

**Summary:**

# **Reduced BAC limit – less drinking and driving?**

## **Reduction of the BAC limit from 0.05 to 0.02 percent**

As the first country in the world Norway introduced a legal BAC (blood alcohol concentration) limit of 0.05 percent (50 milligrams alcohol per 100 milliliter blood) in 1936, and has a long tradition of strict enforcement, with three weeks imprisonment as the normal punishment up to 1988. After 1988 fines were the normal punishment for first offense up to BAC of 0.15 percent and imprisonment above BAC of 0.15 percent. In addition the driver's license is suspended, for one year or more. The attitudes towards drinking and driving, even towards driving with a BAC below the legal limit have been rather reprehensible (Vaas & Elvik, 1992).

After Sweden reduced the legal limit from 0.05 to 0.02 percent in 1990, the pressure increased for a similar reduction in Norway, and the amendment came into effect by January 1, 2001. The stated reasons for this amendment were to reduce the amount of impaired driving and to demonstrate that the driving of a motor vehicle and consumption of alcohol do not belong together. The reduction of alcohol-related road accidents were hardly mentioned in the official documents in this matter, but this reduction was maybe taken for granted, if only a reduction in drinking and driving could be achieved.

The normal punishment for driving with a BAC between 0.02 and 0.05 percent is a fine, and the license is not suspended.

## **Drinking and driving increases accident risk**

It is a well-established fact that the consumption of alcohol before driving a motor vehicle increases the accident risk (Desapriya & Nobutada, 2000; Glad & Vaas, 1993). However, the importance of rather low blood alcohol concentrations (BAC) for accident risk is still discussed. Norwegian studies (Gjerde et al 1993; Statistics Norway 1992) find that drivers involved in fatal, alcohol-related road accidents have on the average quite high BACs, above 0.1 percent, whereas Moskowitz & Robinson (1987) claim that as to divided attention "*Impairment began below .02 %, with 60 percent of the studies reporting impairment at or below .05%.*" and further "*Impairment occurs in most areas at the lowest BAC that can be reliably chemically determined.*".

The question is thus what effect a reduction of the legal BAC limit from 0.05 percent to 0.02 percent will have?

## Hypotheses

Strictly speaking, the reduction of the legal limit should be expected to take effect on driving with BACs in the range of 0.02 to 0.05 percent. However, there is reason to believe that even driving with BAC above 0.05 may be affected according to Mann et al (2001): “*Most studies that have examined the impact of a lowered legal limit on measures of driver BACs, or BAC levels in arrested or fatally injured drivers, have observed a substantial impact on BAC levels other than those specifically affected by the change in limits.*” Two hypotheses are consequently addressed:

The reduction of the legal BAC limit from 0.05 to 0.02 percent will

1. Reduce driving with BAC between 0.02 and 0.05 percent,
2. Reduce driving with BAC above 0.05 percent.

## Survey of license holders – no control group

As the reduction of alcohol-related road accidents should be the most important objective of the amendment, the effect should preferably be assessed in terms of possible changes in such accidents. However, Statistics Norway, which is responsible for the road accident statistics in Norway, discontinued the production of statistics of alcohol-related accidents in 1996, having no plans to revive these statistics.

Consequently, the only option is to assess the effect in terms of the amount of drinking and driving, taking for granted that a reduction in drinking and driving will bring about a reduction in alcohol-related accidents. Drinking and driving is most reliably measured by roadside surveys. Such surveys are however, rather costly, and therefore the Norwegian authorities did not want a roadside survey. A survey of driver knowledge and behavior was then made by questionnaire to a random sample of Norwegian license holders before and after the amendment, June 1998 and June 2001, respectively.

The legal amendment was made effective for the whole country at the same time. Establishing a control group of drivers not affected by the amendment was consequently not possible. In principle it is therefore not possible to state whether changes in driver knowledge and behavior observed between 1998 and 2001 are due to the legal amendment or to other factors.

