Learning Lessons

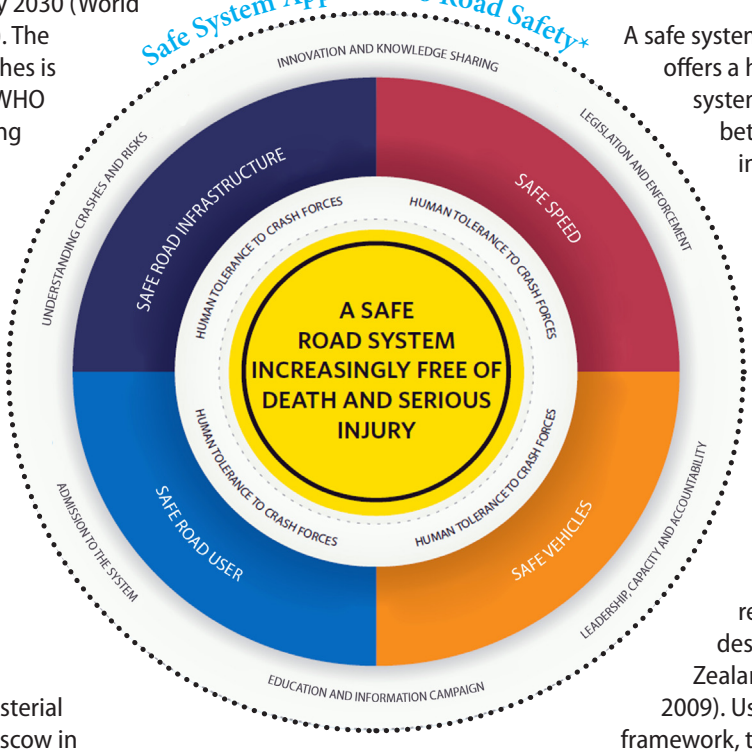
April 2013

Independent Evaluation ADB

Improving Road Safety in Asia and the Pacific

Deaths and injuries caused by road crashes are critical development and public health issues. Globally, road crashes cause around 1.2 million deaths and 20 million–50 million injuries a year, with Asia accounting for 60% of the toll (Asian Development Bank [ADB] 2005). Road traffic injuries are now the 9th leading cause of death worldwide. Without new and improved interventions, road traffic injuries are expected to become the 5th leading cause of death globally by 2030 (World Health Organization [WHO] 2013). The global economic cost of road crashes is estimated at $518 billion a year (WHO 2004). The cost to ADB's developing member countries represented about 2% of their total gross domestic product in 2007, or about $96 billion (ADB 2012).

The number of road crashes continues to rise across the region, with rapid growth in the number of vehicles putting severe pressure on road networks that were created without sufficient attention to road safety features. Moreover, concerned agencies that lack road safety knowledge are contributing to the strain on maintaining road networks. At the First Global Ministerial Conference on Road Safety in Moscow in November 2009, ADB and other multilateral development banks pledged to increase support for road safety through measures that included (i) building institutional capacity for road safety; (ii) mobilizing resources for road safety and cooperating on road safety measures with nongovernmental organizations, local communities, and the private sector; (iii) promoting safe approaches to the design, construction, operation, and maintenance of road infrastructure; and (iv) creating public awareness of road safety.



A safe system approach to road safety offers a holistic view of road transport systems, and considers interactions between several elements. These include road infrastructure, road users, vehicles, and speed. This approach requires that road infrastructure is improved and properly maintained to reduce the risk of crashes and the severity of impacts when crashes occur. It also calls for vehicle safety technologies to reduce the number of crashes and lessen their impact on road users. In essence, a safe road system calls for shared responsibility between system designers and road users (New Zealand Government 2012; Austroads 2009). Using this system as a guiding framework, this paper offers lessons for improving road safety and shares good road safety practices by drawing on various publications.

