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ABSTRACT

Despite the lack of reliability in the statistics on alcohol-related accidents in traffic, we think that it can still be safely concluded that Sweden has been relatively successful in preventing drunken driving. This is true, at least as far as the incidence of drunken driving is revealed in random breath testing. Sweden can probably claim the lowest incidence of drunken driving in the world, aside from countries where alcohol consumption is banned, like Saudi Arabia.

Sweden—Not Switzerland

Sweden is often, especially in the U.S., mistaken for Switzerland, so, just to avoid misconceptions: Sweden is a small but highly industrialized and developed country of approximately 8.5 million inhabitants, on the Scandinavian peninsula. Take a look in your atlas and you will find that the latitude of the capital, Stockholm, corresponds to somewhere in the Hudson Bay, on the northern hemisphere, and to somewhere half-way between Cape Horn and Antarctica, on the southern hemisphere.

Very few human beings would be living here if it were not for the Gulf stream, which brings warm water to the Scandinavian coasts. This far north we also find the Northern lights. In the area of alcohol and traffic safety, the light has been said to come from the north—Sweden has been used as an example to be followed by others but the example has also been called "the Scandinavian myth"—more about that below.

In an international perspective Sweden is only the 29th nation on the ranking list of alcohol consumption. Still, it is calculated that the costs to society, caused by alcohol, are more than 10 billion U.S. dollars or more than 1000 dollars per capita.

Sweden—World Champion of Road Safety

Among road safety people, the question as to which measure gives the best description of the level of road safety in different areas of the world, usually gives rise to endless discussions.

One way of looking at road safety is to use the number of persons killed in traffic per 100,000 motor vehicles. Another way to describe the same thing is to calculate the number of cars needed to kill one person in one year.
These figures were calculated by Prof. K. Rumar and based on IRF-data from 1985. The table, dreadful as it is, gives Sweden the top position, but there are, of course, other ways of describing the situation, like the number of fatalities on the roads per 100,000 inhabitants. This puts Sweden somewhat lower but still in a very high position. It is obvious that no single factor or measure can explain this relatively successful appearance, but the way alcohol in traffic has been dealt with, in Sweden, has probably made a significant contribution. A major breakthrough in the road safety work, however, occurred in 1967, when the dramatic change from driving on the left to driving on the right hand side of the road was made. As can be seen in the figure, a considerable reduction of road accidents was registered.

**Sweden—The Leading Nation Also When It Comes to Alcohol and Road Safety**

Some countries can boast more than 10 drivers per 100 above the legal limit in night-time traffic. The Scandinavian countries deviate sharply from this pattern. In random checks over all days, hours and roads in Sweden, the police consistently find that 1–2 drivers in 1000 are above the legal limit. Friday night is the drunken driving night par preference in Sweden and in a major road block activity in the Stockholm area, 89 out of 13,897 drivers were suspected DWI-cases after screening breath-tests on all drivers. After evidential analysis of the blood samples, only 67 were found to be legally impaired. This corresponds to less than 5 drivers in 1000!! This is a very low figure considering the fact that the police were stopping drivers at the time and the places where they knew that the incidence of alcohol would be at its peak.

But! Even though these figures are impressive in an international perspective, they still mean that some 60 million kilometres are driven by legally intoxicated drivers each year. We find this figure by multiplying the total vehicle mileage, 60 billion km, by the incidence of drunken driving, 0.12%.

It also means approximately 165,000 km of impaired driving per day! Few people deny that this constitutes a problem although it is less than one tenth the magnitude of the problem in most other industrialized countries.

As for the involvement of alcohol in accidents, the official statistics for 1987 list 146 fatal traffic accidents as alcohol related. This is out of a total of 800 fatalities.

