

Alcohol-impaired Driving

The Issue in Brief

Alcohol-impaired driving is a leading contributor to road traffic injuries and fatalities worldwide.

- There is little disagreement about the fact that alcohol-impaired driving is a serious social and public health problem.
- However, there is disagreement regarding the impact of individual measures directed at this problem.
- The relative effectiveness of different interventions aimed at reducing alcohol-impaired driving is also debated.

The evidence:

Road traffic fatalities account for 2.3% of all deaths globally; the bulk of this burden is shouldered by low- and middle-income countries.

Several factors contribute to the risk of being involved in a road traffic crash, including the driver's blood alcohol concentration (BAC) level, age, and gender.

Addressing alcohol-impaired driving requires an integrated approach that relies on a range of components:

- legislative measures, including the implementation of maximum BAC limits for drivers, punitive measures, zero tolerance laws, graduated driver licenses, and special measures for repeat offenders;
- proper, consistent, and swift enforcement, coupled with appropriate penalties;
- risk reduction approaches aimed at intoxicated drivers;
- awareness raising and behavior change strategies.

ICAP Issues Briefings address specific topics relevant to alcohol policy, providing a succinct overview of key evidence. Where appropriate, they include an analysis of intended and unintended outcomes, country-level case studies, and main positions around a particular debate.

Limitations:

Although individual approaches may be useful, they are most effective when implemented as part of a comprehensive, multi-faceted strategy.

Basic regulatory and enforcement elements are at times lacking, particularly in low- and middle-income countries.

Even where legislation and other measures exist, implementation may be difficult.

Relevant ICAP publications:

International Center for Alcohol Policies (ICAP). (2005–ongoing). Module 15: Drinking and driving. In *ICAP Blue Book: Practical guides for alcohol policy and prevention approaches*. Available: <http://www.icap.org/PolicyTools/ICAPBlueBook/BlueBookModules/15DrinkingandDriving/>

International Center for Alcohol Policies (ICAP). (2005–ongoing). Module 16: Blood alcohol concentration limits. In *ICAP Blue Book: Practical guides for alcohol policy and prevention approaches*. Available: <http://www.icap.org/PolicyTools/ICAPBlueBook/BlueBookModules/16BloodAlcoholConcentrationLimits/>

International Center for Alcohol Policies (ICAP). (2008). *Quick reference guide to the ICAP Blue Book: Implementing alcohol policy and targeted interventions*. ICAP Policy Guides Series. Available: <http://www.icap.org/PolicyTools/ICAPPolicyGuides/>

International Center for Alcohol Policies (ICAP). (2008–ongoing). *ICAP periodic review on drinking and culture*. Available: <http://www.icap.org/Publications/ICAPPeriodicReview/>

Stimson, G. V., Grant, M., Choquet, M., & Garrison, P. (Eds.). (ICAP). (2007). *Drinking in context: Patterns, interventions, and partnerships*. New York: Routledge. Available: <http://www.icap.org/Publications/DrinkinginContext/>

What Is the Issue?

Alcohol-impaired driving is a leading contributor to road traffic injuries and fatalities worldwide.

Governments, communities, law enforcement, and those involved in the production, retail, and service of beverage alcohol share a common commitment to reducing the incidence of and harm from alcohol-impaired driving (1).

The evidence supports the need for an integrative approach to developing sustainable interventions, combining a range of measures that can be implemented together (e.g., 3, 98).

What Is the Debate?

There is little disagreement about the fact that alcohol-impaired driving is a serious social and public health problem.

However, there is disagreement regarding the impact of individual measures directed at this problem.

One point of contention is where to set the optimal maximum blood alcohol concentration (BAC) threshold for drivers (e.g., see Table 2).

- Some countries (e.g., Mexico, New Zealand, the United Kingdom, and the United States) maintain a BAC limit of 0.8 mg/ml.
- Others set the threshold at 0.5 mg/ml (e.g., Argentina, Australia, China, and Germany), 0.3 mg/ml (e.g., India, Japan, and Uruguay), or 0.2 mg/ml (e.g., Norway, Mongolia, Poland, and Sweden).
- Still others have a “zero tolerance” policy, or a BAC limit of 0 mg/ml (e.g., Armenia, Brazil, and Romania).

