Driving under the influence of alcohol

SWOV fact sheet, September 2023

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Summary

During the most recent measurements, in 2022, 2.6% of the Dutch drivers were under the influence of alcohol during weekend nights, which amounts to almost double the lowest percentage of alcohol offenders measured (1.4% in 2017). The latest data on alcohol use among cyclists date back to 2013. Measurements in the evening and at night/in the early morning (between 5 pm and 8 am) in the entertainment areas of the cities The Hague and Groningen showed that on average 42% of the tested cyclists had used more alcohol than legally allowed. This percentage is considerably higher than among drivers.

The number of road deaths and serious injuries attributable to alcohol use in traffic is unknown. The relevant information in the police crash database and in the hospital registration is incomplete since alcohol use is not always tested for. Research has shown that crash risk is about 1.4 times higher for a driver with a blood alcohol content (BAC) of 0.5‰ than for a sober driver. At a BAC of 1.0‰, the risk is nearly five times higher, and more than twenty times higher at 1.5‰. Also, for cyclists, crash risk gets higher with increasing BAC. Deterioration in driving behaviour is more noticeable in younger drivers.

The effect of the Dutch designated driver ("Bob") campaign is unclear, since the effect on crashes was not evaluated. Moreover, as most campaigns were accompanied by other activities (such as intensified police enforcement), the effect of campaign itself is hard to assess. However, regular alcohol checks have been proven to be effective in reducing the number of alcohol-related crashes. For the Educational Measure Alcohol (EMA) and the Light Educational Measure Alcohol (LEMA) no effect on the risk of recidivism could be proven. Severer penalties, such as higher fines, more frequent or longer suspension or revocation of the driving licence seem to have hardly any effect on serious alcohol offenders. For this group, new more preventive measures need to be developed, taking a broader approach towards the problem underlying their alcohol offences, possibly in combination with an alcolock or ankle tag.

1 How frequent is driving under the influence of alcohol in the Netherlands?

Cars

According to the latest measurements (in 2022) of drink driving by drivers in weekend nights, 2.6% were under the influence of alcohol [1]. They had a blood alcohol content (BAC) of 0.5‰ or

higher[1]; see *Figure 1*. The favourable development of alcohol use during weekend nights in 2002-2017 (from 4.1% in 2002 to 1.4% in 2017) reversed to a considerable increase in 2019-2022: an increase of 1.4% offenders in 2017 to 2.6% in 2022. The proportion of serious offenders (BAC ≥ 1.3‰) even increased from 0.1% in 2017 to 0.6% in 2022.

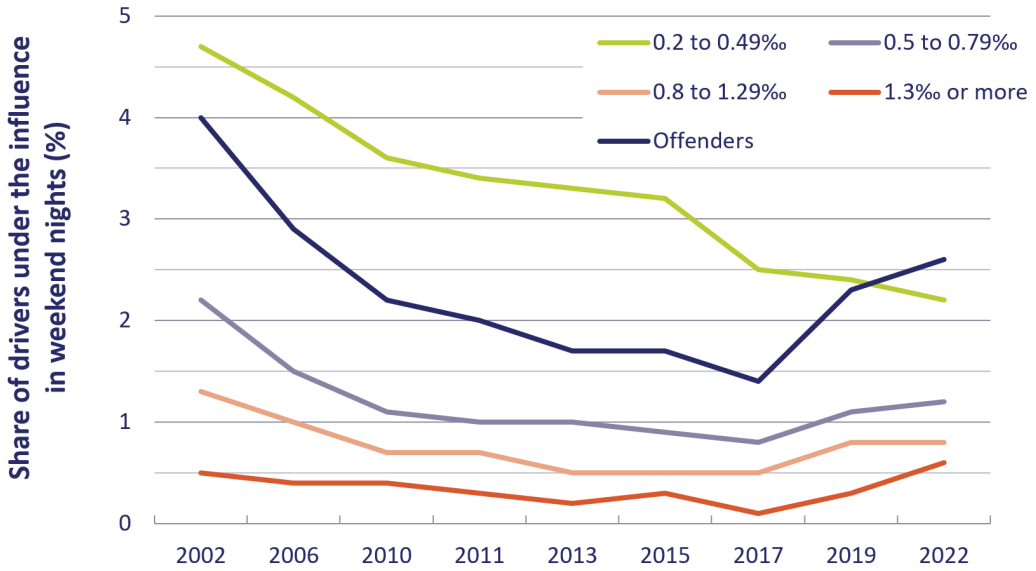

Figure 1. Development of drivers under the influence in weekend nights 2002-2022 (Source: I&O Research [1]).

Among novice drivers (not in *Figure)*, developments are unfavourable as well. In 2019, 2.3% of novice drivers were caught drink-driving (BAC of 0.2‰ or higher), while the percentage increased to 3.7% in 2022. Particularly serious alcohol offences (BAC of more than 1.3‰) increased (more than doubled) from 0.3% in 2019 to 0.8% in 2022.

The study [1] does not explain this negative trend. However, enforcement regarding alcohol use has strongly decreased in recent years. This started as early as 2015-2018 [2] [3]. It is also apparent when considering road user experiences. In 2015, as many as 17% of Dutch drivers said to have been checked for driving under the influence in the past 12 months; that percentage decreased to 10% in 2018 [4]. Conversely, in that same period in Belgium, the percentage of drivers saying they had been checked increased from 17% in 2015 to 24% in 2018 [4]. The Trimbos Instituut, the Netherlands Institute of Mental Health and Addiction, submits that the subjective chance of being caught (road users' perception of the chance of being caught) has also decreased due to a different set-up of alcohol checks: "*The police have discontinued large-scale alcohol checks and have adopted a risk-based approach to alcohol checks. This appears to reduce the subjective chance of being caught for drink driving"* (Scholten & Lemmers [5]; p. 47). In COVID-19 years 2020-2021, alcohol checks were even further reduced compared to previous years [6]. All-in all, it is likely that the decrease of (visible) alcohol checks over a longer period contributed to more drink driving (see the question *How effective are alcohol checks?*).