However, this is not the true involvement because the official statistics are based on police reports and in some of the fatalities, the police do not obtain any information about alcohol. If a driver is seriously injured and rushed to the hospital, the police cannot get either breath or blood samples at the scene of the accident. The
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Persons killed in road traffic accidents and cars in use 1911–1988

Death cause statistics, 1911–1986

Road traffic accident statistics, 1935–1988
Number of killed per 100 000 cars, 1970–1987

- France
- GB
- USA
- Sweden
hospital normally does not provide samples to the police and if the driver dies after, let us say, 15 hours, the autopsy will probably not reveal a high alcohol concentration because the victim survived long enough to metabolize the alcohol. The same is true of non-fatally injured drivers, who are in such a bad shape that the police cannot obtain breath or blood samples at the scene. They also escape and do not show up in the statistics. Special hospital studies have shown that of all accident victims admitted to the hospital with positive BACs, only some 50% are known by the police as BAC-positive.

Another problem is that BACs below 0.05% are considered to be sober and therefore not entered as alcohol positive.

All of this, of course, means that we do not know the role of alcohol in traffic accidents in Sweden. Some badly outdated studies of cases in which the driver died at the scene demonstrated that approximately 30% of the drivers were above the legal limit. In single vehicle accidents, as many as 46% of the drivers were illegally intoxicated. Therefore, the officially cited risk figures are probably understating the problem. Thus, it has been calculated that a BAC of 0.05% increases the risk of an accident by 4; a BAC of 0.15%, by 40.

Maybe the Norwegian figures, which indicate very high risk levels, especially for young drivers with illegal BACs, 900 times the risk than when sober, give a more accurate description of the Swedish situation.

Now, how does this correspond with the exceptionally low incidence of alcohol in the traffic flow? One explanation might be that Sweden has been very successful in preventing the social drinker from driving when he has been drinking and that we now have a selected clientele with a dominance of problem drinkers doing most of the drunken driving. This is also reflected in the very high mean BAC among the 21,000 cases which are analysed each year—0.17%. This explanation is given more support by the figures, describing the distribution of BACs among drivers in (a) the traffic flow, 0.099%; (b) among traffic offenders, 0.139%; and (c) in accident cases, 0.159%.

It is generally agreed that a BAC above 0.15% is an indication of too advanced drinking habits if not problem drinking. As can be seen in the distribution above, the mean BAC is very high irrespective of detection mode.

How is the Drinking Driver Detected?

In a nation with random breath testing and a police force with an active interest in enforcing the drink-driving laws, you would think that most of the DWIs would be detected in road-blocks. However, of the total of approximately 21,000 cases in a year, only approximately 25% were detected in random checks. One reason for this, of course, is the very low incidence of drunken driving in the traffic flow.

Some 50% are detected in accidents or in connection with traffic offences. The remaining 25% are turned in by spouses or neighbours! There are even cases who turn themselves in and ask the police to stop them. In these cases it is obviously a desperate attempt to terminate a drinking problem.

Long Tradition of Research on the Effects of Alcohol

Sweden can boast such giants in the area of alcohol research as R. Bonnichsen, L. Goldberg and E.M.P. Widmark. In more recent years we find W. Jones, H. Klette and M. Valverius.

Widmark’s studies in the early years of this century formed the basis for the determination of concentrations of alcohol in the organism. His contributions have been recognized in that the foremost award which can be bestowed on anyone in the field of alcohol, drugs and traffic safety, bears the name of Widmark. Hordes of drunken drivers have damned the method invented by Widmark. In 1930 he suggested that 0.09% should always acquit and that 0.16% should always convict.

Goldberg looked further into the effects of alcohol on man and he quantified so many aspects that little was left for his successors.
Bonnichsen developed the ADH-method and he was, until his death, very active and instrumental in the transition from blood to breath-testing for evidential purposes in Sweden.

History of Legislation

In the early days of motoring in Sweden the legislators at first relied on driving license rules as a means of preventing and combatting drunkenness among drivers. Driver's licenses were introduced in Sweden in 1917 and the introduction encompassed the requirement that only persons who had a reputation for sobriety and orderly living could be granted a permission for professional driving.

The first penal provision on the subject was introduced with the passing of the motor vehicle act of 1923. This provision which took the form of a rule prescribing a more severe penalty in a particular case, was to the effect that a person driving a car, motor cycle, or tractor, who exceeded the speed limit and who was at the same time intoxicated, could be sentenced to a maximum of three months imprisonment. At the same time, the driving license rules were made more stringent by making the revocation of the driving license compulsory in any case in which the driver had been intoxicated whilst driving. However, it was no longer possible to revoke the driving license permanently.