(See ICAP Policy Table: Blood Alcohol Concentration Limits Worldwide, available at <http://www.icap.org/Table/BACLimitsWorldwide>)

For example, in the European Union (EU), there has been an ongoing discussion about harmonizing BAC limits among Member States to 0.5 mg/ml:

“A myriad of studies have indicated that lowering BAC limits is in the best interest of the public... Leading medical, crash prevention, public health, and traffic safety organizations in the world support BAC limits at 0.5 mg/ml or lower, including the World Medical Association, the American and British Medical Associations, the European Commission, the European Transport Safety Council, the World Health Organization, and the American College of Emergency Physicians.” (2, p. 233; on arguments for lowering the U.S. limit of 0.8 to 0.5 mg/ml, see 82)

Meanwhile, a discussion in Canada about lowering the BAC limit from 0.8 to 0.5 mg/ml concluded with the decision to remain with the status quo:

“Our critical review of the evaluation literature failed to provide strong, consistent and unqualified support for lowering BAC limits. In addition, our review of the literature failed to find any study in a jurisdiction that has a system of BAC limits compared to that in Canada.” (97, p. 113)

Wherever BAC thresholds are set at country level, they are widely regarded as a rational first step in legislation against alcohol-impaired driving, but any law must be enforceable to be effective:

“An enforceable law is a pre-condition for effective enforcement by the police... In general, the existence of a specific law defining BAC levels provides the base conditions usually required by police in order to generate the high levels of enforcement required to influence drivers.” (3, p. 44)

There is also debate regarding the relative effectiveness of different interventions aimed at reducing alcohol-impaired driving.

- In particular, the debate centers on measures that seek to raise awareness and contribute to overall culture and attitudinal changes, such as awareness programs and deterrence strategies.
- While proponents point to the impact of such programs on changing long-term attitudes around drink driving and to general culture shifts (see discussion below), critics argue that educational efforts are largely ineffective (e.g., 4).

What Is the Evidence?

Prevalence

Road traffic fatalities account for 2.3% of all deaths globally (5).

- According to estimates by the World Health Organization (WHO) for 2002 and 2004, over 1.2 million fatalities and between 20 and 50 million non-fatal injuries occur on the world’s roads each year (5, 6).
- Road traffic accidents also make up 2.7% of the total global burden of disease (measured in DALYs)¹ from all causes of death and disability (5).

1 DALYs, or Disability-Adjusted Life Years, measure the burden from death and disability due to particular diseases and injuries in terms of life years lost, based on the projected life expectancy of an individual at the time of death or hospitalization in the absence of the disease.

The bulk of this burden is shouldered by low- and middle-income countries:

- According to WHO estimates, “Around 85% of all global road deaths, 90% of the disability-adjusted life years lost due to crashes, and 96% of all children killed worldwide as a result of road traffic injuries occur in low-income and middle-income countries” (6, p. 4).
- Reflecting this disparity, the road traffic injury burden varies by WHO region (see Table 1).

Table 1. Road Traffic Injury Burden (in DALYs lost) by WHO Region, 2002

Region	% burden
Africa Region	18.4
Americas Region	11.1
South-East Asia Region	26.1
European Region	9.4
Eastern Mediterranean Region	11.9
Western Pacific Region	23.2

Source: Adapted from WHO’s *World Report on Road Traffic Injury Prevention* (6).

Alcohol consumption is involved in a significant proportion of road traffic crashes worldwide; the likelihood of driver alcohol involvement rises with crash severity. For example:

- According to the U.S. National Highway Traffic Safety Administration, around 32% of all fatal crashes in 2008 involved a driver with a BAC of 0.8 mg/ml (the BAC limit in the U.S.) or higher (99).
- In a review of available data from low-income countries in Africa, South-East Asia, Latin America, and the Caribbean, 8 to 29% of drivers in nonfatal crashes had alcohol in their systems; alcohol was present in 33 to 69% of fatally-injured drivers (10).
- As reported by the South African National Injury Mortality Surveillance System, almost 52% of all transport-related deaths in 2001 involved elevated BAC; among these crash victims, 91% recoded BAC levels of 0.5 mg/ml (the BAC limit in South Africa) or higher (100).

It is important to note that, although the main focus of this *Issues Briefing* is on road traffic crashes involving motor vehicles, pedestrians and two-wheeler users are at greater risk for harm and bear more of the burden than motor vehicle occupants (7). This is particularly true in low- and middle-income countries.

Contributing factors

Several factors contribute to the risk of being involved in a road traffic crash.

Blood alcohol concentration (BAC) is, by definition, the main factor involved in alcohol-impaired driving.

Driving ability (along with other motor skills, reaction time, and cognitive performance) is impaired by alcohol in the bloodstream.