Bicycles

Night measurements in 2013, the most recent (Dutch) data available, showed that on average 42% of the tested cyclists had consumed more than the legal amount of alcohol (a BAC higher

1. In this fact sheet, the legal alcohol limit is expressed in ‰ (the number of milligrams of alcohol per millilitre of blood); in the Netherlands, a different measure is also often used, the so-called µg/L, micrograms of alcohol per litre of breath.

than 0.5‰) [7]. These alcohol measurements were carried out among cyclists in the entertainment area of the cities The Hague and Groningen on Thursday and Saturday evenings and nights/early mornings (5.00 pm to 8.00 am). The percentage of cyclists under the influence increased as the evening/night progressed: at the beginning of the evening none of the cyclists had a BAC above the legal limit, after 1.00 am 68% of the cyclists had a BAC higher than 0.5‰, and after 5.00 am in the morning this was even the case for more than 80% of the tested cyclists.

2 What are the legal alcohol limits in the Netherlands?

For road users in the Netherlands, the legal BAC limit is 0.5‰; and 0.2‰ for novice drivers and novice (light) moped riders *(see Table 1)*. For pedestrians there is no legal alcohol limit. However, the police can report a pedestrian for public intoxication. In such a case, the police will not take a breathalyser test or a blood test, but will assess the physical characteristics of drunkenness and the behaviour of the pedestrian. In contrast to most European countries, The Netherlands do not have a different limit for professional drivers (see *Table 2*). The effect of a lower limit for professional drivers has not been examined and is therefore unknown.

Table 1. Legal alcohol limits for different road user groups in the Netherlands [8].

Mode of transport	Legal alcohol limits in the Netherlands
Driver	0.5‰
Cyclist	0.5‰
Truck driver	0.5‰
(Light) moped rider	0.5‰
Novice driver and novice (light) moped rider	0.2‰

Table 2. Legal European alcohol limits in 2021 [9].

Country	Legal alcohol limits in Europe		
	General	Novice drivers	Professional drivers
Hungary, Slovakia, Romania, Czech Republic	0.0‰	0.0‰	0.0‰
Estonia, Norway, Poland, Sweden	0.2‰	0.2‰	0.2‰
Lithuania	0.4‰	0.0‰	0.0‰
Germany, Italy, Croatia, Slovenia	0.5‰	0.0‰	0.0‰
Austria, Switzerland	0.5‰	0.1‰	0.1‰
Cyprus, Greece, Ireland, Luxembourg, Malta, Portugal	0.5‰	0.2‰	0.2‰
France	0.5‰	0.2‰	0.5‰ (bus drivers 0.2‰)
Latvia, the Netherlands	0.5‰	0.2‰	0.5‰
Spain	0.5‰	0.3‰	0.3‰
Belgium	0.5‰	0.5‰	0.2‰
Bulgaria, Denmark, Finland, Scotland	0.5‰	0.5‰	0.5‰
United Kingdom (excl. Scotland)	0.8‰	0.8‰	0.8‰

3 What is the effect of alcohol on driving behaviour?

When drink driving, the skills required for safe driving diminish [10] [11]. Drivers are more impulsive and reckless. Furthermore, they assess traffic situations less well, recognise dangers less timely, are less capable of reacting in time, show worse vehicle control and they are less alert. This deterioration in driving behaviour is more noticeable among young drivers (see the question *Which risk groups are distinguished in the Netherlands?*

Moskowitz & Fiorentino [12] and Caird, Lees & Edwards [13] studied the effect of a low dose of alcohol on reaction speed, vehicle control and driver alertness. They found the following effects:

- **Reaction speed**: the speed with which one perceives objects, processes the information and reacts, already starts to decrease at a blood alcohol content (BAC) of 0.3‰. It then takes longer to recognise a dangerous situation, to react to a red light, and to respond to a braking vehicle in front [13].

- **Vehicle control**: under normal conditions, steering skills begin to deteriorate from a BAC of 0.5‰ onwards, but in particular and/or difficult conditions (e.g., when crosswinds deflect the vehicle) problems are experienced from a BAC of 0.2‰ onwards [12].
- **Alertness**: drivers become less alert, from a BAC of 0.3‰ onwards [12]. When blinking, drivers keep their eyes closed for longer and the reaction to a simple stimulus is slower [13].

Dupont, Martensen & Silverans [14] summarise the effects of alcohol on driving skills as follows ([14] p. 7): "*Automated processes begin to deteriorate from a BAC of 0.5‰ onwards; the processes that require any conscious attention of the driver, are already affected from 0.2‰ onwards"*.

In a meta-analysis of driving simulator studies into the effect of alcohol use on driving behaviour, Irwin et al. [15] found that drinking alcohol (BAC levels ranging from 0.23 to 1.0‰) caused more swerving (variation in lane position) and more variation in speed.

4 How many casualties in the Netherlands are due to driving under the influence of alcohol?

The number of road deaths and serious injuries in the Netherlands due to alcohol use in traffic is unknown. The information in the police crash registration and in the hospital registration is incomplete, as alcohol tests are not always carried out. In addition, road deaths are very rarely tested for alcohol, as this is not considered useful from the perspective of criminal justice. A standard blood test after a road crash in which the (probable) culprit died is impossible to organise within the current Dutch criminal justice framework [16].