It was not until 1941 that per se legislation was introduced—four years after the introduction in Norway. The Scandinavian model of legislation has since become established in most of the industrialized world, though in most cases not until 20–30 years later.

The sole important amendments since 1941 are: the reduction of the lower BAC limit from 0.08% to 0.05% in 1957; and extension in 1975 of liability. This extension meant that a driver, who had been liable to punishment when his BAC had exceeded the limit during the journey, now could be punished also if the legal limit had been reached after the journey. The new principle thus implies that criminal liability is incurred if, as a result of the driver's intake of alcohol, the prescribed BAC limit is exceeded during or after the driving.

In 1977, random breath testing was introduced with the purpose of increasing the efficiency of enforcement. Previously, the police were not authorized to submit drivers to screening breath tests unless they had reason to suspect that the driver was intoxicated or under the influence of alcohol.

Studies involving Swedish policemen had demonstrated great problems in detecting drunken drivers even at high BACs, when the officers approached a driver who had been stopped for a license check. Thus, it was realized that many drivers with illegal BACs escaped discovery even though they were stopped for other reasons. The 1977 law authorizes the police to request breath samples as a routine check in the following cases: pre-ordered road blocks; accidents; certain traffic offences.

The Law

A combination of punishment and administrative license actions are used as the formal means of coercing motor vehicle operators to stay sober while operating their vehicles.

The Swedish drunk driving legislation distinguishes between two different degrees of the offence. The lesser offence, "driving when not sober", covers the BAC interval from 0.05% to 0.15% and normally incurs heavy fines and license withdrawal for six months up to one year. The more serious offence, "drunk driving", when the BAC is higher than 0.15%, normally renders a one-month prison term.

The fines are designed to "hit" the rich and the poor equally hard. Thus, the amount which the sentenced driver has to pay is related to his annual income. The amount also takes into account other factors such as the size of the family, illnesses in the family, etc. The seriousness of the offence i. e., the BAC, of course, also decides the amount.

A repeated offence is usually punished by two months imprisonment and may go as high as six months.
As for license withdrawal and revocation, in relation to alcohol, this is, according to the law, not punishment, even though it seems as if most sentenced drivers perceive it to be the real penalty. License withdrawal is considered to be a road safety measure—to prevent an unreliable driver from risking his own and other road users' lives. The withdrawal is handled by an administrative court.

Studies, unfortunately severely outdated, have shown that only one percent of the drivers would be more inclined to take the risk of driving after consumption of alcohol if the penalty were only to involve loss of license.

Some of the more important consequences of the penal sanctions and withdrawal of the driving license were studied by Klette, who found that fines had no negative social consequences; that imprisonment had very limited negative consequences—especially since the sentenced driver usually can choose when to serve his prison term and thus, can use his vacation time for his "social disappearance"; and that withdrawal of the driving license had major negative consequences. The Swedish tax authorities have found that the public is more willing to accept imprisonment for drunken driving than for any variety of tax cheating, smuggling, burglary or car theft. Klette has concluded that the average driver ranks drunken driving as the most serious offence, followed by reckless driving, assault, fraud and burglary.

Several very recent polls have shown that there is a very favorable opinion climate for a lowering of the Swedish BAC limit. Generally, some 85% of the population seem to be in favor of a reduction of the existing 0.05% limit. Actually, a majority wish to see a zero limit. Everyone expected to see a legislation with a zero BAC limit this year, but today, April 9th, the department of justice has said that a proposal for a 0.03% limit will be presented to the Parliament, to be decided upon in June. At the same time, members of the Parliament have moved for a zero limit. Four of the six political parties represented in the Parliament have already indicated that they will vote for a zero limit.

The situation, thus, is unclear. We can safely assume, however, that Sweden will see a lowering of the BAC limit this year. Concurrently, Sweden will with certainty see a transition from blood to breath for evidential purposes.

Other changes in the legislation are proposed concurrently. Treatment of problem drinking has not been an alternative to punishment except in small research programs. There is hope for amendments of the legislation to allow the courts to offer the DWI-offender, who is willing to do so, to enter a treatment program on contract terms which force him to complete the program. Failure to do so will automatically result in activation of the pending punishment, i.e., license withdrawal and imprisonment.