Lesson Highlights

Road infrastructure

Road safety audits offer opportunities to integrate safety features into road projects. Audits involve systematic safety checks of road projects during planning, design, and construction. While they do not guarantee total road safety, they do enable potential hazards to be identified and mitigated (ADB 2003). In the People's Republic of China, road safety audits during the design and construction of the Jiangxi expressway led to the integration of road safety features—traffic control devices such as road signs made from reflective material, road markings, road shoulders and median crash barriers, and electronic speed management signs (ADB 2004a). In Bangladesh, a countrywide road safety audit by the Jamuna Bridge Access Roads Project helped identify and re-engineer danger spots (ADB 2004b).

Coordination is needed when different teams are involved in road design. Inconsistencies can occur when several elements of the road design are completed by different teams. For example, the work of different design teams may result in road signs being placed in the same location as noise barriers—a situation that could create a break in the noise barrier; noise barriers may not be placed in the appropriate location; and hazards such as bridge

* Source: Adapted from the New Zealand Government. 2012. Embedding the Safe System Approach to Road Safety. Available online at http://www.nzta.govt.nz/resources/safe-system/docs/safe-system.pdf

piers may not be adequately protected. Different design teams therefore need to coordinate with each other to resolve such inconsistencies. Technical specifications for the procurement of materials and services for road safety. Moreover, technical specifications must be planned carefully during the design phase and revisited during the implementation phase. It is essential that experienced engineers review bidding documents thoroughly prior to bidding (World Bank 2008).

Sustainability of road infrastructure is pivotal to road safety. Well-maintained roads contribute to road safety. In developing countries, financial resources for road safety are often scarce. Even so, it is essential to provide funds for road maintenance through, for example, community contributions in cash or in kind, dedicated budgetary allocations, and road user charges.

There are several good practices to secure funds for road maintenance. In the Philippines, an agreement between the Department of Agrarian Reform and local governments enabled budgetary allocations for the repair and maintenance of rural roads after construction (Independent Evaluation Department [IED] 2009a). In the Lao People's Democratic Republic, a government decree provided a mechanism for pooling user charges to a dedicated road maintenance fund, with priority given to the maintenance of national roads and highways. The fund's revenues included user charges, such as fuel levies, bridge tolls, and heavy-vehicle surcharges, as well as development agency funding (IED 2010a). In Cambodia, the government generated revenues for road maintenance from fuel levies, and formed an inter-agency committee to mobilize significant funding for maintaining national roads (IED 2009b). In Fiji, a dedicated budget for road safety comes from vehicle insurance levies and sponsorships. Part of Fiji's road maintenance budget from the general government budget is also spent on infrastructure improvement and pedestrian facilities (Aeron-Thomas et al. 2002).

Road users

Road safety campaigns and stakeholder consultations need to be promoted among road users. Such campaigns should focus not only on physical interventions, but also on educating drivers on road safety. In the People's Republic of China, many traffic crashes involve drivers unfamiliar with road conditions and traffic signs. Unauthorized road crossing by pedestrians is a problem; the result of poor planning and inadequate stakeholder consultation. As a rule, road safety improvements need to be undertaken in consultation with local communities. In the People's Republic of China, it is not unusual to find pedestrians crossing roads directly rather than using available underpasses and to see the removal of sections of fencing to gain access to motorways (ADB 2004a and ADB 2004c). In the Kyrgyz Republic, about 49% of road crashes are caused by improper driving and 14% by pedestrians (IED 2010b). Road safety education is an indispensable part of any country's road safety strategy, and is most effective when combined with engineering interventions, appropriate legislation, and effective enforcement (ADB 2005).

Road user behavior and needs raise differing safety concerns. Due to differences in road user behavior and needs, a road with similar engineering standards can have different safety concerns during its operational phase. In Mongolia, road safety was compromised along the Ulaanbaatar–Altanbulag road by poor driving practices, such as not using vehicle lights at night, lack of awareness of safe distance between vehicles, and disregarding safe speeds (IED 2007b). In Viet Nam, risk factors include the use of substandard helmets by motorcycle riders, alcohol abuse, and ignoring traffic rules (WHO 2013, World Bank 2009, IED 2007a). Substandard helmets commonly worn in Viet Nam have fragile plastic shells with no polystyrene layer to absorb the impact of a crash. To stop the proliferation of substandard helmets, the country is currently reviewing related legislation and enforcement mechanisms (WHO 2013).