On the basis of the Injury Information System (Letsel Informatie Systeem (LIS)) it was *estimated* that among the (road) casualties treated at an Accident & Emergency Department (a&e) in 2021, 6% had used alcohol and/or drugs [17]. In 2012-2021, alcohol was the substance most frequently used (98%) among the road casualty group that had used substances; almost 6% of the casualties had (also) used drugs and almost 3% had only used drugs before the crash [17]. In that same period, three quarters of the road injuries that had used substances (especially alcohol!) were cyclists. In 2012-2021, the number of a&e visits on account of serious injuries due to a road crash involving drug and/or alcohol use increased by no less than 71%. A note to be added to these figures, however, is that LIS is not explicitly queried for substance use data. Only when substance use is apparent and/or when it is relevant to the medical treatment, will it be registered in LIS. Therefore, LIS substance use figures should be considered as the lower limit of the actual problem [17].

In 2015, the number of road deaths in the Netherlands due to alcohol use in traffic was estimated at 12% to 23% of the total number of road deaths; at that time, this amounted to 75 to 140 road deaths [18]. The estimate was based on the share of drivers with an above-limit blood alcohol content (BAC) in weekend nights in 2015, and the risk figures per BAC category (see Houwing et al. [19] for the estimation method). The estimate was not disaggregated by mode of transport

(for example, cyclists and drivers).

5 What are the risks of driving under the influence of alcohol?

Cars and delivery vans

The risk of a crash increases with the amount of alcohol a driver has drunk. A large-scale American case control study shows that at a blood alcohol content (BAC) of 0.5‰, crash risk is approximately 1.4 times higher than when no alcohol has been consumed. At a BAC of 1.0‰, the risk is nearly five times higher, and at a BAC of 1.5‰, the risk of a crash is more than twenty times as high as that for a sober driver (see *Figure 2;* [20]).

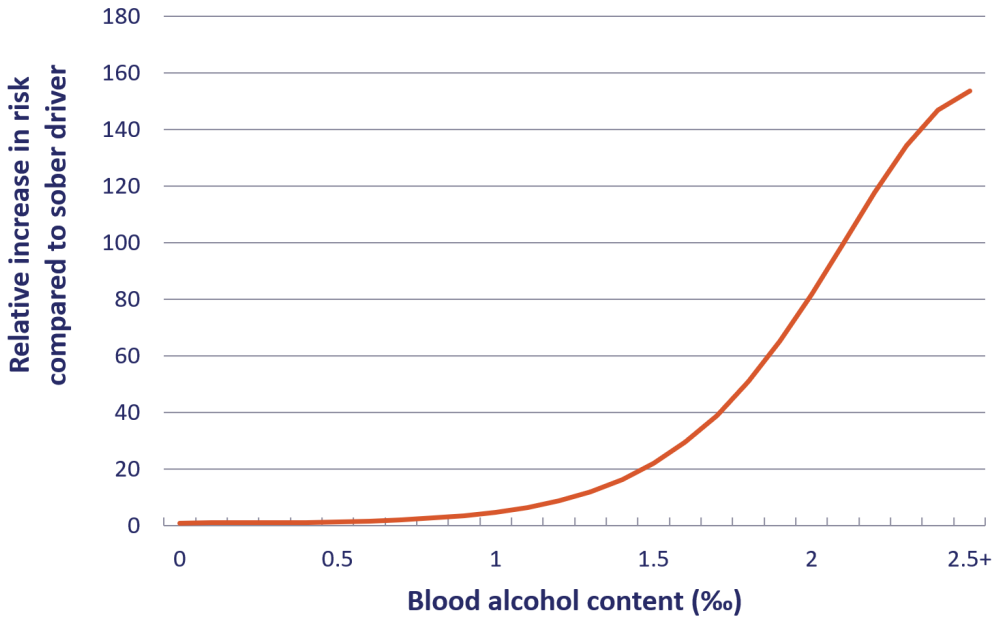

Figure 2. Relative increase in risk at increasing blood alcohol content (Blomberg et al., 2005; Table 33 [20]).

Other studies show that even at a BAC lower than 0.5‰, crash risk is adversely affected. Compton & Berning [21] report a 1.2 risk increase for all drivers having a BAC of 0.3‰. Lower BAC levels mainly involve a risk increase for young (inexperienced) drivers. For example, Peck et al. [22] report a risk increase of 1.4 for drivers under 21 at a BAC of 0.1 to 0.3‰.

Cyclists

For cyclists, crash risk increases with alcohol consumption. In Canada, Asbridge et al. [23] found bicycle crash risk to increase four times after alcohol consumption. The risk increase was established during different kinds of alcohol measurements: both questionnaire measurements and blood value measurements resulted in the same risk increase.

Combination alcohol & drugs: extra high risk

Combining drugs and alcohol results in a risk increase comparable to driving under the influence with a BAC higher than 1.2 ‰, which can be labelled an extremely increased risk. The risk of being seriously or fatally injured in a crash is 20 to 200 times higher than under normal driving conditions. The range is that wide because the different risk estimates vary, depending on the European country in which the research was carried out, the type of drugs used, and the risk outcome used (the risk of death or the risk of serious injury).

The findings above are derived from a large-scale European study into driving under the influence of alcohol, drugs and medicines in the period 2007-2009 (DRUID: Driving Under the Influence of Drugs, Alcohol and Medicines [24]). *Figure 3* shows the results of this research for the increase of crash risks for the separate use of alcohol and the combined use of alcohol and drugs. As the study was conducted in 2007-2009, it concerns combinations that were common in traffic at that time.