A government commission recently put forward a proposal to the effect that a driver who has been sentenced for drunken driving will have to prove himself to be non-dependent on alcohol to get his license back. The proposed legislation states that the applicant would have to do this by providing liver enzyme test results and psychological assessments.

Irrespective of the fact that loss of license is not a penalty, to the driving population it is and it is also what people fear the most. And it can be questioned how effective this countermeasure is. In the fatalities it is found that in 36% of these accidents, the driver did not have a license, whereas in non-alcohol related fatal accidents only 2% of the drivers lacked the license.

If the license withdrawal is for less than 12 months, the license is automatically given back when this period has expired. Revocation for a longer period means that the driver will have to go through the whole licensing procedure, including all the formalities of the written and the driving tests, to get a new license.

Unfortunately, it is possible to drive even though the license has been withdrawn. In alcohol-related accidents as many as 30–40% of the drivers do not possess a valid driver license. The corresponding figure in non-alcohol related accidents is 2%.
It was not until three years ago that the jail sentence was accompanied by any treatment or education activities. It has been estimated that some two-thirds of known violators of the more serious drunken driving law and about half of the violators of the lesser, have previously been treated by the authorities for problem drinking. Even though it was well known that a majority of those who were sentenced to imprisonment had drinking problems, they were just imprisoned without any attempts to change their drinking habits. The first attempt to try to influence convicted drunken drivers is now being made quite widely in Swedish prisons. All prisoners are offered an educational course over three weeks, dealing with alcohol. These courses, thus, are not given exclusively to those who have been sentenced for drunken driving. The emphasis is on making the participants aware of their own drinking problems. An evaluation is under way but no figures are available as yet.

**How Effective Is the Swedish Legislation**

It has already been implied above that the situation is less than satisfactory. The fact that so many serious crashes involve alcohol, often in very high concentrations (true not only of Sweden but also of Norway and Finland) may testify to the failure of the Scandinavian approach to remove the more deadly alcoholic from the wheel.

A comparison between Sweden and Norway has been made. In Norway, the penalty for driving above the legal limit of 0.05% is normally imprisonment and loss of the license for two years. As has been mentioned above, the normal penalty in Sweden would be fines and loss of license for a few months.

You would expect to find a lower incidence of DWI and less driving with high BACs in Norway if imprisonment has a stronger deterrent effect than fines. However, if anything, the problem seems to be slightly worse in Norway than in Sweden. Thus, increased surveillance seems to be the most important countermeasure. We must, however, bear in mind that the underlying statistical data leave a lot to be wished for in both countries.

In a research paper involving the examination of extensive time-series data from Norway as well as from Sweden, Ross concludes that the effectiveness of law enforcement measures in controlling drunken driving can be dismissed as the "Scandinavian Myth".

Votey, however, finds evidence of a deterring effect of the drink driving laws in Sweden. In this country, the data also suggest that it is law enforcement rather than control of beverage sales that has the greater influence on accidents.

How do these results go along with Ross' conclusions? With his technique Ross found no evidence with the implementation of the per se laws that accidents were reduced. The adoption of per se laws does not mean, however, that accident rates must go down. Drunken driving was already illegal and the police and other authorities in Sweden and Norway were seriously concerned with the regulation of drunken driving long before the introduction of the laws. The incidence of drunken driving had been on the rise and continued to do so after the introduction of the new legislation.

The primary effect of the new per se legislation was to make it easier for the authorities to procure a conviction for drunken driving and consequently the costs per case for enforcement and prosecution to be reduced. Other things being equal, a larger number of successful prosecutions and hence a reduction in accident rates would be expected. Other things were not equal, however, since the alcohol consumption was increasing; the total vehicle mileage was rising; and the law enforcement system was changing. The time-series analysis, leading Ross to his conclusions does not take these changes into account.

Others find strong support for the contention that all sanctions in use in Sweden are cost effective in the mix currently being administered.
Reasons for Success

There are several factors which might have contributed to this relative success:

Legislation

Sweden has had strict legislation and rather harsh penalties for drunken driving for more than 50 years. This means that several generations of drivers have been weaned into the alcohol or driving norm.

