

PIARC GLOBAL ROAD SAFETY KNOWLEDGE EXCHANGE

A PIARC SPECIAL PROJECT



STATEMENTS

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Any opinions, findings, conclusions and recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of their parent organisations or agencies.

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The PIARC Global Road Safety Knowledge Exchange Project is a dedicated initiative aimed at facilitating knowledge sharing within the field of road safety through appropriate implementation aids that reflect previous work of, but not limited to, PIARC. The project places a particular emphasis on creating contemporary and engaging tools to effectively disseminate PIARC-generated knowledge on road safety including the Road Safety Manual (RSM). These tools are designed to be adaptable and readily aligned with the evolving needs of low- and middle-income countries, while remaining versatile enough to complement future PIARC products. The primary objective of the project is to bridge the knowledge gap and promote best practices in road safety, with a special focus on extending support to low- and middle-income countries.

This final deliverable of the PIARC Exchange Project provides a comprehensive overview of the key components of this highly relevant initiative. It begins with a description of the literature review, which serves as the foundational groundwork for the project's knowledge-sharing efforts. This rigorous review process ensures that the project is firmly rooted in a deep understanding of the latest PIARC research and insights related to road safety in LMICs.

A central element of the project is the knowledge-sharing campaign, a dynamic and responsive approach to disseminating critical road safety information. Through this campaign, the project aims to reach and engage with stakeholders and practitioners from LMICs, as well as PIARC members and partners, fostering a sense of community and collaboration in the ongoing pursuit of safer roads in LMICs.

The project's dissemination material constitutes the practical manifestation of its overarching goals. These materials have been thoughtfully crafted to present complex road safety concepts in a clear and accessible manner, ensuring that knowledge is effectively shared with a global audience. Crucially, this material, i.e presentations, factsheets, messages, is designed to be adaptable and tailored to the unique needs and social dynamics of different regions, thereby ensuring that the knowledge shared is both relevant and culturally respectful and appropriate.

In summary, the PIARC Global Road Safety Knowledge Exchange Project is an ambitious and essential endeavor aiming at harmonizing, modernizing, and disseminating knowledge related to road safety in LMICs. By facilitating the exchange of expertise, promoting collaboration, and ensuring that the shared information is accessible and adaptable, the project takes a significant step forward towards a safer, more informed, and more inclusive global road safety landscape.

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1. INTRODUCTION

1.1. ABOUT PIARC EXCHANGE

PIARC **Global Road Safety Knowledge Exchange** project promotes knowledge sharing through appropriate implementation aids that reflect previous work of but not limited to PIARC and are also modern, appealing and appropriate for disseminating PIARC-generated knowledge on road safety including the Road Safety Manual (RSM). This material can be adjusted to the needs of its end-users, meaning PIARC members and partners, and will be adjustable to future PIARC products.

The project focusses on **spreading road safety knowledge to low- and middle-income countries**. Thematically the road safety knowledge focusses on the Safe System approach, addressing safe roads and roadsides, safe road users, safe vehicles and safe speeds. Specific target groups have been identified and a literature review of the work of PIARC and its partners highlighted existing needs of stakeholders in terms of knowledge sharing. Gaps will be filled-in with the development of dissemination and knowledge sharing tools with focus on:

- High quality materials worthy to the PIARC standards
- Highly ergonomic tools to increase usefulness
- Fulfilment of user needs based on the results of the literature review
- Easiness of updates to cover future PIARC work and user needs
- Participation of highly esteemed road safety experts in virtual and in-person events

The purpose of this report is to present an overview of the the key components of this project, focusing on the **dissemination activities and material**. The report presents:

- An overview of the **literature review**,
- The **dissemination material**, developed based on the literature review findings
- The **knowledge-sharing campaign** along with the dissemination activities, that took place during the project.

1.2. OBJECTIVES

PIARC has an active role in the efforts to improve road safety worldwide through evidence-based studies, technical reports and other type knowledge products. All these products are widely available to PIARC members and also non-members. Still there is a large audience, particularly in LMIC countries that could benefit from this consolidated knowledge but currently has limited or no access to it. Therefore, it is crucial that this valuable knowledge is shared in the most appropriate and effective manner, using various and modern dissemination channels.

The purpose of PIARC Exchange is to promote knowledge sharing about road safety especially to LMIC countries with limited resources but also to more developed countries with different needs and priorities. Therefore, the products of this project cover different audiences, different dissemination methods as well as different levels of experience and understanding of road safety, but with emphasis on LMICs.

