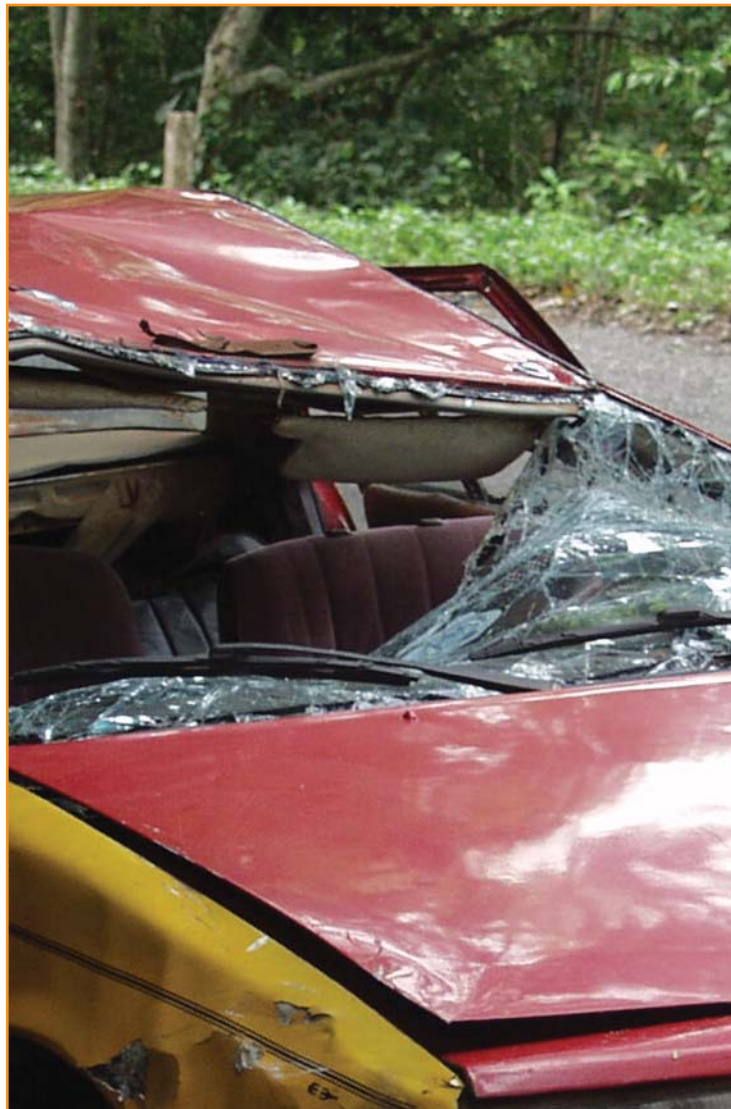




GLOBAL  
**ROAD SAFETY**  
PARTNERSHIP



Impaired driving  
in developing countries

# IMPAIRED DRIVING

Global Road Safety Partnership



Anecdotal evidence suggests that impaired driving is a contributory factor to the poor road safety situation in many developing countries. In contrast to the detailed studies which have been carried out in several high income countries (HIC), little is known about the nature and scale of the problem, and its implications for road safety, in low income countries (LIC). In order to understand more about the role of impaired driving on death and injury on the roads the Global Road Safety Partnership (GRSP), with the financial support of the UK Department for International Development (DFID), awarded the Transport Research Laboratory (TRL Limited) in the UK (TRL) a grant to conduct a 'scoping study' on impaired driving - with particular reference to developing countries. This research note summarises the results.

The scoping study report (Davis et al, 2003 - hereafter referred to as the review) reviewed existing knowledge about impaired driving - with special reference to developing countries. It was carried out by a team led by the TRL, including three experts from developing countries who conducted a series of regional reviews that covered a large proportion of developing countries around the world. It was anticipated that this approach would provide more valuable in-depth (and sometimes unpublished) information about a significant number of countries.

