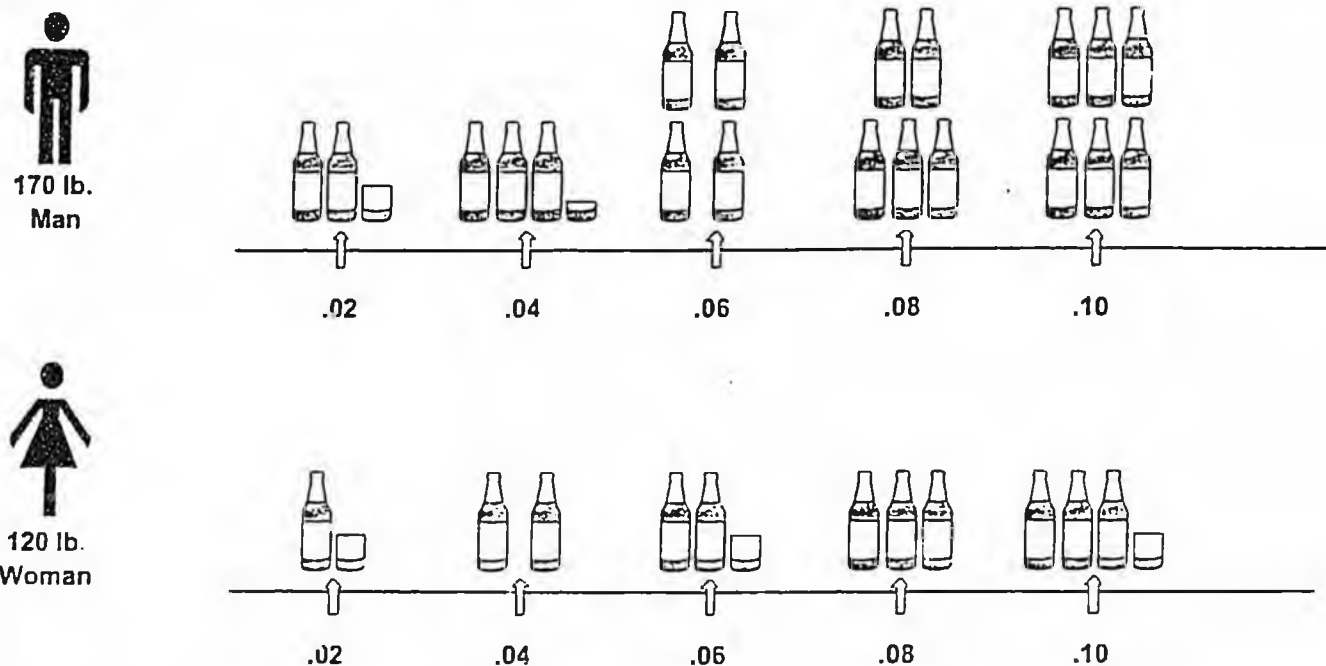
Figure 1: State Blood Alcohol "per Se" Laws






Note: States with .08 BAC laws are shown with the year the law became effective.

Source: GAO's illustration based on information from NHTSA.

Figure 2: Alcohol Consumption and Blood Alcohol Levels



Drinks consumed in a 2-hour period

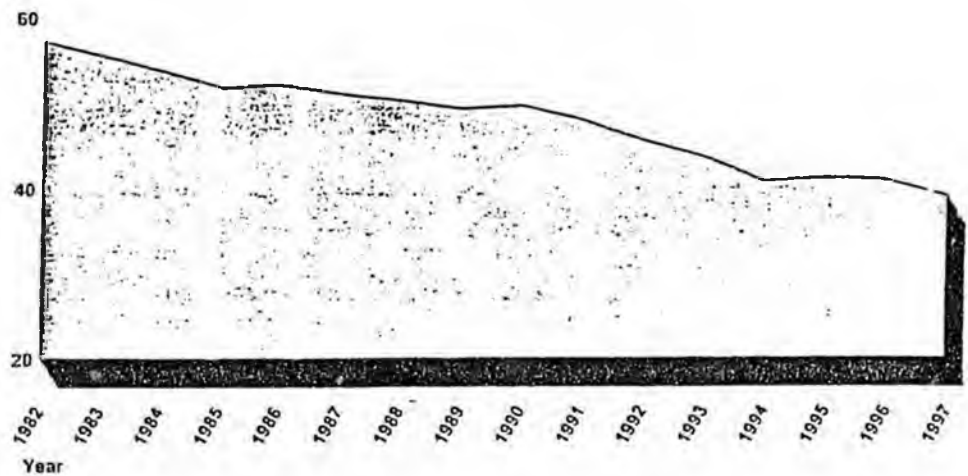
-  12-ounce beer (4.5% alcohol by volume)
-  1/2 beer
-  1/4 beer