## Operationalization of drinking and driving

Drinking and driving was measured by the following questions:

*How much alcohol would you drink before driving an hour later?*

*How likely are you to drive with a BAC above the legal limit within the next three years?*

*How likely are you to drive after drinking, but with a BAC below the legal limit within the next three years?*

In addition the following question was asked in 2001:

*How likely are you to drive with a BAC above the former legal limit of 0.05 percent within the next three years?*

### **Other issues**

In addition questions were asked about knowledge, perceived risk and behavior such as:

- Knowledge of legal limit
- Knowledge of amount of alcohol required reaching the limit
- Perceived risk of apprehension
- Knowledge about penalties for drinking and driving
- Social norms of drinking and driving
- The use of a car when going to occasions where alcohol is expected to be served
- Frequency of designating a driver when going to occasions where alcohol is expected
- Kms driven per year
- Age, gender, education and place of residence

### **Data collection**

Random samples of driver's license holders were interviewed by telephone by a professional opinion poll company in June 1998 and June 2001. The response rate was 56 percent in 1998 and 53 percent in 2001. A total of 3001 interviews were completed both years.

### **Knowledge of the BAC limit and the penalty**

To comply with the reduced BAC limit, the drivers have to know the limit. 86 percent of the license holders answered correctly as to the BAC limit both before and after the change. To comply with the rule, it is also necessary to know approximately how much alcohol it takes to get to the limit. 47 percent knew the right answer<sup>1</sup> after the change and 42 percent knew the right answer before.

Knowledge about the penalty for drinking and driving would also be necessary in considering whether or not to drink and drive. The penalty for drinking and driving in Norway is a combination of imprisonment, fines and suspension of the license, depending on the actual BAC level. The majority of Norwegian drivers have realized that the BAC limit is changed. In 1998 80 percent of the drivers said there would be no reaction or a warning for driving with a BAC of 0.03 percent. In 2001 64 percent

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<sup>1</sup> It is difficult to state the accurate amount of alcohol it takes to get to the limit, but a simplified answer would be two bottles (0.33 liters) of normal beer (4.5 percent alcohol) to get to a BAC of 0.05 and one bottle of normal beer to get to 0.02 percent for a man of 70 kg. For the sake of simplicity a similar question was not asked about women.

said it would be a fine, either fixed or depending upon income, which is the right answer. 8 percent thought that the penalty would be some kind of imprisonment, and 26 percent thought that the license would be suspended, which is not the case. As to the penalty for driving with a BAC of 0.07 percent the answers are pretty much the same before and after the reduction of the limit, except that 20 per more give more than one answer in 2001.

### **Subjective risk of apprehension**

The risk of apprehension is normally considered one of the more important factors affecting road traffic behavior, i.e. the subjective risk rather than the objective risk. Apprehension statistics are not widely published in Norway. There are only small differences in the drivers' opinions concerning subjective risk of apprehension between 1998 and 2001.

### **Social norms**

People are known to be affected by the social norms. Ajzen and Fishbein (1980) describes as "a person's subjective norm, i.e. his perception that most people who are important to him think he should or should not perform the behavior in question." The subjective norm as to driving after drinking one bottle of beer has changed somewhat. The percentage of drivers who think people they know would dislike driving after one bottle of beer (0.33 liter, 4.5 percent alcohol) has increased from 63 percent in 1998 to 71 percent in 2001. The norm for driving after four bottles of beer has, however, remained the same.

The most striking fact is, however, the widespread strictness of the norms against drinking and driving. Even in 1998 63 percent of the drivers claimed that people they knew would dislike their drinking and driving after one bottle of beer even though the majority thought that two bottles or more would be necessary to reach the legal limit of 0.05 percent.

### **More or less drinking and driving?**

A bottle of normal beer would be the maximum amount a man of 70 kilograms could drink and still be on the legal side of the 0.02 percent limit. Only 1 percent in 1998 and 0 percent in 2001 claim that they would drink more than this amount before driving. However, the percentage that would not drink at all before driving has increased from 82 percent to 91 percent.

Two percent in 1998 and 8 percent in 2001 claim they are likely to drive with a BAC above the legal limit (0.05 percent in 1998 and 0.02 percent in 2001), which may be reasonable, as the limit has been reduced. What is more important is however, the percentage likely to drive with a BAC in the range of 0.02 to 0.05 percent. This percentage cannot be calculated exactly as questions were only asked above and below 0.05 in 1998. However, the percentage of license holders likely to drive with a BAC

below, but not above 0.05 was 13.6 in 1998 and 13.3 in 2001, i.e. *no change* from 1998 to 2001. Moreover, the percentage of drivers likely to drive with a BAC above 0.05 per is the same, 2 percent, in 1998 and 2001.