## What is impairment?

The impairment of normal driver behaviour is regarded here as 'a reduced ability to perform adequately the various elements of the driving task'. The cause of driver impairment (or resulting dangerous and erratic behaviour) may be the result of a number of factors such as alcohol consumption, drug ingestion, injury, infirmity, fatigue, the natural ageing process; or a combination of these factors.

The focus of the review was on driver impairment caused by alcohol, illegal or medicinal drugs and fatigue. These impairment factors were thought to be most relevant with regard to the problem of improving road safety in developing countries. Also, especially with regard to alcohol consumption, there is scientific evidence to link impairment to driving performance and crash involvement rates.

## Drinking and driving

Drink driving, sometimes referred to as 'driving under the influence' (DUI) or 'driving while impaired' (DWI) is considered to be one of the most dangerous and anti-social behaviours linked to alcohol consumption. This is because it has long been recognised as one of the leading causes of road traffic injuries and fatalities in high income countries (HIC). As a result, many countries agree on the need to establish regulations that prohibit drink driving, and have set a maximum

allowable blood alcohol concentration (BAC) as a tool for both enforcement and prevention. BAC represents the amount of ethanol (ie alcohol) in a given amount of blood, noted as 'weight by volume', and is measured as either grams of ethanol per 100 millilitres of blood (g/100 ml - used in the United States) or milligrams of ethanol per 100 millilitres of blood (mg/100 ml - used in Europe).

A number of epidemiological studies have been undertaken to identify the correlation between road crashes and blood alcohol concentration levels in HIC. Among these are a study conducted in Toronto, Canada, in 1955 (Lucas et al, 1955), the 'Grand Rapids' study conducted in Michigan, USA between 1962-63 (Borkenstein et al, 1964), and more recently a study of crash risk conducted in Long Beach, California and Fort Lauderdale, Florida, in 2002

(Moskowitz, 2002). These contributions to knowledge of the relative risk of a crash produced by a driver's blood alcohol concentration have done much to emphasise the need for more stringent legislation and enforcement. The Grand Rapids study was one of the earliest and largest studies of its kind and it has had a strong and lasting influence on drink driving laws in the United States and abroad.

Compton et al (2002) summarised the results of Moskowitz, showing that crash risk rises with BAC above 0.04 g/100ml, with an accelerated rise above 0.1 g/100ml. (see figure below). By the time BAC reaches 0.1 (twice the level permitted in many European countries), the relative crash risk is more than four times that of BAC level zero. At 0.15, the risk of crash involvement is over 20 times that of BAC level zero.