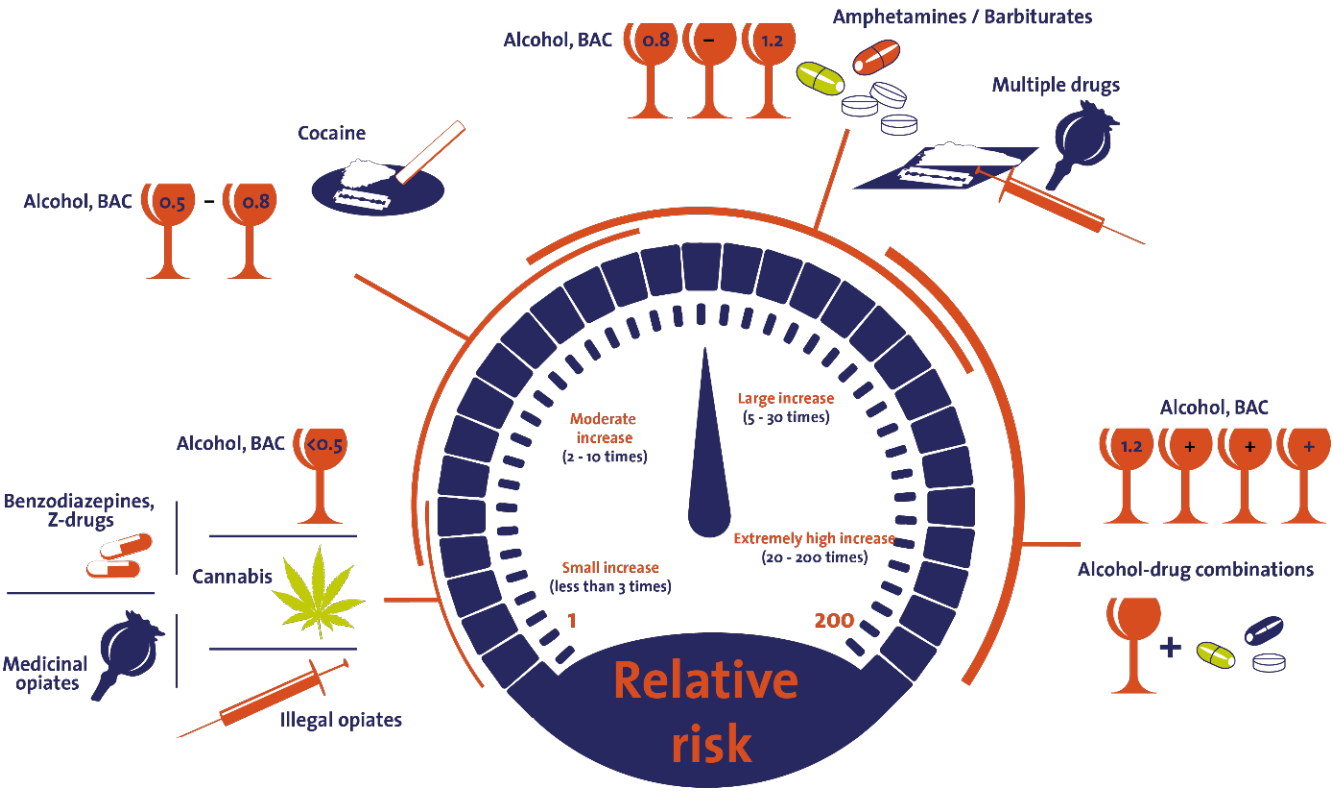

Figure 3. Relative risk of severe or fatal injury due to the use of psychoactive substances in traffic [24].

6 Which risk groups are distinguished in the Netherlands?

Young men

Although young drivers use less alcohol than older drivers [25], they are overrepresented in the casualty and driver groups involved in drink-driving crashes [26]. The reason is twofold: for young drivers, inexperience makes for a higher crash rate anyway, and alcohol affects driving behaviour more when drivers are young than when they are older [20] [22] [27]. Although, in 2009, young drivers (aged 18-21) only constituted 4% of the total number of driving licence holders, they made up 29% of the seriously injured drink drivers], according to the European study DRUID (Driving Under the Influence of Drugs, Alcohol and Medicines), and more than 90% of the young injured drink drivers were men [28]. Young women were not overrepresented among seriously injured drink drivers.

Serious alcohol offenders

In 2015, it was estimated that between 90,000 and 125,000 drivers in the Netherlands can be characterised as serious alcohol offenders: offenders who have been apprehended with a BAC higher than 1.3‰ at least once [29]. They were responsible for two-thirds of all severe alcohol crashes. Traditional measures such as licence suspension and imposing fines seem to have hardly any effect on serious alcohol offenders [29]. For this group, new measures are needed, focusing on prevention with a broader approach to the problems underlying the alcohol offence, possibly in combination with an alcolock or ankle tag. See the question *What other measures can be taken*?

Goldenbeld, Blom & Houwing [29] characterise serious alcohol offenders as follows: they are more likely to be male, 30-40 years old, single and to be poorly educated. They have a high degree of alcohol dependence and additional psychiatric problems. Furthermore, their mindset tends to downplay the problem of driving under the influence and to avoid personal responsibility. An antisocial or anti-authoritarian attitude may also be part of this mindset. Serious alcohol offenders are also more frequently involved in criminal behaviour in fields other than traffic and they often use drugs in addition to alcohol.