1.3. TARGET GROUPS

The project focused on spreading road safety knowledge to low- and middle-income countries. For targeting these countries, a definition was first needed. It is proposed to use the low income and lower middle-income countries as defined by the World Bank in 2020. LMICs with no road authorities are the main target group of the road safety manual, so special material is provided for them. Training the people and providing them materials which they can share with others (presentations, hand out materials like fact sheets, etc.), so they train the others themselves, are considered as promising opportunities to share the road safety knowledge. On this direction, stakeholders that are potential end-users of PIARC products are identified based:

- On geographic area
- type of authority (public authorities-Ministries and Road Authorities, private companies, Universities and Research Institutes, NGOs)
- type of activity (road safety management, infrastructure, automation, driver behaviour, enforcement)
- technical skills such as experience and level of technical setup

2. LITERATURE REVIEW

The literature review provided a comprehensive overview of relevant PIARC knowledge in terms of reports, seminars, proceedings, webinars and manuals on road safety for low and middle income countries. Over 40 PIARC documents were reviewed based on their relevance to **8 major Road Safety areas**, selected based on the Safe System Approach:

1. Management Strategy/Policies
2. Data
3. Speed
4. Vulnerable Road Users
5. Human Factors/Behaviour
6. Infrastructure
7. Vehicles
8. Tunnels.

The dissemination material that has been developed as part of the PIARC Exchange project is related to the literature review findings for each researched road safety area.

2.1. METHODOLOGY

PIARC offers a wide and comprehensive variety of knowledge on the topic of road safety in different forms, areas and languages. To identify what knowledge is available for LMICs and possible gaps, first the LMICs were defined, then potentially relevant literature was collated and then reviewed.

To gather the relevant and potentially relevant literature, the PIARC knowledge base on the PIARC website was examined. All the documents are free to access, after having registered for free. Reports, case studies, conference proceedings, seminars, workshops etc. were considered within the years 2015-2022. This includes almost three cycles of PIARC work i.e., the past cycles 2013-2016 and 2016-2019 as well as the ongoing cycle 2020-2023.

The literature review of **over 40 publications** confirmed that a wide and comprehensive set of information, observations, conclusions and recommendations are available in the PIARC database for addressing road safety in Low and Middle Income Countries.

The **Road Safety Manual** can be viewed as a complete document, addressing all the management needs of road authorities. Similarly, the Road Tunnels Manual offers tunnel authorities a comprehensive guide for the management of road tunnels. Technical reports, Proceedings of Seminars, Workshops and Conferences, Case studies and Webinars provide road safety knowledge on all the areas of the Safe System Approach and more.

2.2. KEY MESSAGES

Based on a synthesis of the overall literature review findings, the following overall observations and key messages can be drawn:

- Fatalities and serious injuries are an unacceptable consequence of the road transport system across the whole world;

- The road transport system's function and design create the basic prerequisites for people to travel safely. Therefore, the road environment is the first and foremost protection layer and therefore plays a crucial role in a safe system perspective.
- Providing a safe operating environment for road users is a primary responsibility for the government, national road authorities and industry organisations that design, build, maintain and regulate the road infrastructure and vehicles;
- The road transport system needs to anticipate and accommodate for human errors and work towards preventing consequent deaths or serious injuries. Building awareness of the Safe System Approach's possibilities and application is a critical step for LMICs. This can be achieved through leadership, training and knowledge development.
- As the main modes of transport in LMICs are walking, motorcycling, cycling and public transport, there is a need for planning and providing for the safety needs of these vulnerable road users;
- A key message for road engineers and designers is to include vulnerable road users in the design process; road design should include a self-explaining and failure-forgiving road according to the needs of the road users;
- Also, as road characteristics can influence a driver's right or wrong driving actions, it is of high relevance to include human factors in the road design process to achieve a self-explaining road design;
- All roads should be designed to control speeds and manage the kinetic energy of moving vehicles so that when drivers or other road users make errors, they will be protected from crash forces that could cause death or serious injury. The roles and responsibilities in setting speed limits are different in countries and areas, as there are different approaches for road design and roads in operation; speed management is not only about regulating the speed but also planning and designing appropriate road layouts and networks for safe travel speed;
- The collection and analysis of crash data has been the most widely applied approach to managing safety. This will continue to be an important method and is an important starting point for LMICs.
- Road safety audit and safety inspection are widely applied tools, highly relevant for LMICs, which need a robust audit and inspection protocol;
- Data is a key factor to evaluate road safety related investments. This is especially important with limited budgets, as effectiveness of road safety measures should be demonstrated and inefficient use of limited funding or an increase of crash risk should be known. As little as 1-3% of road construction budgets are needed to make road safety improvements and when the value of lives saved and serious injuries prevented are considered, the return on investment is positive.
- Regarding vehicle automation and infrastructure readiness, LMIC governments and transport industry should be prepared to avoid being caught off guard and to not get left behind the global community.
- The global trend toward urbanization will cause widespread expansion of cities and create new urban areas in coming decades with an increasing mix of traffic users. The United Nations Department of Economic and Social Affairs predicts that urban areas will grow by more than 50 percent over the coming 30 years, with the great majority of this expansion occurring in Africa and Asia. New roads and infrastructure will be necessary to