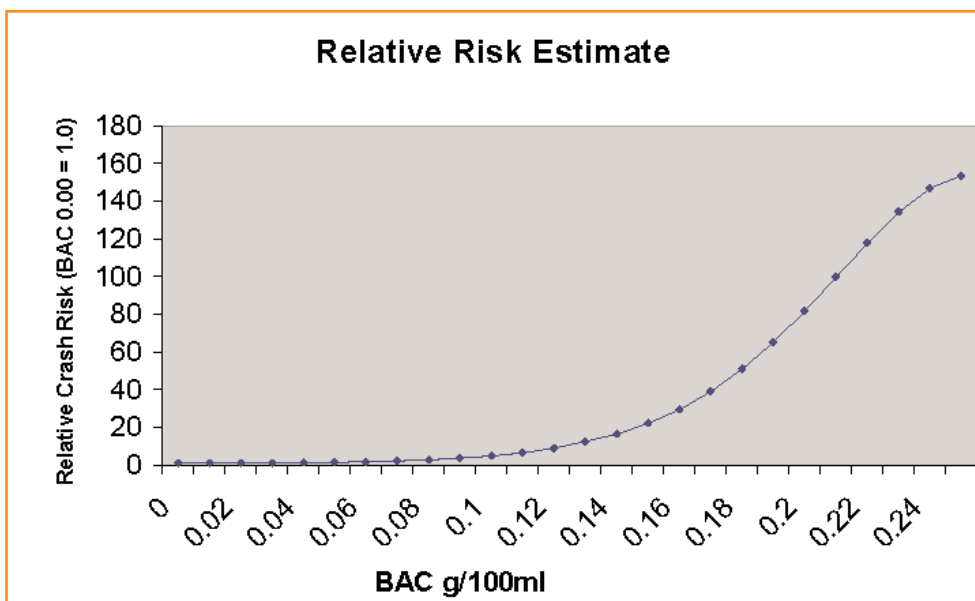


Figure 1: Relative Risk Estimate



### Drugs and driving

The use of illegal or psychoactive substances and medicinal drugs whilst driving is a more recent cause for concern. The effect of drugs on road safety is more complex than that of alcohol, because impairment can be caused by such a huge range of prescription drugs, illegal or 'recreational' drugs, solvents, or stimulants used to counter fatigue. Hence, it is very difficult to provide an objective enforcement 'benchmark' (as can be done for drink driving enforcement) against which impairment caused by drugs can be measured and related to driving performance and crash involvement.

In most surveys reported in different European countries the prevalence of licit drug use falls in the range of 5-15%, and illicit drug use in the range of 1-5%. In the general (non-crash involved) driving population, cannabinoids are the most frequently detected drug, with the use of opiates less frequently observed (Council of Europe, 1999).

In Australia, research commissioned by the Road Safety Committee of the Parliament of Victoria (Parliament of Victoria, 1996) showed that a quarter of all road crash fatalities had drugs in their bodies. The report concluded that drivers who consume drugs alone or with alcohol have a higher risk of being in a fatal crash than those who are drug free. The incidence of drugs in drivers killed is now comparable to the incidence of alcohol. These figures are confirmed by a recent study of road fatalities in the UK (Tunbridge et al, 2001). In Victoria, the presence of drugs in drivers of itself is not the issue, but rather the driver impairment caused by drugs. Boorman (2002) reports that impairment cannot be established by quantification of the drugs present because the variable characteristics of each drug, coupled with the variable factors for each person, make it impractical to set quantitative impairment levels.

### Fatigue

Driver fatigue has also been identified as a significant factor in road crashes, particularly amongst commercial drivers. Fatigue, caused by one or all of: overwork, excessive hours of driving, lack of rest and lack of nourishment, produces a state of reduced mental alertness which may lead to sleepiness or drowsiness. Many commercial drivers work long hours, particularly long-haul truck drivers. There is a link here back to drug use, as it is believed that some drivers use stimulants to counter the effects of fatigue.

Fatigue in commercial road transport is common, as commercial drivers are most exposed to circumstances leading to fatigue. There is an increased risk of fatigue-related crashes at night (a risk factor ten times higher than daytime levels), an increased risk the greater the length of the working day, and with irregular working hours and shift patterns.

The prevalence of sleep-related crashes varies from country to country. Driver sleepiness has been found the cause of between 1.5% (in the United States) to over 30% (on UK motorways) of crashes, and as much as 40% of fatal crashes on the New York State highway (Rayner, Flatley and Horne, 1998; Flatley and Rayner, 1995). Sleep-related vehicle crashes are more likely to result in fatalities because there tends to be no braking or attempt to avoid a collision before impact. Research has indicated that the peak times for driver drowsiness are between midnight and 6am, and between 2pm and 4pm (especially for older male drivers).

Skilled workers and shift workers, who are often exposed to long driving hours as part of their profession, have a greater risk of being involved in a sleep-related crash (Horne and Rayner, 2001; Maycock 1995), with 40% of such crashes involving commercial vehicles.

### Africa

The review found few epidemiological studies conducted in Africa to examine the associations between alcohol or drugs and driving. The majority of non-fatal injury studies have been conducted in South Africa. A series of hospital-based studies have shown that between 26% and 31% of non-fatally injured drivers are intoxicated - with BAC exceeding the then South African legal limit (Peden et al 2001).