7 Which criminal and administrative measures for driving under the influence are available?

Driving under the influence of alcohol is a traffic crime. Drivers who are apprehended for driving under the influence, are often sanctioned by one or more of the following measures: a fine, driving disqualification, an educational measure, and an examination of fitness to drive. In more serious cases - involving an extremely high BAC level, recidivism, or an at-fault crash – community

service, a prison sentence and licence revocation are also considered. *Table 3* presents an overview of sanctions for experienced and novice drivers at different BAC levels.
In the Netherlands, a driver who is apprehended for drink driving often faces two procedures, each with its own measures: a criminal procedure in which a penalty is imposed by law (by the Public Prosecution Service (OM) or in court) and an administrative procedure in which the offender may face a 'notification order' (previously known as a requisition order) of CBR, the organisation responsible for driving licences in the Netherlands [29]. The main purpose of the criminal procedure is to punish the offender. The purpose of the notification order is to determine if a driver is still sufficiently capable or skilled to perform the driving task, and whether an additional measure can prevent him from committing another alcohol offence. The notification order therefore focuses more on prevention and future behaviour.

Criminal procedure

In the *criminal procedure,* offenders with a blood alcohol content (BAC) up to and including 1.65‰ are punished by the Public Prosecution Service (OM). At a first offense the OM often issues a penalty order (fine), supplemented by suspension of the driving licence for a fixed term. The amount of the fine and the duration of the suspension increase as the BAC category gets higher. At a BAC of 1.66‰ or higher, in an injury crash, or in case of multiple recidivism, the alcohol offender is brought to court. Irrespective of whether the OM or the judge impose a penalty, the alcohol offender's 'file' (formerly a criminal record) is entered into the Judicial Documentation System (JDS).

In accordance with the Regulation Recidivism Alcohol and Drugs, the driving licence is automatically revoked if a second drink-driving offence is committed within five years after the first conviction or penal order has become irrevocable, and if the offender's BAC is higher than 1,3‰ [30]. In case of a revocation, the driver will, once more, have to pass the theoretical knowledge and practice tests to obtain a driving licence.

Administrative procedure

In the administrative procedure, the alcohol offender faces the measures that can be issued by CBR: an educational measure (Light Educational Measure Alcohol – LEMA, an Educational Measure Alcohol – EMA), an examination of fitness to drive, or – until 2015 – an alcolock. See the questions *How effective are educational measures (EMA and LEMA) in the prevention of driving under the influence?*; *How effective is an alcolock in the prevention of driving under the influence?* and *What other measures can be taken?*. The outcome of the examination of fitness to drive (or a more specific examination of alcohol use) may be that the driver does not meet the requirements for driving skills or fitness to drive. In that case, the driving licence will be revoked. The difference with a suspension of the driving licence is that after revocation of the licence the driver must once more prove his skills and/or fitness to drive at CBR. In the administrative procedure, the height of the BAC, the number of years of holding a driving licence (novice driver or experienced driver), and whether or not the driver is a multiple offender, also determine the type of sanction.

The CBR examination of a driver's alcohol use primarily intends to ascertain whether the offender's alcohol use can be diagnosed as problematic, and consists of a psychiatric and physical examination, and a blood test [31]. If the outcome is that the offender is 'fit', an EMA is imposed; if the outcome is that the offender is 'unfit', the driver's licence is revoked, for the duration of the driver at least having been demonstrably free of alcohol abuse or addiction for one year. Comparing participants in this examination to similar offenders who did not partake, shows that

participation results in a statistically significant reduction of the chance of reoffending (from 11% to 7%). This effect has been shown for both the subgroup obliged to accept an EMA (examination declared them 'fit') and for the subgroup whose driving licence was revoked [31].

Table 3. Sanctions for experienced and novice drivers of motor vehicles in the Netherlands. The sanctions are for first offenders; higher penalties apply for multiple offenders (Sources: Staatscourant and Trimbos instituut [32]).

Offence	Experienced drivers	Novice drivers
0.22/0.54 - 0.80‰	€ 300	€ 300 Possibly: LEMA
0.81 – 1.00‰	€ 425 Possibly: LEMA	€ 425 + 2 months DD Possibly: EMA
*1.01 - 1.15‰	€ 550 Possibly: EMA	€ 550 + 2 months DD Possibly: EMA
1.16 - 1.30‰	€ 650 Possibly: EMA	€ 650 + 4 months DD Possibly: EMA
1.31 – 1.50‰	€ 650 + 4 months DD Possibly: EMA	€ 650 + 6 months DD Possibly: examination fitness to drive
1.51 – 1.65‰	€ 750 + 6 months DD Possibly: EMA	€ 750 + 6 months DD Possibly: examination fitness to drive
1.66 – 1.80‰	€ 850 + 7 months DD Possibly: EMA	€ 850 + 7 months DD Possibly: examination fitness to drive
> 1.81‰	Min € 950 + min 8 months DD Possibly: examination fitness to drive	Min € 950 + 8 months DD Possibly: examination fitness to drive
> 2.36‰	Min 60 h. community service + min 12 months DD Possibly: examination fitness to drive	Min 60 h. community service + min 12 months DD Possibly: examination fitness to drive
Recidivism	In case of recidivism, fines are higher and DD is longer. According to the Recidivism Scheme Serious Offences of June 2011, the driving licence is revoked if the BAC in the second alcohol violation > 1.3‰. In this case, the driver must once more take and pass the theoretical and practical exam in order to get a driving licence.	

DD = Driving Disqualification (OBM in Dutch)
EMA = Educational Measure Alcohol
LEMA = Light Educational Measure Alcohol

8 How effective is an alcolock in the prevention of driving under the influence?

An alcolock has proved to be effective: it leads to less recidivism than suspension or revocation of the driving licence. This effect is often only observed during the period in which the alcolock is present. However, if the causes of alcohol abuse are also tackled, for example by wider deployment of an integrated alcolock programme, the measure may also have more lasting effects. An alcolock is an alcohol tester that is connected to the starting mechanism of the car. The tester works as an immobilizer. It is only possible to start the car after passing an alcohol test. An alcolock is usually part of an alcolock programme that does not only include installing an alcolock in the car, but also involves an accompanying educational or medical programme. Since 2015, CBR has no longer been allowed to impose the alcolock programme on alcohol offenders in the Netherlands.