accommodate the urban expansion and this creates an opportunity to incorporate Safe System design features from the beginning.

Based on the synthesis of the literature analysis, a **few gaps were identified** which could be addressed in the next work cycles. As stated in the beginning of this chapter, the Road Safety Manual is a comprehensive and complete document which addresses all management needs for road authorities and more. However, it is also a complex online tool, which may seem complicated, daunting and overwhelming for LMIC authorities which seek to start applying the Safe System Approach or looking for particular insights. It is therefore our recommendation that an adjusted manual specifically aimed at LMICs would be highly beneficial. Another observation could be made regarding the availability of PIARC documentation in different languages. There are several important documents which are not available in French, language which would be highly relevant for LMICs. Moreover, free tools/guides should be marked as free. Finally, more focus should be put on documentation/guides related to the implementation of effective road safety interventions in LMICs that require minimum funding.

3. KNOWLEDGE-SHARING MATERIAL

The extensive array of dissemination materials developed as part of the PIARC exchange project is intrinsically linked to the insightful literature review findings concerning each of the meticulously researched road safety areas. These materials have been strategically crafted to serve as invaluable resources for disseminating and sharing the wealth of PIARC knowledge that collected and reviewed as part of the project. Central to this dissemination effort are the **presentations, factsheets, and road safety messages**, all of which are carefully tailored to encapsulate and convey the essence of the research findings effectively.

Furthermore, it's essential to underscore that all project material has been thoroughly aligned with the visual identity of PIARC, adhering to the organization's graphic standards and incorporating its official logo. This ensures that all materials maintain a consistent and recognizable branding, reinforcing PIARC's commitment to the highest standards of quality in its work. Additionally, the development process has been sensitive to the nuances of various social particularities that may exist in different countries. The material has been **thoughtfully designed** to avoid any contradictions or insensitivity regarding gender or specific behavioral issues, a testament to PIARC's dedication to inclusivity and cultural sensitivity in its global road safety efforts. This comprehensive approach underscores the organization's commitment to excellence and a holistic understanding of the unique challenges faced in different regions, ultimately contributing to more effective road safety practices worldwide.

3.1. ROAD SAFETY PRESENTATIONS

After conducting the extensive literature review, a diligent process of document organization and information extraction was undertaken for each of the road safety areas under scrutiny. This meticulous curation involved sifting through the wealth of data and research materials, distilling the **most critical and relevant information**. This refined knowledge was then thoughtfully compiled and arranged into **comprehensive presentations**. Maintaining a consistent structure across all eight presentations was pivotal to ensure cohesiveness and accessibility. This homogeneity facilitates easy navigation for the audience, offering a structured and predictable format for absorbing crucial insights.

The structure of these presentations is deliberately uniform, systematically organized to ensure a consistent and clear flow of information. With an estimated duration of 15 to 20 minutes, each presentation spans 30 slides, providing a manageable timeframe for **conveying the essential findings and recommendations** pertaining to **each road safety area**. This standardized approach allows for efficient communication of key takeaways while ensuring that the audience can easily transition from one presentation to another, fostering a cohesive understanding of the 8 road safety areas addressed in this project.

The sections of each presentation are:

- **Introduction** containing information about PIARC, PIARC Road Safety Committee and PIARC Exchange project (similar to all presentations)
- **Fundamentals** regarding the studied Road Safety area,
- **Problems** tackled in the Road Safety area
- **Solutions** proposed by the reviewed PIARC documentation

- **Recommendations** for authorities and policy makers, based on the PIARC documents suggestions
- **Relevant PIARC documents**, with the links of each document in the PIARC website.

All presentations are **available on PIARC website**. The project partners have also shared the presentations with their network. The created presentations were also presented by PIARC during the two project webinars.

The presentations are not included in the deliverable due to their volume. All presentations can be found in the related PIARC webitems.