Few studies have been conducted to establish BAC levels amongst the general driving population. In Kenya, of the 479 drivers who were breath-tested during a roadside survey conducted by Odera and Zwi (1997), 19.9% were positive for alcohol, 8.3% had BAC in excess of 0.05g/100ml, and 4% exceeded the maximum allowable BAC level of 0.08g/100ml. All intoxicated drivers were male, and aged 25 years and above. Similar results were found in Accra, Ghana, see box (Mock et al, 1998). These results suggest a much higher level of impaired driving in Africa than in the UK - where, in 1990, only 1% of drivers were over 0.08g/100ml (Everest et al, 1990)

722 drivers were stopped and breathalysed by the roadside in Accra in 1998. 21% of the drivers had detectable BAC, while 7.3% had BAC in excess of 0.08g/100ml. Of the commercial vehicles, taxi drivers had the highest rate of impaired driving (10.3%). Truck and large bus drivers also had high rates of 9.9% and 8.1% respectively.

Most of the countries in Africa which have a legal BAC limit for drivers stipulated in their traffic laws are in Southern Africa. With the exception of South Africa, where the legal limit has recently been reduced to 0.05g/100ml, the rest have a legal limit of 0.08g/100ml. In the majority of countries, the traffic law is vague. Although 'drink driving' is usually illegal, the law does not specify the BAC level to define 'drink', nor does the law state the methods to be used in detecting alcohol or drugs, or mechanisms for enforcement.

In spite of the growing use of psychotropic drugs world-wide, very few studies have been conducted in Africa to determine the extent of their association with the increasing burden of traffic crashes. Medical practitioners report that drug usage is common among injured patients presenting to hospitals in Africa. However, because of the high cost of conducting analyses and the technical sophistication required, drug detection capacity is limited.

The South African Community Epidemiology Network on Alcohol, Tobacco and Other Drug Use (SACENDU) carried out a surveillance study on abuse which provides strong evidence on the prevalence of both alcohol and illicit drugs among trauma patients treated at specific hospitals (Peden et al, 2001).

A small number of studies have documented the role of fatigue as a risk factor. Focus group discussions with commercial drivers in Ghana revealed that demands for increased returns (by transport owners) force drivers to speed and work when exhausted (Mock et al, 1998). In Kenya (Kapila et al 1982) found that on average a matatu driver works very long hours - 14 hours a day for 7 days a week.

The SACENDU study enrolled a total of 1,354 trauma patients arriving at hospitals in Cape Town, Port Elizabeth and Durban over a period of two years (1999-2000). Of these, 281 (20.8%) had been injured in traffic crashes. The results indicated that 51% of pedestrians (n=114), 35.5% of drivers (n=44) and 23.2% of passengers (n=123) had used a drug prior to being injured. The most commonly identified drugs in all trauma patients tested were cannabis (used by 32.5%), methaqualone (14.5%), mandrax, known locally as "white pipe" (11.6%), cocaine (4.2%) and amphetamines (0.6%).





### South-East Asia

The countries in south-east Asia currently suffer from around 35% of global road deaths. The review suggests that a substantial proportion of crashes occurring in south-east Asia have an alcohol and/or drugs contributory factor. For example, in Thailand, a survey of traffic injury victims in public hospitals found nearly 44% with BAC levels of 0.1g/100ml or more (Lapham et al, 1999). In Bangalore, India, Gururaj et al (1993) found that 15% of people with traumatic brain injuries caused by crashes had consumed alcohol. In more recent work (Gururaj and Benegal, 2002) found that 28% of crashes involving males over 15 years were attributable to alcohol. Roadside breath tests conducted as part of the same project concluded that 30-40% of night-time drivers were in a state of intoxication.

The review found no reported research into the use and impact of drugs and/or fatigue in south-east Asia.

No research appears to have been done that examines the impact of alcohol-related crashes on health, social and economic aspects at either the individual or community levels.

Legislation prohibiting drinking and driving is included in most countries' traffic laws, but not all use BAC to define permissible levels. The review found that enforcement and public understanding are poor. In a recent study in Bangalore Gururaj and Benegal (2002) found that, of 480 road users under

the influence of alcohol, 97% were aware that drinking and driving is not permitted by law, 99% agreed that it was dangerous, but only 3% were aware of the legal consequences. Breathalyser readings were not understood by the public on many occasions.