Source: GAO's illustration based on NHTSA's BAC estimator

Alcohol use is a significant factor in fatal motor vehicle crashes. In 1997, the most recent year for which data are available, there were 16,189 alcohol-related fatalities, representing 38.6 percent of the nearly 42,000 people killed in fatal crashes that year. In the states with .08 BAC laws, alcohol was involved in 36 percent of all traffic fatalities, lower than the national average and the 39.5-percent rate of alcohol involvement in the

Figure 3: Alcohol-Related Fatalities,  
1982-97

80 Percentage of all fatalities that are alcohol-related



Source: GAO's illustration based on NHTSA's Traffic Safety Facts, 1997

Each state reports, and NHTSA collects and publishes, data on fatal crashes through the Fatal Accident Reporting System (FARS), a comprehensive national database of all crashes in which a person dies within 30 days of the crash. These data include (1) the number of fatalities that occur in all crashes and (2) the number of drivers involved in fatal crashes. FARS also includes whether crashes involved drivers who had been drinking. However, FARS has limitations regarding alcohol involvement in crashes—for example, fewer than half of the drivers at the scene of fatal accidents are tested for alcohol. To address the missing data, NHTSA developed a statistical model, first used in 1982, to estimate alcohol involvement in cases in which data are not available. The model provides estimates in three broad categories—sober (.00 BAC), "low BAC" (.01-.09 BAC), and "high BAC" (.10 BAC and above).<sup>4</sup> Therefore, certain questions—such as how many fatal crashes involve drivers with .08 BAC

<sup>4</sup>When cataloguing fatalities in crashes in which more than one driver had been drinking, FARS uses the driver with the higher BAC.

Since 1992, when it first recommended in a report to the Congress that all states have .08 BAC laws, NHTSA's position has changed from urging the states to pass .08 BAC laws to favoring that states be required to do so. The latter position was embodied in the President's endorsement of a Senate bill entitled the Safe and Sober Streets Act. This bill would have required all states to enact and enforce .08 BAC laws by October 1, 2001, or lose 5 percent of certain federal highway funds the first year and 10 percent each succeeding year. The Senate approved this bill on March 4, 1998, but the House took no action before the 105<sup>th</sup> Congress adjourned.<sup>7</sup>

As figure 4 shows, NHTSA has a number of reasons why it believes all states should adopt .08 BAC laws.

**Figure 4: NHTSA's Reasons Why All States Should Adopt .08 BAC Laws**

- Virtually all drivers are substantially impaired at .08 BAC with regard to critical driving tasks.
- The risk of being in a crash increases substantially when a driver reaches .08 BAC.
- .08 is a reasonable level to set the limit
- The public supports lower BAC limits.
- Other industrialized nations have .08 or lower BAC laws.
- Lowering the limit to .08 is a proven effective countermeasure that will reduce crashes and save lives.

One of NHTSA's principal arguments for nationwide adoption of .08 BAC laws is that the medical evidence of drivers' impairment at that level is substantial and conclusive. According to NHTSA, and as shown in figure 5, reaction time, tracking and steering, and emergency responses are impaired at even low levels, and substantially impaired at .08 BAC. As a result, the risk of being in a motor vehicle crash increases when alcohol is involved, and increases dramatically at .08 BAC and higher levels. In contrast to NHTSA's position, industry associations critical of .08 BAC laws contend that .08 BAC is an acceptable level of impairment for driving a motor vehicle and that these laws penalize "responsible social drinking." These associations also believe that .08 BAC laws do not address the problem of drunk driving because many more drivers using alcohol are reported at the "high" BAC levels (above .10 BAC) than the lower BAC levels.

<sup>7</sup>The Senate approved this bill as an amendment to its surface transportation reauthorization bill. However, these provisions were not included in the House bill and were not included in the final version of the Transportation Equity Act for the 21st Century.

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May 1998, the NHTSA Administrator stated, "The traffic safety administration is aware of four published studies, . . . [and] each study has shown that lowering the illegal blood alcohol limit to .08 is associated with significant reductions in alcohol-related fatal crashes." In a fact sheet distributed to state legislatures considering these laws, NHTSA stated that the agency's "analysis of five states that lowered the BAC limit to .08 showed that significant decreases in alcohol-related fatal crashes occurred in four out of the five states *as a result of the legislation*" (emphasis added). NHTSA used these study results to encourage states to enact .08 BAC laws, testifying in one instance before a state legislature, "We conservatively project a 10-percent reduction in alcohol-related crashes, deaths, and injuries" in the state.

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### Seven Studies Have Examined the Effectiveness of .08 BAC Laws

Seven studies have been published assessing the effect of .08 BAC laws on motor vehicle crashes and fatalities in the United States. Four studies published between 1991 and 1996 assessed the effectiveness of .08 BAC laws in the five states that enacted them between 1983 and 1991. On April 28, 1999, NHTSA released three additional studies. Table 1 summarizes the seven studies that examine .08 BAC laws.