In Delhi, the elderly, children, and physically-challenged are at higher risk of road injuries. In response to their needs, segregated pedestrian, bicycle, and bus lanes were created on a major arterial road. Street vendors have also been provided with space that does not obstruct the flow of bicycles and pedestrians (WHO 2009).

The licensing process helps reduce risks from road traffic injuries and deaths. Beginner drivers of all ages lack both the driving skills and experience to recognize potential dangers (WHO 2013). The younger a person starts unrestricted solo driving, the higher the likelihood of a crash (Organization for Economic Co-operation and Development [OECD] 2006). Setting an appropriate minimum age for unrestricted solo driving is imperative.

A driver's first year at the wheel is considered to be the most vulnerable time. Governments should apply restrictions during this period to protect road users, and especially beginner drivers themselves. Significant risk reductions can be achieved by restricted driving conditions for beginners, such as limits on passenger numbers and night driving, until they gain more experience. Graduated licensing, along with extended training during learner periods to gain experience in various road and weather conditions, has been used to reduce crashes among beginner drivers. Probationary periods should be imposed on beginner drivers, whereby they could lose the right to drive or undergo obligatory retraining. Vehicle insurance premiums are another means of encouraging safe driving (OECD 2006). In Singapore, insurance providers offer premium discounts to safe drivers (ADB-ASEAN Regional Road Safety Program 2005).

Elderly drivers are also a risk group. In Japan, seminars and practical examinations are required for elderly drivers above the age of 70 before their licenses are renewed. These are aimed at raising awareness of the driving characteristics of the elderly, and the types of road crashes in which they are most often involved. Driving tests gauge their ability to drive safely (Cabinet Office 2010).

Solutions must be found to the overloading problem. Truck overloading poses a sizable safety hazard to road users in many countries in Asia. In the Lao People's Democratic Republic, logging trucks are the main source of overloading on some roads, a practice which damages road surfaces and shortens the life of the road. Furthermore, vehicle weighing stations on the country's national roads do not adequately enforce vehicle axle controls, while provincial and rural roads lack such stations (IED 2010a).

In Bangladesh, the Jamuna Bridge Access Roads Project drew attention to the need for permanent weighbridges at strategic locations (ADB 2004b).

In the People's Republic of China, many expressways are rutted due to truck overloading. In other cases, overloading has led to bridge failures. Although measures exist to enforce axle-load limits, such as fines and higher tolls based on weight, these have not solved the overloading problem. One option is to increase allowable axle loads; higher loads could make enforcement more acceptable to transporters (World Bank 2008).

Vehicles

Vehicle safety standards enhance road-user safety. Vehicle safety technologies improve road safety by preventing crashes through electronic stability control. In the event of a crash, they shield drivers and their passengers through air bags and restraints and protect other road users through a less rigid vehicle front structure (New Zealand Government 2009). Other vehicle safety features include seat belts, headrests, special seats for children, and protective gear such as helmets for motorcyclists and cyclists. In Malaysia and Thailand, the compulsory wearing of motorcycle helmets helped reduce traffic fatalities by 56% and 30%, respectively (World Bank 2009). To ensure that the overall standard of vehicles is gradually raised, roadworthiness inspections must be backed by adequate roadside checks (ADB 2005).

Independent assessments of the safety performance of different models of vehicles and disseminating this information to consumers have encouraged car manufacturers to produce safer vehicles. In many high-income countries, assessment programs have created a "market for safety." However, in lower-income countries, improving the safety level of vehicle fleets remains a major challenge. Governments should insist that vehicles sold in their country are subjected to independent consumer crash testing through appropriate assessment programs for new vehicles (WHO 2013). Other options to encourage governments to advance safety improvements include (i) community information programs promoting safer vehicles, (ii) encouraging fleet operators to maintain safe fleets through tax incentives, (iii) working with vehicle suppliers to improve safety standards, (iv) and eliminating inappropriate vehicle advertising (OECD and ITF 2008).