A maximum permissible BAC level of 0.05g/100ml was set in Thailand in 1994. No active efforts to publicise the law were made until 1997, but in 1999 high visibility 'sobriety points' were set up. Suriyawongpaisal et al (2002) report that these campaigns raised awareness and support for the law, but did not change the proportion of hospitalised crash victims with illegal BAC levels. It was concluded that law enforcement activity was limited in scope and intensity and that people perceived a very low chance of being stopped, even when they were under the influence of alcohol.

Overall, within south-east Asia, it can be concluded from the review that there is little good practice regarding drink drive issues, with the problem still largely ignored.



Roadside breath tests, Bangalore, India

## Latin America and the Caribbean (LAC)

Countries such as Colombia, Argentina, Brazil, Chile, Costa Rica and Mexico all have an institutional framework based on a National Road Safety Council (NRSC). Typically, NRSC's are established to develop appropriate road safety interventions and to co-ordinate and monitor their implementation. The NRSC in Costa Rica has established a national plan, including action on drink driving.

Although only a few research papers were found that considered the role of impairment caused by alcohol in road crashes in the LAC region, the review reports that alcohol plays a major role in contributing to the numbers of crashes. There is a lack of information in many of the region's countries which may reflect the absence of any monitoring or research being conducted. The LAC review reports that one study in Colombia found 34% of driver fatalities and 23% of motorcycle fatalities are associated with alcohol. They also report that a study in Argentina found 83% of drivers acknowledge that they drink and drive.

In general, the entire LAC region includes the alcohol (and driving) issue within the legislation related to road traffic. However, a major problem is the lack of effective enforcement of the legislation and a second problem is that, although there is a law for impaired drivers, there is not one for impaired pedestrians.



Waiting and boredom result in fatigue.  
Mountain pass, Bolivia

Another serious issue reported in the review is that, in some LAC countries, there is a high percentage of 'hit and run' crashes. This situation is encouraged in Mexico, for example, because current legislation always judges drivers to be the guilty party in certain incidents, irrespective of the circumstances. It is also widely believed that many crashes occur because the driver may be drunk (or under the influence of drugs) and is afraid of the consequences of stopping and reporting the crash.

# INTERVENTIONS

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## Drink driving

Evidence suggests that a minor reduction of driving under the influence of alcohol would have a large effect on crash occurrence (ETSC, 1995). There is also wide agreement in the international scientific literature that increasing drivers' perception of the risk of being detected for excess alcohol is a very important element in any package of measures to reduce alcohol related crashes. Police powers, procedures and the type of evidentiary equipment used all play a large part in determining the extent to which this objective can be reached. In the UK, the Institute of Alcohol Studies (IAS) (1997) state that during the first seven years of the legal BAC limit, enforced by breath testing (introduced in 1967), 5,000 lives were saved and 200,000 injuries were prevented.



Campaign poster, Bangalore, India

Publicity campaigns, backed up by enforcement, have been shown to reduce the incidence of crashes involving alcohol. For example, in the UK, the percentage of people failing breath tests after injury crashes has fallen from 8.5% in 1990 to 3.7% in 2000. Yet, without effective legislation, raising awareness through publicity campaigns and public information schemes remains a short-term action, of limited value in influencing people's driving behaviour. Experience from highly

motorised countries demonstrates that enforcement and sanctions, through the legal system, are needed to make clear that drink driving is unacceptable.

The evidence about the impact of drink driving campaigns and enforcement comes essentially from OECD countries. Clearly campaigns must take account of local circumstances and culture, although the principle that legislation and enforcement are essential in order to make a major impact appears to be robust.

Legislation for drinking and driving is variable from country to country. Virtually the only legislation that is consistent across countries is somehow to define drinking and driving as illegal. This is most easily done by defining maximum, allowable blood alcohol concentration levels or breath alcohol content. However, BAC limits are not standardised across countries, with many (especially low and middle income countries) not applying BAC levels at all. In those countries that have achieved success in reducing impaired driving (mostly OECD countries) it is accepted that appropriate legal sanctions are an essential part of any national anti-drink or drug driving campaign. Law enforcement, and appropriate penalties for drivers that flout drink driving laws, are essential.

