

## The Role Of Law In Preventing Accidents

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### Abstract

Major contributors to road crashes, serious injuries and death include driving at excess or inappropriate speeds, influence of alcohol while driving, sleepy or fatigued driving and driving without protective gear. Many countries have enacted strict laws to modify risk taking behavior of possible accident victims. However, the effect of these laws is not uniform in all the countries. The factors that determine successful implementation of laws are discussed. Isolated use of laws or public education and information campaigns do not deliver a tangible and sustained reduction in road traffic deaths and serious injuries. Automated enforcement – such as speed cameras is more effective than policing. Public education and information campaigns have proven to be highly effective when they are used in conjunction with laws and law enforcement. Key to successful reduction in road traffic deaths and serious injuries is enforced compliance. In order to successfully modify risk taking behavior it is critical to create a meaning full deterrent by law and enforce it consistently so that perceived risk of being apprehended and swiftly punished is high.

Major contributors to road crashes, serious injuries and death include driving at excess or inappropriate speeds, influence of alcohol while driving, sleepy or fatigued driving and driving without protective gear (such as seatbelts, child restraints and helmets) for all vehicle occupants. Many countries have enacted strict laws to modify risk taking behavior of possible accident victims. However, the effect of these laws is not uniform in all the countries. The objective of this article is reviewing the factors that determine the success of enacting laws.

Higher speed of vehicle is associated with severe impact to the crash victim. Probability of a road traffic crash resulting in injury is proportional to the square of the speed; for serious injury, this probability is proportional to the cube of the speed; and for fatal injury, this probability is proportional to the fourth power of the speed (1). Speed limits that are perceived as realistic by

road users and self-enforcing speed limits have the greatest chance for achieving compliance. Self-enforcing speed limits may be ensured by road network designs that discourage speeding. Similarly design of roads, can make drivers uncomfortable with exceeding speed limits. Speed cameras or radars may be used to apprehend drivers exceeding speed limits. A multi-country study has reported (2) that use of instruments that automatically catch drivers reduce road traffic deaths and serious injuries by 14%, whereas enforcement by police officers achieves a 6% reduction. Publicity about speed cameras or radars has been reported to be associated with increased compliance of laws and consequential decreased incidence of crash and injury (3, 4–6). Another study conducted in Tasmania, Australia, reported that the long-term placement of stationary police vehicles on high risk stretches of a rural road achieved an average 3.6 km/h

reduction in speed and a 58% reduction in crashes resulting in death or serious injury (6). Devices that limit the speed of the vehicle are also effective. Use of speed-limiting governors in heavy goods vehicles has been reported to reduce the incidence of road

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traffic injury by an estimated 2% (7). The use of speed governors in buses, minibuses and trucks traveling on rural roads could contribute even more to incidence of road traffic injury (8).

Probability of a crash, serious injury or death increases due to consumption of alcohol. Experimental laboratory studies have reported on the physical deficits experienced with a 0.08 percent blood alcohol concentration (BAC). These deficits include reduced peripheral vision, poorer recovery from glare, poor performance in complex visual tracking and reduced divided attention performance (9). Since acceptable BAC limits vary in countries, it is difficult to make comparisons. However, a number of studies have reported the extent of driving while under the influence of alcohol. A study conducted in Ireland reported 14.2% of the drivers having BAC more than the legal limit (10). A study conducted in Ghana (11) reported the BAC of more than 7% of drivers to exceed 0.08 g/dl. A study conducted in South Africa reported alcohol consumption to be a factor in 47% of driver deaths and 27% of crashes in which drivers survived (12); another study reported presence of excess alcohol in 52% of the people with trauma involved in road crashes (13). Consumption of excess of alcohol by pedestrians puts them at greater risk of road traffic injury. A study reported that pedestrians consuming alcohol are more likely to cross the street in an unsafe manner and sustain more serious injuries (14). Alcohol consumption was reported to be involved in more than 61% of pedestrian fatalities in South Africa (11). A study in the United Kingdom (15) concluded that 48% of pedestrians killed in road traffic collisions had been drinking.