The tough legislation has been possible partly because of very influential temperance organizations and a wide overrepresentation of abstainers in the Parliament. The current proportion of alcohol abstainers in the population is approximately 10% and in the Parliament slightly higher.

Restrictions on availability

Alcohol is sold in monopoly stores only and served in licensed bars and restaurants. The license for serving is not easily obtained. The monopoly stores are closed on Saturdays and Sundays.

Price

In a deliberate effort to curb the consumption of alcohol, the government has put heavy taxes on alcoholic beverages—any visitor to Sweden will have noticed the high prices on alcohol. The level of taxation rises progressively with the alcohol concentration in the beverage. A bottle of ordinary whiskey costs approximately U.S. $38 in the monopoly stores. The pricing of alcoholic beverages served in bars and restaurants is free in principle. Nevertheless, the price may not undercut the retail cost for the beverage plus, normally, at least 25%. Moreover, pricing may not be used to promote the sale of drinks with a higher alcohol content.

Generally, it is so expensive to drink alcohol in bars and restaurants that few can afford it and, therefore, most drinking takes place at home or at parties in private homes. This probably also contributes to road safety since less transportation is needed.

Drinking habits

Traditionally, Sweden has been a hard liquor drinking country, where people tend to drink alcohol once a week—to get drunk. The weekly amount of alcohol is consumed on one occasion, usually on Friday nights. This means that people also know that they will be too drunk to drive and can plan for other solutions to their transportation problems than to drive after alcohol consumption.

In contrast to other cultures, where alcohol is consumed more or less daily, it is probably easier to plan your transportation, or to stay the night, just once a week instead of several times a week.

The drinking habits are changing, however. "Continental" patterns of consumption, which mean increased use of beer and wine, are added to the old pattern of hard liquor use. It also means more frequent drinking and consequently more situations in which drinking-driving conflicts might occur.

Designated drivers

At least until very recently, it was the rule rather than the exception that the driver would always ask for or be offered non-alcoholic beverages when arriving at a party. However, in the last two years, we have had a very active discussion in the media about a lowering of the legal BAC limit. In connection with these discussions, information has also been disseminated concerning how much you can drink before you reach the legal limit. For ages, the general belief has been that two bottles of beer will raise your BAC to 0.05%. Several experimental drinking sessions have been described to the public in newspapers, radio and TV. From these,
people have learned that you can have a drink before the meal, half a bottle of wine to go with the meal and a brandy with the coffee and still be below the legal limit! This new information has seeped in and apparently it has also changed the drinking habits of the designated drivers for the worse.

**Attitudes**

For a very long time, drunken driving has been considered to be a very serious crime. In a comparison between different criminal acts, drunken driving is ranked by the ordinary driver as a more serious offense than, e. g., assault and physical violence. Drunken driving is socially unacceptable. If you drive home after alcohol consumption, you do not tell even your friends about it—not even if you did not get caught.

**Enforcement**

The Swedish police, the prosecutors and the courts consider drunken driving as a very serious road safety problem and therefore there is no reluctance in a very active enforcement of the legislation.

**Alternative means of transportation**

It is probably a lot easier to obtain compliance with the drunken driving regulations if you do not ask people to refrain from drinking but only not to combine drinking and driving. This, however, necessitates the availability of alternative means of transportation. In most built-up areas of Sweden, there is readily accessible public transportation.

**Publication of research findings**

There has been a very wide publication of research results related to alcohol and road safety. Swedish results demonstrating impaired performance at low blood alcohol concentrations in actual car driving and in related situations, have had a great media impact. Hence, it is well known among Swedish road users that even well below the legal limit, you are performing worse than when you are sober. This awareness is also reflected in the attitudes towards the BAC legislation, as described above.

This list of possible factors behind the relative success indicates that it is probably impossible to single out any one factor and expect that the adoption of this factor in a different cultural setting will solve the drunken driving problems. It is probably necessary to combine factors and the process is probably rather lengthy. Nevertheless, it has to be initiated as soon as possible.