Effectiveness alcolock

A study by WODC Research and Documentation Centre shows that the recidivism rate in the Netherlands is lower than for other measures, even after removal of the alcolock [33] [34]. Participation in an alcolock programme, reduces the recidivism rate of drink driving by 50% in the two years after termination of the alcolock measure.

Various international studies in the period 1990-2020 also show that the recidivism rate of users of an alcolock is 65-90% lower than that of drivers whose licences were suspended or revoked [35] [36] [37]. In the studies, no evidence was found for an effect of the alcolock after it had been removed from the vehicle [38] [39] [40] [41]. The alcolock programmes in Sweden [42] [43] and the US [44] showed that the programme did result in lasting changes, both in alcohol consumption and drink driving. According to the Swedish researchers, these lasting changes are the result of the integral character of the programme: it addresses the cause of the alcohol problem, and not just the symptoms. This outcome corresponds to the US findings: if an alcolock programme is coupled with psychological counselling to deal with an alcohol problem, reduced recidivism lasts from one to four years after removal of the alcolock [44].

In addition to a measurable effect of reduced recidivism, US studies also found proof of a direct road safety effect: in states with an alcolock measure the number of alcohol-related road deaths is significantly lower than in states without such a measure [45] [46] [47] [48]. In Ireland, the cost benefit ratio of introducing an alcolock programme for repeat drink-driving offenders was estimated to be one to six [49].

Ban on alcolock

In March 2015, the Dutch Council of State determined that CBR could no longer impose the alcolock programme. The main argument was that imposing the programme under administrative law, without the intervention of a judge, could have disproportionate effects in a substantial number of cases. In 2018, after consultation of several experts, the Minister of Justice and the Minister of Infrastructure and Water Management concluded that other measures were preferable to reintroduction of the alcolock programme (under criminal law) [50]. The ministerial

arguments against reintroduction of the alcolock programme were that the target group eligible for the imposition of an alcolock would be small (30 – 2270 persons in the scenarios that were examined), that the costs of an alcolock are high and that the alcolock is susceptible to fraud. The ministers put forward the option to increase the penalty for drink driving and lowering the BAC for the examination of fitness to drive as alternative measures for the alcolock. See the question *How effective are heavier penalties?*

9 How effective are educational measures (EMA and LEMA) in the prevention of driving under the influence?

The WODC Research and Documentation Centre found no effect of EMA, (Educational Measure Alcohol) on recidivism [51]. Also for LEMA (Light Educational Measure Alcohol) no measurable effect on recidivism was found (both general traffic offence recidivism and drink-driving recidivism were studied) [52]. Blom, Boschman and Weijters [51] even found a referral to LEMA to be counter-effective for novice drivers and for drivers without previous criminal drink-driving records. There was, , a trend showing that LEMA is more effective (reducing recidivism) for drink drivers subjected to (several) criminal proceedings [51]

LEMA and EMA are educational measures that can be imposed by CBR (see the question *Which criminal and administrative measures for driving under the influence are available?*). LEMA and EMA are courses about the risks of alcohol use in traffic, and on the necessity of separating alcohol consumption and traffic participation. The LEMA course takes two afternoons or two mornings, with a week in between. The two-day EMA course is spread over seven weeks. During the course, participants share their experiences and make assignments at the course location and at home. The course concludes with a one-hour personal meeting with the trainer.

The WODC studies mentioned above, were conducted on 2013 data (LEMA) or 2015 data (EMA). Since then, the design of both measures has been changed, however. This implies that the study results cannot be translated to the current situation on a one-to-one basis.

10 How effective is the lower alcohol limit for novice drivers?

International research shows that lowering the alcohol limit for novice drivers results in less driving under the influence and in fewer crashes. Dutch data, however, do not show such positive

effects. After the introduction of the reduced alcohol limit for young drivers in the Netherlands (January 2006), their alcohol use did not decrease more strongly than alcohol use among older drivers [53]. Nor was there a decline in the number of alcohol-related road casualties among young people in the first two years after the introduction of the reduced limit [54].

International

Different reviews of mostly American and Australian studies conclude that lowering the alcohol limit for young drivers (mostly to 0 or to 0.2‰) results in less drink driving and fewer alcohol-related crashes [55] [56] [57] [58].

Netherlands

In the Netherlands, the legal alcohol limit for novice drivers was lowered to 0.2‰ in January 2006. The lower limit was not only expected to reduce alcohol consumption by young drivers, but also to reduce combined use of alcohol and drugs. The latter mainly occurs among young men and goes hand in hand with a very high crash risk (see the question *What are the risks of driving under the influence of alcohol?*). Data on alcohol use by young road users in a four-year period before and after the introduction of the lower limit (20002-2010) show that their alcohol use did not decrease more strongly than that of older drivers [53]. Whether the measures reduced combined alcohol and drug use by road users is unknown.

Weijermars & Van Schagen [54] also conclude that there is no evidence that the measure had a road safety effect in the first years after its introduction. They find that the proportion of 18- to 24-year-olds among the number of fatal and severely injured alcohol-related casualties did not decline in the two years after introduction of the reduced limit: in 2004/2005, on average 24.6% of the alcohol-related casualties were in the age group 18-24, in 2006/2007 the average was 24.8%, and 28.4% in 2008. For novice drivers, the relatively slight chance of being apprehended possibly causes the lack of an effect.

11 How effective is the Bob campaign?

It is unclear whether the Bob campaign (designated driver campaign) has contributed to a reduction of alcohol use in traffic or to the number alcohol-related crashes, since the effect of the campaign on crash rate has not been evaluated. Due to coinciding other activities (such as intensified police enforcement), the effect of the campaign itself is hard to determine. It is apparent, however, that the Bob campaign is appreciated and that its message comes across [59].