Speed Limits

Speed limits cut road death rates. Speed limits need to be set that are appropriate to the type and function of roads. To this end, speed limits should consider the types of vehicles using the road, roadside risks, traffic volumes, the presence of vulnerable road users, and frequency of use by pedestrians and cyclists. The probability of a pedestrian being killed increases eightfold as the speed of the impact vehicle increases from 30 kilometers per hour (km/h) to 50 km/h. Pedestrians and nonmotorized traffic need to be provided with safe segregated paths, walkways, and lanes. The higher the traffic speed, the more stringent the requirements should be on safe parallel infrastructure, such as sharing the road at 30 km/h, dedicated zones limiting speeds to 50 km/h and even 70 km/h, and using well-separated secured zones at speeds beyond that (OECD and International Transport Forum [ITF] 2008).

Other Aspects: Road Management, Law Enforcement, Capacity Development, and Knowledge Sharing

Achieving road safety requires leadership, orchestrated action, and accountability. Governments have the main responsibility for ensuring road safety. However, other players need to be involved as partners to achieve better road safety results. A lead agency in government with a reliable funding source is crucial to guide national road safety efforts (IED 2007a). Such agencies must have the power to make decisions, control resources, orchestrate action across sectors, and promote accountability.

Road safety requires an integrated strategy that engages key sectors such as transport, health, education, and law enforcement. Road safety needs to be approached in a systematic manner. A coordinated response must include an integrated strategy that considers the needs of road users and establishes links to other sectors (WHO 2004). Such a strategy should articulate not only proposed road safety interventions, but also the institutional arrangements for delivering desired outcomes. Moreover, for road safety to improve dramatically, sustained government commitment at the highest level is essential. Agencies involved in road safety also need to build their financial resources and capacity to pursue strategic interventions, ensure sound coordination, and achieve measurable results (World Bank 2009).

Governments must enact and enforce laws that protect road users. Enacting and enforcing road safety legislation affects exposure to risk, accident occurrence, injury severity, and post-accident injury outcomes. Legislation is needed on speed limits that are appropriate to the type and function of the road, setting blood alcohol concentration limits to reduce drunk driving, and occupant protection measures. Where vulnerable road users are present, provisions for pedestrian facilities and speed limits are imperative.

Inefficient law enforcement is the main cause of road safety problems in the Lao People's Democratic Republic and Viet Nam. The effectiveness of development support to improve road safety can be enhanced if it builds on a regime of law enforcement by local authorities (IED 2010a). In Cambodia, where motorcycle users account for 60% of road deaths, the government has pursued a program to increase helmet wearing through legislative action and enhanced enforcement. The program includes helmet checkpoints and revising legislation to increase penalties for non-compliance (WHO 2013). In South Korea, penalties are imposed on speeding, drunk driving, and traffic law violations to protect vulnerable road users (Yang and Kim 2003).

Strengthening capacity for road safety in developing countries requires phased investment. Developing countries experiencing difficulties in improving road safety performance should review their management capacity in this area, and prepare long-term strategies to overcome capacity constraints. National road safety strategies and plans of action should be done in phases to be effective. This requires progressive institutional strengthening and focused interventions to reach a stage where actions can be managed and sustained in the long term. Data collection systems should be strengthened to improve decision making, program management, and impact evaluation (World Bank 2009).

Well-designed demonstration projects are essential for helping develop capacity. They anchor capacity development efforts in investment programs that simultaneously build management capacity while achieving safety improvements in high-risk corridors and areas.

Knowledge sharing is shaped by the capacity of countries to implement safety innovations and the capacity of global and regional organizations to support and transfer knowledge. Creating and sharing knowledge on how to design, build, manage, and maintain safe road systems is crucial—and must be undertaken at the global, regional, and country levels. Knowledge transfer must be grounded in actual practice through a learning-by-doing approach. Strong and sustained international cooperation is required to mobilize resources for knowledge sharing (OECD and ITF 2008).

Conclusion

Road safety recognizes the interactions between road infrastructure, road users, vehicles, and speed. Engineering interventions help incorporate safety features in road design and mitigate risks with road markings, barriers, traffic control signs, and other preventive measures. While engineering measures are essential to make roads safer, equally important are capable institutions that mobilize resources and orchestrate action to improve road safety, enforce the law, uphold accountability, and promote knowledge sharing. Together, they enhance efforts to reduce deaths and injuries from road crashes.