3.2. ROAD SAFETY FACTSHEETS

The creation of factsheets has emerged as a pivotal component in translating the knowledge shared through the presentations into a **concise and highly accessible format**. These factsheets serve as valuable reference materials, capturing the essence of each road safety area's presentation in a succinct manner. Each factsheet is thoughtfully structured to encapsulate the critical insights and findings shared through the presentations, ensuring that the core takeaways and key information are presented in a clear and comprehensive manner.

These factsheets were designed to provide an effective means of disseminating crucial road safety information to a wider audience. With each factsheet limited to four pages in length, they strike a balance between depth and brevity, making them a **practical resource** for both road safety professionals and the general public, not only in LMICs but also worldwide. The factsheets are instrumental in consolidating and disseminating the wealth of road safety knowledge produced by PIARC, ensuring that it is readily accessible and can be readily employed by those working towards enhancing road safety in LMICs.

The colours used are the PIARC colours and their format is presented in Figure 1. Links to the factsheets are included in the webitems dedicated to the RS Area. The sections of each factsheet are:

- Information about **PIARC Road Safety Committee**
- Information about **PIARCs work on the specific RS Area**
- RS Area **Fundamentals**
- RS Area **Issues**
- **UN Decade of Action** for Road Safety
- RS Area **Measures**
- RS Area **Recommendations**
- Read More (links of PIARC reports)



Figure 1: Factsheet on Speed

The factsheets are not included in the deliverable due to their volume. All factsheets can be found in the relevant PIARC webitems.

3.3. ROAD SAFETY MESSAGES

Based on each presentation, **4 messages** have been developed **for each one of the road safety areas**, reaching a total of 32 messages. These messages were used to disseminate the PIARC produced knowledge using social media and more precisely, Twitter (X) and LinkedIn. All messages have a common structure, containing a short title (4-6 words), the problem (1-2 sentences), the solution (1-2 sentences) and the recommendation (1-2 sentences). At the end of the message links of relevant PIARC reports are included. In the following sections the messages for each RS area are presented.

3.3.1. Management

1. Management System in LMICs for Road Safety Enhancement



Problem: In many LMICs the organizational structure of the management system may suffer from deficiencies. These deficiencies are weakening the institutional functions across key road safety players. In addition, subpar measurement and reporting systems may mean that crash data suffer from significant underreporting.

Solution: Adopting country-wide management systems is crucial to improving country/jurisdictional road safety performance.

Recommendation: To ensure road safety management and leadership and to build road safety expertise, LMICs should develop a strong leading agency and a robust set of local guidelines and regulations.

Read More: [Road Safety Manual - Road Safety Management - Safety Management System](#), [Road Safety Manual - Road Safety Management - Target and Strategic Plans](#)

2. Effective Road Safety Strategy based on the Safe System Approach



Problem: Fatalities and serious injuries are an unacceptable consequence of people's mobility and the design of our road transport systems across the whole world.

Solution: The development of an effective road safety strategy starts from the notion of the Safe System approach, to prevent fatal and serious crashes. The Safe System approach considers that the transport environment should be intuitive and forgiving, so that fatalities and injuries can be mitigated or avoided altogether. Building awareness of Safe System possibilities and application is a critical step especially for LMICs.

Recommendation: An efficient management system and leadership body are essential for the implementation of an effective road safety improvement program. In addition, the promotion of that the Safe System approach can only be built on the understanding of common, shared responsibility amongst authorities, motorists, enforcement agencies and all stakeholders overall.

Read More: [Road Safety Manual - Road Safety Management - The Safe System Approach](#)

3. Road Safety Lead Agencies in LMICs



Problem: The success and effectiveness of road safety lead agencies (RSLAs) in coordinating preventative road safety interventions in developing countries is dependent on the existence of lead agencies with full-time expert staff, legally endowed powers, permanent funding, political support, and access to relevant data.

Solution: Set out a performance management framework for the delivery of interventions and their outcomes, delivered primarily by the Government Agencies with core road safety responsibilities in government partnerships with civil society and business, with the support of research and professional community.

Recommendation: LMICs should exercise caution in establishing complex targeted strategies and plans until data and appropriate management capacity are available. They should allow support and power to but also enforce good oversight on the agencies

Read More: [Road Safety Manual - Planning, Design & Operation - Roles, Responsibilities, Policy Development and Programmes](#), [Proceedings of the PIARC International Seminar on: "Road Safety in Low- and Middle-Income Countries: Issues and Countermeasures"](#)

4. Management Functions for Global and National Road Safety Goals



Problem: Achieving global and national road safety goals and targets requires appropriate managerial capacity.

