SAFETY STRATEGIES FOR RURAL ROADS
EXECUTIVE SUMMARY

The rural road safety problem is serious

Each year, more than 75 000 people are killed on rural roads in OECD Member countries. This represents more than 60% of all road fatalities in OECD countries. The socio-economic costs of the resulting fatalities are on the order of USD 135 billion per year. It is likely that personal injuries in rural road crashes are equally staggering in their number and costs. Unfortunately, data for documenting the rural road safety problem from this perspective is unreliable and inconsistent among the OECD countries. The risk of being killed on rural roads per kilometre driven is generally higher than on urban roads and four to six times higher than on motorways. Rural road accidents are generally more severe than accidents on urban roads due to differences in operating speeds, road geometry, functionality, enforcement levels and other factors. This accounts for the relative share of rural road fatalities in total road crash fatalities which has increased from less than 55% in 1980 to more than 60% in 1996. Because OECD countries have generally experienced a reduction in the total number of road crash fatalities in the same period, it is clear that motorway and urban road safety improvements have been more successful or have been given higher priority than those on rural roads.

The conclusions from these data are inescapable: the rural road safety problem is very serious and all road safety indicators (size, risk, development over time) clearly require priority attention by decision makers and the road safety community. From all appearances, the rural road safety problem has been neglected over the years in comparison to the higher level attention that has been given to the safety problems on motorways and urban/residential roads and streets. This is evidenced by the general lack of explicit safety policies or targets for rural roads in most OECD countries. Given this state of affairs, the rural road safety problem deserves a higher priority in future road safety policies, without, of course, hindering the efforts directed at reducing crashes in urban areas. The OECD therefore created an Expert Group composed of representatives from 13 countries to examine the problems and propose strategies for improving the situation.

Characteristics of the rural road safety problem

Rural roads are defined in this report as roads outside urban areas that are not motorways or unpaved roads. The wide variety of principles and implementation practices used in road classification schemes obscures a correct representation of the size and nature of the road safety problem and makes it difficult to compare rural road safety across countries. In spite of this, it is apparent that as much as 80% of all accidents on rural roads falls into three categories: single vehicle accidents -- especially running off the road, head-on collisions and collisions at intersections.
Single vehicle accidents constitute 35% or more of all fatal rural road accidents. This type of accident is the most prevalent because all three elements of the family of hazard factors -- driver behaviour, vehicle, and road (infrastructure) environment -- contribute to these accidents and increase their severity. Head-on collisions make up nearly 25% of all fatal accidents on rural roads. Driver behaviour and the road environment are the principal factors in these accidents. Collisions at intersections account for about 20% of all fatal rural road accidents. Again, driver behaviour and road infrastructure are the key contributing factors to these types of accidents.

Rural road accidents are scattered over the entire rural road network. Under these circumstances, a pressing challenge for safety professionals is to understand their causes and the contributing factors. A main conclusion from this analysis is that the rural road system itself has inherent characteristics that significantly contribute to the high number of accidents and the high risks.

Inappropriate and excessive speeds are a key factor in rural road accidents because the actual speeds on rural roads are relatively high under circumstances where these high speeds cannot be safely maintained. For example, because of their historical origins, rural roads generally have inconsistent design characteristics over their total length as well as problems in individual design elements. This requires constant speed adaptation to account for regularly changing situations and circumstances, thus increasing the opportunities for human errors and leading to higher risks for accidents. The report therefore concludes that reducing inappropriate and excessive speed together with safe road and roadside design are the key elements to improve rural road safety. Aside from this, fatigue and alcohol/drug use are also key factors in rural safety. Equally importantly, speed variation caused by the presence of buses, heavy trucks, agricultural vehicles, mopeds and bicyclists generates higher accident risks than on other types of roads.

A strategy to improve rural road safety

Rural road safety is completely different than motorway or urban road safety and thus requires a separate management approach. Such an approach is almost non-existent in OECD countries. Knowledge about safe rural road design is developing rapidly, although it is still incomplete. A systematic research approach with generally accepted research methodologies and tools would markedly increase the speed of knowledge development as well as the reliability and usefulness of the results. Specific attention to safety as a basic design element in university-level road engineering courses would also help speed knowledge dissemination. It is therefore recommended that every OECD Member country should develop a rural road safety improvement strategy. It is also recommended that each country should develop short-, short- /medium- and long-term programmes based on a sound analysis of the problems. Such plans must pay special attention to raising awareness of rural road safety both within the general public and within the organisations of all key actors -- i.e. government, peer groups and others.

In the short-term programme, it is advisable to develop and implement a speed management programme in which speed-limit setting and speed enforcement (combined with publicity campaigns) are key components. Also, a trauma management system could be installed in the short term. In the short- and medium-term programmes, traditional infrastructure measures have to be chosen that emphasize investment in the quality of the rural road infrastructure. It is recommended that low-cost, effective and efficient infrastructural measures are selected that preferably fit into existing road maintenance programmes. Targeted “black spot” programmes have proved highly effective in this regard. Long-term programmes should include Intelligent Transport Systems (ITS) applications among other measures.
Various safety measures, including many that are low cost, can improve rural road safety and these are suggested throughout the report. Although a structural network-wide approach is required and recommended in the report, there is a clear understanding that individual low-cost measures can contribute substantially to the safety of the rural road network. For example, individual safety measures that address infrastructure offer the most plentiful opportunities for safety enhancement on rural roads.