Without enforcement by local authorities and police forces, legislation against drink driving is virtually redundant. Unless potential offenders perceive that they will be detected, and there is an effective deterrent, drink driving offences will continue. The review concludes that, for drink driving at least, breath testing is the most effective means of both enforcing legislation and deterring potential or high-risk offenders.



### Drugs and driving

At present, there is insufficient information to support policy and the development of valid and standard protocols to evaluate driver impairment caused by drugs. The aim of the European Commission's IMMORTAL (Impaired Motorists, Methods of Roadside Testing and Assessment for Licensing) research programme is to provide evidence to propose intervention methods for driver impairment, and support the future development of European policy governing driver impairment legislation.

Victoria (Australia) is developing a drugs and driving code of practice to enable health professionals to provide advice to the public about the likely effects of medications on driving. Publicity campaigns will be initiated to inform the public. The State has also developed assessment techniques for police officers to use at the roadside in order to judge whether a driver is impaired by drugs, and the cause of the impairment. Similar developments are under way in the UK. Both the UK and Germany are testing screening devices using saliva or perspiration to test for the presence of illegal drugs.

In Europe, some countries use a warning pictogram on medications to draw the attention of patients to the potential risks associated with some medicinal drugs. However until there is clear evidence linking degradation in driving performance, or crash risk, to specific drugs (legal or otherwise), it is unlikely that there will be the same levels of intervention possible as now exists with alcohol.

So far as less motorised and poorer countries go, the ability to assess the scale of the problem, and then to act as a result, appears to depend on the developments discussed above, followed by their adaptation to local conditions. Both are some years in the future.

### Fatigue

'Don't drive tired' messages feature on variable message signs in Europe and some US states. The UK Department for Transport has featured tiredness in its Think! Road Safety campaign since 2000, although it is too early to say whether this has led to a reduction in crashes involving fatigue.

Driving hours regulations which are applied in Europe and a number of other countries are, in part, intended to reduce the risk of drivers suffering from fatigue. It seems self-evident, that if obeyed, regulations which restrict driving hours would reduce the risk of crashes involving fatigue. However, ETSC (2001) argues that the current European regulations are not effective in delivering safety benefits, and argues for stricter controls.

In developing countries anecdotal evidence suggests that many drivers of commercial vehicles (freight and passenger) are at the wheel for much longer periods of time than is common in OECD countries. It may be, therefore, that the introduction and enforcement of driving hours regulations would have a beneficial impact in such circumstances. This is yet to be established.



# CONCLUSION & references

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Any long-term effective strategy to reduce impaired driving in developing countries will need the support and encouragement of the government. In order to encourage politicians and policy makers to support such activities it is necessary to persuade them about the 'true' size of the problem and provide convincing evidence about the social and economic cost of impairment issues. This type of information - together with objective assessments of what a variety of interventions would be likely to achieve - could provide a very strong case in many developing countries for implementing countermeasures.

Most is known about impairment due to alcohol, as a result of a clear link between levels of blood (or breath) alcohol and crash risk. Similar links are not yet established for drugs (legal or illegal) and fatigue.

Although sparse, the epidemiological evidence available from developing countries clearly demonstrates that drink driving is not only a problem of rich societies. Data are limited in many countries but the review confirms the presence of a real problem which merits action. The combination of information and publicity campaigns, legislation and enforcement, which has been effective in many motorised countries, is recommended as a framework for action in all countries.

Dealing with drugs and driving is much less well based on evidence and practice, and in the absence of good information is less susceptible to interventions: alcohol first, drugs later - may be the most pragmatic way forward.

Finally, evidence concerning the extent and impact of fatigue is lacking in developing countries. More basic data about its extent is needed, together with careful examination of driving hours legislation.

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