In 1995, the Bob-campaign was designed by the Belgian Institute for Road Safety, currently the Vias Institute [60]. The campaign aims to get people to agree on the designated driver before drinking alcohol. Late 2001, the Bob campaign was introduced in the Netherlands. The campaign concept is renewed every so often, to safeguard the appeal of the Bob message to the target group. In Belgium, the Bob campaign was extended in 2020 by giving drink drivers a key ring shaped as the name of a child that was killed due to drink driving.

In reviews of international studies of the effect of designated drivers (the Bob drivers), no conclusions are drawn about the effectiveness of these programs in reducing drink driving or alcohol-related crashes, since most of the studies do not present enough evidence [61]. A review of American and Canadian studies about the effectiveness of programmes for alternative transport for pub- and partygoers (including designated driver programmes) did not draw any firm conclusions either [62].

12 How effective are heavier penalties?

There is no evidence that heavier penalties for alcohol offenders have an effect on reducing offences.

The Dutch information dates back to a few decades ago, and it is based on a considerable increase in the penalties for driving under the influence in 1992 (higher fines and more rapid suspension of the driving licence). The severer penalties did not lead to a decrease of drink driving [63] [64]. On the contrary, there was even a slight increase, probably partly due to the fact that the enforcement level simultaneously declined strongly.

More recent International studies did not find evidence of the effect of heavier penalties on drink driving either. An Australian study [65] found no relation between the penalty level and the chance that an alcohol offender would reappear in court. Nor was there any evidence that the length of the period that the driving licence was revoked affected this chance. Sloan et al. [66] found no relation between self-reported drink driving and perceived risks of being fined, of licence suspension, or of an ankle tag that monitors alcohol use (SCRAMM). In the US [67] and in Chile [68], no proof was found that heavier penalties for drink driving resulted in fewer alcohol-related road deaths.

Imprisonment is one of the heaviest penalties for drink driving. In different American States, the introduction of laws that impose imprisonment on offenders who are caught drink driving for the first time, were found to have little or no effect on drink driving [69]. Australian research found no relation between imprisonment and recidivism [70]. Howard et al. [71] conclude that for a deterrent to be effective, penalties should be applied swiftly, confidently and consistently, while the severity of the penalties has a smaller effect.

There may definitely be good reasons to impose heavier penalties on drink drivers, but ever-increasing penalties should not be expected to be effective in reducing alcohol-related road casualties or recidivism. Most certainly not if the *subjective* chance of being caught – the probability of an alcohol check as estimated by road users – remains low.

13 How effective is suspension or revocation of the driving licence?

Suspension or revocation of the driving licence reduces the number of alcohol offences and alcohol-related crash involvement and thus contributes to increased road safety [72]. Yet, these penalties are often more effective in combination with other measures (rehabilitation for example) than as a standalone measure [72].

When a driver's licence is suspended, the driver is not allowed to drive a car for a certain amount of time. When the driving licence is revoked, driving skills and/or fitness to drive will have to be proved to CBR once more (see the question *Which criminal and administrative measures for driving under the influence are available?*).

Suspension or revocation of the driving licence is no guarantee that the convicted drivers do in fact no longer drive a car. Based on telephone interviews with 1000 drivers in Austria, for example, it was estimated that more than a quarter of the drivers whose driving licence had been suspended continued to drive, and about 15% even continued to drive under the influence of alcohol [73]. American and Australian studies (described in [74]) indicate that 50-70% of the alcohol offenders continued to drive (occasionally) even after suspension or revocation of the licence. Goldenbeld, Houwing & Blom [29] conclude that traditional measures, such as fines and licence suspension, seem to have little or no effect on the group of serious alcohol offenders. At least 45% of serious alcohol offenders are persistent in their violation behaviour and continue to drink drive even after such penalties were imposed.

14 How effective are alcohol checks?

Regular alcohol checks are effective in reducing the number of alcohol-related crashes. A meta-analysis on results from forty studies indicates that crashes decrease by 17% when regular alcohol checks are carried out [75]. The effects are considerably larger in Australia (22% reduction) than in the United States (12% reduction).

The greater effectiveness in Australia is probably due to the fact that they use random breath testing on large numbers of drivers (annually, about one in three is tested). In random testing, every stopped driver is tested for alcohol use, irrespective of gender, age, or skin colour. In the United States, considerably fewer drivers are tested for alcohol and testing is not random. According to the law, a police officer can only carry out a breath test if a driver is suspected to be under the influence.

Partly based on Dutch data, Mathijssen [63] estimated that each doubling of the number of alcohol checks results in 25% fewer alcohol offenders.

15 What other measures can be taken?

Reintroduction planned alcohol checks

Regular alcohol checks are effective in reducing the number of alcohol-related crashes (see the question *How effective are alcohol checks?*), but in traffic, enforcement of drink driving laws has strongly declined in the last few years. In 2020 and 2021, COVID-19 clearly contributed to the decline [6], but in the preceding years, the number of alcohol checks had already decreased. In 2016, the number of wide-scale alcohol tests at DUI checkpoints was almost half that of 2013 [3]. In 2017, fewer than 19,000 drink drivers came into contact with the criminal justice system, a 32% reduction of the 2012 number that amounted to slightly over 27,000 ([2] based on Public Prosecution Department figures).