The report strongly recommends that safety should receive explicit attention at every level of the process, from the decision to build or rebuild a road to the planning and design stages, through construction and during operation and maintenance. The basis of safe road design is a consistent, hierarchical road network, in which each road category has a particular function to fulfil. Rural roads should therefore be assigned a specific function rather than trying to cater to a varying mix of functions. Also, the design of the road should be consistent with the function and in accordance with the lowest functional use of the road. Several other measures, ranging from straightening horizontal curves to appropriate application of pavement markings and roadside markers, are suggested.

The report stresses the importance of “forgiving” roadside concepts and roadside improvements in general because they can significantly reduce the severity of accidents. There is very high potential for improving overall safety by treating or removing roadside obstacles. Obstacle free zones of between four and ten metres are desirable if the road geometry and right-of-way will allow it. Finally, knowledge transfer and training in the area of roadside safety is a key action area that can contribute to better and more timely treatment of roadside hazards.

Because physically separating opposing traffic is a rather drastic and often impractical approach, the provision of conflict-free overtaking opportunities combined with effective measures to prevent overtaking elsewhere can have many advantages. In addition, for the prevention of certain types of accident, including run-off-the-road, a combination of increasing lane width and shoulder width is an effective approach. In considering intersection collisions, the report concludes that roundabouts are generally the safest solution. However, because roundabouts are a relatively expensive alternative, the decision to install roundabout intersections must be based on a thorough analysis of the cost-effectiveness of this solution in comparison to others. Channelisation as a remedial measure at existing ordinary intersections can be profitable, as can road lighting at intersections to reduce the number of night-time collisions.

In addressing the issue of speed variance on rural roads, separating slow and fast traffic will contribute to the overall safety of rural roads and a number of ways to accomplish separation are suggested in the report. As a final comment on infrastructure, safety impact assessments and safety audits should be undertaken, as appropriate, when planning, designing, (re)building or maintaining roads with the aim to prevent accidents rather than respond to those that have already happened.

Police enforcement is especially important given the contribution of inappropriate and excessive speed to rural road crashes. Effective enforcement can serve as a general deterrent factor that can bring about long-term behaviour changes in drivers if it is coupled with appropriate penalty regimes and publicity. However, due to the great length of the rural road network, enforcement by conventional means has very limited potential. Publicity campaigns associated with targeted enforcement can increase the enforcement effects and contribute to a change in driving norms. In a similar vein, the report concludes that repeated enforcement creates longer halo effects compared to “blitz” campaigns. By introducing a random enforcement element, enforcement effectiveness can also be increased and longer halo effects produced. As well, automated enforcement technologies that target the causes of the principal rural road
accidents should be considered. Finally, the report recommends that a portion of the funds generated from traffic enforcement activities be earmarked for rural road safety.

The full potential of ITS solutions for rural road safety can be realised only if research is undertaken that addresses the costs of these systems, specific technical issues, the human-machine interface, and institutional and political constraints. The report identifies a host of low-cost ITS measures that will be ready for deployment within the next three years and that could make contributions in reducing the principal accident types on rural roads. Paramount among these, given the major role of speed in rural road accidents, are speed control technologies such as speed advisory systems and adaptive cruise control. Other near-term, low cost measures include systems for driver monitoring, intersection approach warning and guide lights. Applications such as smart seat belts, air bags and vehicle data recorders will be broadly available and can lessen the rural road safety problem. Decisions to apply higher cost measures in rural road situations must be made on case-by-case basis.

Identifying an accident location is one of the key problems in responding to rural road crashes. The report cites several options that can improve the situation, including: improving road and kilometre/mile identification schemes; expanding the use of GPS; and exploring possibilities for automated accident detection. Available technologies such as cellular telephones are viewed as an extremely positive advance as they can shorten arrival time and improve the overall information available about an accident situation. Publicity campaigns in conjunction with more widespread first aid training can also help to improve trauma treatment at the scene of a rural road accident. The report recommends and describes common guidelines and standard procedures that local hospitals could adopt to improve trauma treatment. In the case of multiple traumas or severe injuries that are likely to surpass the capabilities of the local hospital, the police or others on the scene should be aware of procedures for notifying and obtaining assistance from trauma specialists.

Research needs

There is currently insufficient information available on rural road safety problems to adequately support appropriate policy and investment decisions. This is important because improving rural road safety will require unified methods for collecting and reporting accident data, identifying exposure measures and intervention levels, monitoring and evaluating countermeasures and estimating cost effectiveness and benefit-cost ratios of these countermeasures. With these unified methods in place it is possible to build a sound basis for rational rural road safety policies. Therefore, more systematic evaluation of the effectiveness of countermeasures is necessary based on valid and reliable data. In this regard, benchmarking of rural road strategies may help to improve effectiveness. Finally, further research into rural road safety strategies and several individual rural road safety measures is required to rapidly advance safety improvements on rural roads.