### **Driving a car to occasions where alcohol is served**

As the amount of alcohol that can be consumed without exceeding the BAC limit has been reduced, it is reasonable to expect that people would drive a car to places where alcohol is served to a lesser degree in 2001 than in 1998. However, there is no change in driving a car to such a place.

As a consequence of the reduced BAC limit, designating a driver not to drink alcohol and drive the others home from places where alcohol is served, should be expected to increase. However, no change has occurred in designating a driver.

### **Changes from 1998 to 2001**

The following factors have changed from 1998 to 2001:

- 86 percent knew the correct limit both in 1998 and 2001, and they had thus perceived the legal change.
- The amount of alcohol required reaching the limit has consequently also changed. 42 percent in 1998 and 47 percent in 2001 answered correctly, the latter having perceived the change.
- The knowledge of the changed penalty for driving with a BAC of 0.03 percent.
- The social norm for driving after drinking *one* bottle of beer.
- The amount of alcohol accepted by oneself before driving.

The following factors have not changed:

- The subjective risk of apprehension.
- The knowledge of penalty for driving with a BAC of 0.07 percent.
- The social norm for driving after *four* bottles of beer. It has changed a little in the opposite direction.
- The likelihood of driving with a BAC *below*, but not above 0.05 percent.
- The likelihood of driving with a BAC *above* 0.05 percent.
- Likelihood of driving a car to an occasion where alcohol is served.
- Designating a driver to drive home from occasions where alcohol is served.

### **Why no change in drinking and driving?**

The most surprising of the results described in chapter 3 is perhaps that the likelihood of driving with a BAC below or above the old BAC limit of 0.05 percent has not changed even though the amount people would drink before driving has changed and the social norm of driving after one bottle of beer has also changed. However, only 1 percent of the interviewees said in 1998 that they would drive after drinking two bottles of beer or

more, which is what it takes to get considerably above the 0.02 limit. This fact shows that the potential for improvement was diminutive before the reduction of the legal limit.

### **The cause of the observed changes**

As there is no control group not affected by the reduced BAC limit, it is impossible to claim that the changes observed are caused by the legal amendment. However, the changes in knowledge about the limit, the penalties and the amount of alcohol it takes to get to the limit, could hardly be caused by other factors than the publicity created by the amendment.

The changes in the social norm and the amount of alcohol the drivers themselves accept to drink before driving can of course be caused by other factors. However, the norm for driving after four bottles of beer, which was illegal even before the amendment, has not changed, a fact supporting the hypothesis that the change in the norm for driving after one bottle of beer is in fact caused by the amendment. The change in the amount of alcohol the drivers themselves would drink before driving, is most likely caused by the change in the norm. It may of course be due to other factors, though no other likely factors are evident.

### **Was the reduced limit successful?**

The first hypothesis is that the new BAC limit will reduce the driving with BACs between 0.02 and 0.05 percent. There is no change in the percentage of license holders saying that they are at least a little likely to drive with a BAC below, but not above the former limit of 0.05 percent. Consequently the first hypothesis has to be rejected. However, the percentage claiming that they will drink no alcohol before driving has increased by 10 percent.

The second hypothesis is that the new limit will also reduce the driving with BACs above 0.05 percent. There is no significant change in the percentage of license holders saying that they are likely to drive with a BAC above 0.05 percent. Thus, the second hypothesis has to be rejected as well.

The objective of the reducing driving with BACs below or above 0.05 percent has not been achieved so far. However, the after-survey was carried out less than six months after the amendment came into effect. Another explicit objective of the amendment was “to demonstrate that driving of a motor vehicle and the consumption of alcohol do not belong together.” (Odelsting Proposition 26 (1999-2000)). In terms of this objective the amendment may be considered successful as the social norm of driving after only one bottle of beer has become stricter and more people claim that they drink no alcohol before driving.

The most important question whether or not the reduced limit will reduce the number of alcohol-related road accidents cannot be answered by the kind of data presented in this paper, and it is also too early to say. Bernhoft and Behrendorff (2000) have shown that even if drinking and driving was reduced in Denmark by a reduced BAC limit, the number of alcohol-related accidents need not be reduced. If no reduction of alcohol-

related accidents is observed in Norway, the question could be asked whether the reduced BAC limit is a necessary restriction on Norwegian drivers.