A reason for this decrease is the lack of effectiveness of the wide-scale alcohol checks or DUI checkpoints due to drivers' increasing ability to avoid them by up-to-the-minute information on social media/apps [76]. Although it is indeed harder to 'catch' offenders in this way, DUI checkpoints *can* affect the *subjective* chance of apprehension; road users' estimation of the chance of being checked. If road user groups use social media to inform one another, the one target group that is especially receptive to information about alcohol checks is the drink driver group. To achieve maximum effectiveness, large-scale alcohol tests at DUI checkpoints can be alternated with flexible alcohol checks that are of shorter duration and more often change locations. In Australia, it was found that small-scale alcohol checks by three to five police officers (instead of eight to twelve) could achieve a similar crash reduction [77].

Introduction of a 0-limit/further lowering of the limit

The European Transport Council advises a zero-tolerance policy for alcohol use in traffic, which in practice entails a 0.2 ‰ alcohol limit in Europe [78]. At a BAC lower than 0.5‰, driving skills are already adversely affected (see the question *What is the effect of alcohol on driving behaviour?*) and crash risk increases (see the question *What are the risks of driving under the influence of alcohol?*).

In several countries – Brazil [79] [80], Chile [81] [82], Japan [83], Uruguay [84], Taiwan [85] and Sweden [86] – proof was found that lowering the alcohol limit from 0.5 or 0. 6‰ to a lower limit (0.2 or 0.3‰) positively affects road safety. The lower limits were always coupled with a significant reduction of alcohol-related road crashes or road casualties. On the basis of scientific knowledge, it was estimated that for Belgium introduction of a 0-limit (instead of 0,5‰) would probably result in an annual reduction of 10 to 17 road deaths (2.4% to 3.9%) [87]. A majority of Dutch road users (65%) also support a 0-limit for alcohol use in traffic; throughout Europe, 67% of road users are in favour of this measure [88].

The effectiveness of lower limits does, however, depend on the level of traffic law enforcement. Most road users will only adjust their behaviour if they think that there is a fair chance of being checked [89] (see SWOV fact sheet *Traffic enforcement*). The rather low chance of apprehension probably explains why previous lower limits for novice drivers were not effective in the Netherlands (see the question *How effective is the lower alcohol limit for novice drivers?*)

Public communication & education about alcohol use

It has not been proved that public communication by itself, without additional measures such as police surveillance, reduces drink driving (see the question *How effective is the Bob campaign?*) and SWOV fact sheet *Public Service Advertising*.

To improve public communication in the Netherlands, researchers of the Trimbos Institute advocate a more setting-related form of public communication about alcohol and drug use in traffic, which should be a better fit for the current hotspot approach (targeting events, hotels/restaurants/cafes, certain areas, Friday evening work socials) to enforcement concerning alcohol and drug use [5]. Campaigns about values and standards are also advocated to make friends hold each other to account for driving under the influence of alcohol and/or drugs [5]. The researchers also call for evaluation of such campaigns on the basis of behavioural measurements.

Yet, there is evidence, mostly based on US studies, that long-term education programmes at schools and universities about the general (multiple) risks of alcohol (and other substances) can reduce alcohol consumption among young people [90] [91] [92]. These universal prevention programmes have a broader scope than just the prevention of driving under the influence. The Trimbos Institute also sees several possibilities to improve the preventive approach to drink driving by better collaboration between the health and road safety domains [5]. Specific opportunities for collaboration are, for example:

- Elaborate the theme of *driving under the influence* and add it to the treatment protocols for clients and their loved ones;
- Link up with prevention programmes of the Dutch Addiction Association and the Dutch Addiction Probation Service;
- Develop a strategy for calling to account road users who intend to get into their cars while under the influence of substances. To this effect, a protocol could be developed for groups of friends and professionals working at hospitality venues, at festivals and in sports canteens.

Prevention of alcohol offences and ankle tags

For a more prevention-oriented approach towards alcohol offenders in traffic, Goldenbeld, Houwing & Blom [29] distinguish three directions in which policy and measures can be further developed in the Netherlands:

1. *Better profiling* of alcohol offenders can be helpful in developing better prevention measures or providing a better referral to criminal and administrative measures (or forms of assistance).
2. *New preventive measures* should be developed targeting serious (alcohol) offenders who, as we already know, are not helped effectively by current policy.
3. Prevention should have a *broader approach* than addressing serious or repeat offenders in traffic. Not just actual alcohol offenders, but also potential or future offenders, need to be addressed by the policy and stimulated to change their behaviour.

An example of a preventive measure is regular or continuous monitoring of alcohol consumption by alcohol offenders. In the US, alcohol offenders whose alcohol consumption is measured through an ankle tag, were found to hardly reoffend when wearing the tag. Offenders who *did* reoffend were found to do so at a later time than the offenders in a control group [93]. Dutch ankle tag pilots proved to diminish alcohol consumption and delinquent behaviour, while tagged wearers were mostly positive about this means to monitor behaviour [94]. In 2020, the minister

of Justice and Security indicated to intend to introduce this alcohol meter in the Netherlands as well [94]. How the ankle tag will affect driving under the influence is still unknown, and will mostly depend on how frequently judges will impose the measure.

Reduce alcohol consumption

An effective national policy to reduce alcohol consumption contributes to diminishing the alcohol problem and drink driving. Particularly measures aimed at the cost price and marketing of alcohol are effective in reducing alcohol consumption at a national level [95]. In addition, employers and event organisers could take responsibility, by preventing excessive alcohol consumption. The negative social consequences of frequent and excessive alcohol use go beyond the domain of road safety [95]. Campaigns only have a supportive effect: information campaigns and education do increase problem awareness, but are not enough to realise sustained behaviour changes [95].

Publications and sources

Below you will find the list of references that are used in this fact sheet; all sources can be consulted or retrieved. Via Publications you can find more literature on the subject of road safety.

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SWOV (2023). *Driving under the influence of alcohol*. SWOV fact sheet, September 2023 . SWOV, The Hague.

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