- Effects can begin at BAC levels as low as 0.1 mg/ml and increase as BAC rises (8-10).
- Drivers with BAC levels between 0.5 and 0.9 mg/ml are 11 times more likely to be involved in a fatal crash than those who have not consumed alcohol (e.g., 11-13; on the effects of BAC on motorcycle crash characteristics, see 14).
- The risk of crash involvement and the likely severity of resultant injuries increase exponentially with BAC (11-13, 24).
- The likelihood of traffic crashes rises further when intoxicated drivers are also performing secondary tasks while driving (15, 16).

Age is another important contributor: Young drivers are more likely to be involved in road traffic crashes than older drivers (7).

- Road traffic injuries are the leading cause of death globally among 15- to 19-year-olds, and the second major cause of death among young people aged 20 to 24 years (7).
- Relative crash and injury risks are higher among younger drivers than among older drivers at the same BAC level (e.g., 11-12).
- Reasons for the increased risk vary but include young people’s inexperience with both drinking and driving, a tendency to overestimate driving skills and control, and a general inclination toward risk-taking (e.g., 12, 17-20).

Gender also plays an important role, with men being more likely than women to be involved in alcohol-related crashes (7, 11, 21-23).

- The gender disparity is due, in part, to a higher number of male drivers in most countries. However, the number of female drivers involved in alcohol-related crashes is growing (e.g., 25-26).

Policy, prevention, and interventions:

Sustainable measures against alcohol-impaired driving include a mix of approaches: legislation, enforcement, risk reduction, and education.

Legislation

BAC limits

A key component of road safety policies is the establishment of a maximum legal BAC limit for drivers of motor vehicles.

- Such limits provide an objective standard against which the degree of impairment can be assessed.
- BAC levels are measured in two ways:
 - on-site, through breath testing;
 - by laboratory testing of blood samples (more accurate than breath testing but also more labor- and cost-intensive).

As illustrated in Table 2, where BAC limits are set varies across countries (27-28), often reflecting culture and other local considerations.

Table 2. Maximum Legal BAC Limits for Automobile Drivers, by Country

Country	BAC (mg/ml)	Country	BAC (mg/ml)
Argentina	0.5	Hungary	0.0
Botswana	0.8	India	0.3
Canada	0.8	Japan	0.3
Czech Republic	0.0	New Zealand	0.8
Estonia	0.2	South Africa	0.5
Germany	0.5	Thailand	0.5
Honduras	0.7	USA	0.8

Source: ICAP Policy Table: Blood Alcohol Concentration Limits Worldwide (see <http://www.icap.org/Table/BACLimitsWorldwide>).

In addition to general BAC limits for drivers of motor vehicles, many countries have specific standards for commercial and professional drivers and may also set different limits for other forms of transportation (e.g., airplanes, shipping) (28).

Zero tolerance laws

Zero tolerance laws make it illegal for drivers to have any measurable alcohol in their blood. Breach of this may result in immediate license suspension and fines.

- In 2008, Brazil passed a zero tolerance law for all drivers (29).
- Several countries in eastern Europe, including the Czech Republic, Hungary, Romania, and Slovakia, have maintained zero tolerance drink driving policies (e.g., 28, 30).

In addition to setting BAC limits for the general population, some countries mandate zero tolerance laws for novice or young drivers and/or drivers of commercial vehicles and public transport operators.

For example:

- Croatia mandates a 0.0 mg/ml for professional drivers and drivers under 24 years of age (28).
- “Zero tolerance laws” in the United States refer to the special BAC limit of up to 0.2 mg/ml for drivers aged under 21 years (the drinking age in the country; some U.S. states define zero tolerance to include BAC of 0.1-0.2 mg/ml to allow for variation in alcohol testing instruments).

There is evidence that zero tolerance policies for young and inexperienced drivers have a positive impact on reducing alcohol-related fatal crashes (31).

- A comprehensive evaluation of multiple studies in Australia and the United States on the effectiveness of lower than general BAC limits for young and novice drivers found 9 to 24% reductions in crashes (32).
- Zero tolerance laws have been shown to increase the likelihood that an individual below the legal drinking age but who may legally drive will be sanctioned for drinking and driving (33).
- Additional research suggests that zero tolerance policies may reduce the instances of heavy episodic drinking and the overall number of drinks consumed, directly affecting alcohol-impaired driving (23, 35).

Graduated driver license programs

When it comes to novice drivers, graduated driver license programs are often implemented in conjunction with zero tolerance laws.