Crash risk increased with the amount of alcohol consumed by drivers. The Grand Rapids study conducted in the year 1964 (16) demonstrated how the crash risk increased with the amount of alcohol consumed by drivers and provided the basis for the 0.08 g/dl BAC still accepted as the limit in many countries.. Perceived risk of being caught is reported to be more effective than the severity of the penalty in discouraging driving while under the influence of alcohol (17). Swift and certain punishment such as disqualification from driving has been found to be a more effective deterrent to driving after drinking than harsh penalties like imprisonment (17,18,).

Driver fatigue is also implicated as a cause of road traffic crash. Risk factors for driver fatigue are young age, especially men aged 16-29 years, night shift at work, long

irregular working hours, untreated sleep apnea, and narcolepsy (19). Other risk factors for driver fatigue include driving long distances, under pressure, on monotonous roads, on unfamiliar roads, after consuming alcohol, in extreme weather during hours when normally asleep, after poor quality sleep and during periods of the day (such as in the afternoon) when the driver normally feels drowsy (20). Several high-income countries have enacted laws that restrict the number of hours commercial drivers can drive at one go. Laws regarding driver fatigue should be guided by the following principles: the risk of a crash doubles after 11 hours of driving; the risk of fatigue-related crash is 10 times higher at night than during the day; and adequate time and facilities need to be provided to ensure breaks for rest, meals and naps (21).

Compulsory use of seat-belt has played a significant role in road crash injury prevention and has saved many lives. Seat-belts were introduced as optional features in new cars in the 1960s. They were found to be very successful at reducing the incidence of fatal and serious injury. This prompted the state of Victoria, Australia to enact laws in the year 1971 that required their presence and use in all cars. Well-publicized, highly visible and intensive enforcement programmes over particular periods, several times per year work best to increase compliance with seat-belt laws (22). Compliance is also reported to be increased by lottery like incentives, in which people found wearing seat-belts are eligible for prizes (23).

Motorcycle and moped riders without helmets, when involved in a crash are three times more likely to sustain head injuries than those with helmets (24). Use of helmets reported to reduce fatal and serious head injuries by 20–45% (25). In contrast to countries that require use of helmet by law, less than 10% of motorcyclists wear helmets in most countries that do not require the use of helmets by law (26). Wearing helmets among child cyclists involved in crashes reduces the incidence of head injury by 63% and of loss of consciousness by 86% (27, 28). Australia, New Zealand, Sweden, the United States and several other countries have laws requiring that cyclists wear helmets. However, the worldwide proportion of bicycle helmet use is low.

Use of hand held mobile phones while driving is an emerging road safety problem and increases the chance of a road traffic crash. By the year 2002, thirty five countries from diverse regions of world banned the use of hand-held

mobile phones by the operator of the vehicle while driving (29). A study conducted by the University of Illinois using the theory of planned behavior identified two key determinants of high-level mobile phone use. Those two factors, subjective norm (i.e., perceived social norms) and self-identity (i.e., the degree to which individuals see mobile phones as a part of their self), might be promising targets for the development of persuasive strategies and other interventions aimed at reducing inappropriate and problematic use of mobile phones, such as using mobile phones while driving (30).

Isolated use of laws or public education and information

campaigns do not deliver a tangible and sustained reduction in road traffic deaths and serious injuries. However, public education and information campaigns have proven to be highly effective when they are used in conjunction with laws and law enforcement. Key to successful reduction in road traffic deaths and serious injuries is enforced compliance. In order to successfully modify risk taking behavior it is critical to create a meaningful deterrent by law and enforce it consistently so that perceived risk of being apprehended and swiftly punished is high. Automated enforcement – such as speed cameras is more effective than policing.

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