References

Aeron-Thomas, A., A.J. Downing, J.P. Fletcher, T. Selby, and D.T. Silcock. 2002. *Review of Road Safety Management Practice.* London: Department for International Development.

Asian Development Bank. 2003. *Road Safety Audit for Road Projects: An Operational Tool Kit*. Manila.

_____. 2004a. *Project Completion Report on the Jiangxi Expressway Project*. Manila.

_____. 2004b. *Project Completion Report: Jamuna Bridge Access Roads Project*. Manila.

_____. 2004c. *Project Completion Report on the Chongqing Expressway Project.* Manila.

_____. 2005. *Arrive Alive. ASEAN Regional Road Safety Strategy and Action Plan (2005–2010)*. Manila.

_____. 2012. *Implementation of Sustainable Transport Initiative: Mainstreaming Road Safety in ADB Operations Action Plan.* Manila.

ADB-ASEAN Regional Road Safety Program. 2005. *National Road Safety Action Plan in Singapore.* Manila.

Austroads. 2009. *Guide to Road Safety Part 1*. Sydney.

Cabinet Office. 2010. *White Paper on Traffic Safety in Japan*. Tokyo.

Independent Evaluation Department. 2007a. *Sector Assistance Program Evaluation: Transport Sector in India.* Manila: ADB.

_____. 2007b. *Project Performance Evaluation Report on the Roads Development Project in Mongolia.* Manila: ADB.

_____. 2009a. *Special Evaluation Report: ADB's Contribution to Inclusive Development through Assistance for Rural Roads.* Manila: ADB.

_____. 2009b. *Sector Assistance Program Evaluation: Transport Sector in Cambodia*. Manila: ADB.

_____. 2010a. *Sector Assistance Program Evaluation: Transport Sector in the Lao People's Democratic Republic.* Manila: ADB.

_____. 2010b. *Kyrgyz Republic: Project Performance Evaluation Report on the Road Rehabilitation Project, Second Road Rehabilitation Project, and Third Road Rehabilitation Project.* Manila: ADB.

New Zealand Government. 2009. *Safer Journeys.* Wellington.

_____. 2012. *Embedding the Safe System Approach to Road Safety*. Wellington.

Organization for Economic Co-operation and Development. 2006. Young Drivers: the Road to Safety. *Policy Brief*. Paris.

Organization for Economic Co-operation and Development and International Transport Forum. 2008. *Towards Zero: Ambitious Road Safety Targets and the Safe System Approach*. Paris.

World Health Organization. 2004. *World Report on Road Injury Traffic Prevention.* Geneva.

_____. 2009. Global *Status Report on Road Safety—Time for Action.* Geneva.

_____. 2013. *Global Status Report on Road Safety: Supporting a Decade of Action*. Geneva.

World Bank. 2008. China: *Road Traffic Safety*. Washington, DC.

_____. 2009. Confronting *"Death on Wheels": Making Roads Safe in Europe and Central Asia*. Washington, DC.

Yang Bong-Min and Kim Jinhyun. 2003. Road Traffic Accidents and Policy Interventions in Korea. *Injury Control and Safety Promotion.* Vol. 10, Nos. 1–2.

Written by Brenda Katon and George Bestari under the guidance of Vinod Thomas, Director General, Independent Evaluation. This synthesis benefitted from the comments of Toshiyuki Yokota, Nana Soetantri and Elizabeth Fischelis.

About the Independent Evaluation at Asian Development Bank
The Independent Evaluation Department evaluates the policies, strategies, operations, and special concerns of the Asian Development Bank relating to organizational and operational effectiveness. It contributes to development effectiveness by providing feedback on performance and through evaluation lessons.

Learning Lessons is a synthesis of key evaluative lessons drawn from the experience of ADB operations and non-ADB sources. Lessons presented in this brief are not prescriptive, and users are advised to carefully review these lessons in the context of country, sector, and thematic conditions.

Contact Us
Independent Evaluation Department
Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
Tel +63 2 632 4100
Fax +63 2 636 2161
www.adb.org/evaluation
evaluation@adb.org