These require successful attainment of intermediate licenses before a full license can be obtained, including a required learner’s permit, an intermediate (provisional) license, and, finally, a full license. For example:

- All Australian states have graduated driver license programs. An individual receives a license permit at age 16; the permit must be held for at least 12 months before its carrier can progress to the probationary stage (applicants must be 18 years old to receive probationary license). The probationary phase lasts

three years, and licensees are limited to a maximum BAC of 0.2 mg/ml while driving (34).

- Young people in Norway also receive a probationary license. It is valid for two years, automatically converting into a full license thereafter (34).

The rationale for the graduated approach is to allow novice drivers to obtain experience under low-risk conditions (35, 36).

- A review of 13 studies evaluating 12 graduated licensing programs implemented in Australia, Canada, New Zealand, and the United States concluded that such programs are effective in reducing crash rates among young drivers, although the magnitude of the effect is unclear (37).

Recidivist alcohol-impaired drivers

Recidivism among drunk-driving offenders is a serious concern; repeat offenders are more likely to be involved in alcohol-related crashes than first-time offenders (38-41).

Legal sanctions on repeat offenders have not been shown to produce long-term behavioral change (e.g., 42). Therefore, a number of additional approaches may be applied (e.g., 47).

- Remedial driving programs may be mandatory for repeat alcohol-impaired driving.
- Hardcore drunk drivers (individuals who repeatedly drive with BAC levels of 1.5 mg/ml or more) may require more intense rehabilitation and judicial monitoring than other drivers, partly because many are also problem drinkers (39, 43-47).
- Where appropriate, treatment for alcohol problems may be required.
- In some jurisdictions, vehicles of recidivist drunk drivers may be outfitted with interlock devices by court order (see below).

Evidence on the impact of these measures on future behavior is mixed.

Enforcement

Proper, consistent, and swift enforcement, coupled with appropriate penalties, is essential for the success of any legislation around drinking and driving (3, 48).

Research has shown that, in the absence of effective enforcement, legal sanctions have been unsuccessful in deterring alcohol-impaired driving or reducing the rate of repeat offending (49).

Enforcement can take on a number of forms.

Alcohol screening of drivers is the key component of enforcement and a useful deterrent, particularly if it is high-profile and visible (32, 48).

- Sobriety checkpoints have been shown to be a general deterrent to drink driving (32, 50-52).
 - For example, in Thailand in 1999, highly visible sobriety checkpoints were set up as part of an initiative to raise awareness and support for the new 0.5 mg/ml BAC limit. There was no measured change in the proportion of hospitalized crash victims with illegal BAC limits after sobriety checkpoints were implemented (53).
- Random breath testing, often implemented in conjunction with publicity awareness campaigns (3), shows a measured impact on drink driving and alcohol-related crashes across different countries (32, 51, 54).

Legal sanctions against those breaking the law are associated with reductions in drink driving offences for the general population across cultures (42).

Sanctions include license suspension, monetary fines, and imprisonment.

- License suspension has been useful in reducing alcohol-impaired driving, but its impact may be limited by repeat offenders who continue to drive despite suspensions (55-57).
- Monetary fines have been shown to be a deterrent for alcohol-impaired driving; however, their effectiveness depends on the severity of the fine (58-59).

A special measure applied to repeat offenders is the interlock device, which measures the driver's breath alcohol concentration before allowing a vehicle to start (60).

- While success has been noted (32, 61-62), this type of sanction is strengthened by continued enforcement through periodic random breath testing (63, 64).
- High cost of installation is a deterrent to the use of interlocks (44, 60), although some automobile manufacturers are developing this technology in newer vehicle models (65).
- Research evidence on whether interlocks are as effective for first-time offenders as they are for recidivist drunk drivers is mixed (60, 66).

Risk reduction

While most of the interventions described above attempt to reduce the amount of alcohol being consumed to what is deemed appropriate for driving, other interventions are intended to reduce the risk associated with drinking. These include designated driver and alternate transportation schemes.

Designated driver programs have been implemented in many countries (70).

- Some are government-sponsored programs, others are implemented by those who produce or sell beverage alcohol, working in cooperation with police and other stakeholders.
- Many such programs provide incentives for individuals willing to serve as designated drivers.

The provision of alternative transportation to those whose drinking makes it unsafe for them to drive is another example of risk reduction. These efforts include safe-ride services and taxi programs (68, 70).

Safe-ride services have contributed to a reduction in alcohol-impaired driving. For example:

- An evaluation of the *Tipsy Taxi* service in the U.S. state of Colorado revealed a 15% decline in traffic crashes resulting in one or more injuries (67).
- Safe-ride programs that also ensure that a drinker's vehicle is returned home, such as *Operation Ned Nose* (*L'Opération Nez rouge*) in Canada, are most readily used by the target population (69).

There is evidence that such efforts toward risk reduction are increasingly becoming part of normative behavior and culture and are making alcohol-impaired driving socially unacceptable. For example:

- The *EuroBOB* designated driver program was launched in Belgium in 1995 to educate the public about the dangers of alcohol-impaired driving.
 - Currently, 97% of the Belgian population is aware of the *BOB* campaign; 46% claims to have been driven home safely by a designated driver; and 80% views alcohol consumption as unacceptable before driving (48, 70). The program was successfully replicated in a number of EU countries.
- In a survey of young people in Canada, 17% of respondents had used *Operation Red Nose* when they were the driver, and 36% had suggested that their driver call the service when they were passengers (71).

- In a U.S. survey of adults aged 21 and over:
 - 61% of respondents reported ever being a designated driver;
 - 87% thought that promoting the concept of designated drivers was "an excellent/good way" to reduce alcohol-impaired driving (72).

However, there is also evidence that designated driver and alternate transportation schemes may not always be successful in reducing the likelihood that someone will drink and drive (68, 73-74).

- Some studies have suggested that the focus on designated driver programs may divert public attention from addressing the environmental and social factors that contribute to both harmful drinking and impaired driving (75-76, 78).

Concerns have also been raised about potential unintended outcomes of designated driver and safe-ride schemes.

- It has been suggested that risk reduction programs may encourage those who will be passengers to drink more heavily than they would otherwise because a designated driver or a safe-ride option is available (74, 77-78).
- Some studies have pointed to designated drivers who did not abstain from drinking despite the responsibility they had assumed (78-79).
- The claim has also been made that servers may be more likely to over-serve patrons who are accompanied by a designated driver than those who are not (80).

Awareness-raising and education

Finally, a number of strategies are aimed at raising awareness and changing behavior and cultural views on alcohol-impaired driving. Such programs target a range of population groups.

- Some of these programs attempt to increase drivers' perceptions of the risks of injury and/or of being detected when driving while intoxicated (70, 81).
- School-based education about drinking and driving can have a positive impact on alcohol-related harm by increasing young people's knowledge about the dangers of impaired driving (83-85).
- Server training programs seek to educate staff in alcohol-serving establishments (including both servers and security personnel) about the importance

of server judgment in reducing intoxication and therefore drink driving incidents (73, 86-90). These programs often go hand-in-hand with sponsorship of designated driver and alternate transportation schemes.

- Well-executed mass media campaigns can also help raise public awareness and reduce alcohol-related crashes, especially when paired with other prevention efforts, such as highly visible enforcement (91-94).

Awareness-raising and education programs are best integrated into a more comprehensive approach that also includes other elements and strategies (e.g., 52, 91, 98).

What Are the Limitations?

Despite evidence of their positive impact, measures aimed at alcohol-impaired driving have a number of limitations.

While individual approaches may be useful, they are most effective when implemented as part of a comprehensive, multi-faceted strategy (e.g., 3, 32, 52, 91, 98).

Passing road traffic safety legislation can be a formidable challenge.

- Some low- and middle-income countries lack official limits for allowable BAC levels (95).
- The impact of risk reduction and awareness-building measures is significantly weakened without a solid legislative framework.

Even where legislation and other measures already exist, implementation may be difficult. For example:

- Inadequate enforcement poses a considerable challenge to combating alcohol-impaired driving (3, 95).
 - In many low- and middle-income countries, lack of human and technological resources weakens the ability of the police to routinely monitor driver alcohol involvement (10, 95).
 - Judicial and police corruption is another obstacle to proper enforcement in many countries (e.g., 96).
- Weak public understanding of the risks associated with alcohol-impaired driving and existing laws and countermeasures, coupled with cultural views on whether driving after drinking is acceptable, is also a hurdle to effective interventions (e.g., 52).

Whatever other approaches are implemented to address alcohol-impaired driving, enforcement that can help secure credibility and compliance among drivers is essential.

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International Center for Alcohol Policies
Analysis. Balance. Partnership.

1519 New Hampshire Avenue, NW
Washington, DC 20036 USA

Tel: +1.202.986.1159

Fax: +1.202.986.2080

www.icap.org

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