Solution: Adopt institutional management functions ensuring: coordination, legislation, funding and resource allocation, promotion, monitoring, analyzing and evaluation, as well as research, development and knowledge transfer and dissemination

with the wider public.

Recommendation: Define expected results, as the desired safety performance endorsed by government at all levels, stakeholders and the community, and communicate with them at all levels exploiting the relevant feedback loops.

Read More: [Road Safety Manual - Strategic Global Perspective - Scope of the Road Safety Problem](#), [Road Safety Manual - Road Safety Management - Safety Data](#)

3.3.2. Infrastructure

1. Road Safety Audits and Inspections to Enhance Road Safety



Problem: In most countries, and especially in urban areas, more than half of all road fatalities and severe injuries happen on less than 10% of the total road length.

Solution: Assessment of risk should be undertaken for the entire road network in a standardized and segmented manner. For existing road networks, where data is available, assessment of crash data should be undertaken to identify high risk locations.

Recommendation: Road Safety Audits and Inspections enhance safety. Undertake road safety audits on all sections of new roads (pre-feasibility through to detailed design) and complete assessments using independent and accredited experts to ensure a minimum standard of three stars or better for all road users. Complete assessment with road safety inspections on critical locations of existing roads. iRAP provides an affordable solution for RSA and RSI and is recommended especially for LMICs.

Read More: [Road Safety Manual - Planning, Design & Operation - Risks and issue identification, Documents Relevant to Road Infrastructure and Transport Security A PIARC Literature Review](#)

2. Road Infrastructure Improvements for Road Safety



Problem: Road infrastructure is often the single most significant factor that contributes to the severity outcome(s) of a crash.

Solution: Avoiding severe injuries from crashes involves: removing hazards from the roadside, removing conflicts as much as possible by separating users in space, separating users in time and increasing attentiveness and awareness. Aim for reduction of motorized traffic as much as possible, especially powered-two-wheelers, and shift the modal split towards active travel.

Recommendation: Focus upon improvements in infrastructure and vehicle safety over the medium to longer term will be essential in providing a forgiving system. Allow for the accommodation for new/emerging modes in the network before they come and place special emphasis on protecting Vulnerable Road Users.

Read More: [Road Safety Manual - Planning, Design & Operation - Designing for Road Users](#), [Road Safety Manual - Planning, Design & Operation - Infrastructure Management](#)

3. Smart Roads for Safe Roads



Problem: Currently, only high-capacity highways, motorways, freeways have the features necessary for applying a Smart Roads Classification.

Solution: When building new roads, road designers should aim to achieve the highest Smart Roads Levels. Activities should be directed towards implementing and expanding 5G coverage, at

least along their main corridors.

Recommendation: LMIC Governments and transport industry should be prepared to avoid being caught off guard and to not get left behind the global community.

Read More: [Smart Roads Classification](#), [Automated Vehicles – Challenges and Opportunities for Road Operators and Road Authorities](#)

4. Safe System approach for Safe Infrastructure



Problem: Fatalities and serious injuries are an unacceptable consequence of our mobility and the design of our road transport system in the whole world.

Solution: The road transport system needs to anticipate and accommodate for human errors (even those we would call violations) and prevents consequent death or serious injury. All

roads should be designed to control speeds and manage the kinetic energy of moving vehicles so that when drivers or other road users make errors, they will be protected from crash forces that could cause death or serious injury.

Recommendation: The costs of road improvements are manageable in context. Studies indicate that as little as 1-3% of road construction budgets are needed to make significant road safety improvements. When the value of lives saved and serious injuries prevented are considered, the return on investment is positive.

Read More: [Road Safety Manual - Road Safety Management - The Safe System Approach](#)

3.3.3. Tunnels

1. Road Tunnels Safety and Human Factors



Problem: Tunnels are enclosed structures with confined space that can cause, for some users, feelings of anxiety and particular behavior especially at the event of a collision.

Solution: Drivers need to be more aware of how they should behave in tunnels. A fairly long stretch of road (150-200m) before the tunnel should not contain too many signs or signals.

The tunnel safety facilities should be easily recognizable even in normal traffic. Alarm signals should be provided by multiple-redundant sources (e.g. public address system and variable message signs).

Good ventilation and lighting throughout the tunnel is essential as well, conforming to established design regulations.

Recommendation: The design of tunnels and their operation should take account of human factors. Ensure that the measures implemented are likely to be well understood and adopted by the users.

Read More: [PIARC Road Tunnels Manual](#), [Technical report 2008 R17 “Human factors and road tunnel safety regarding users”](#)

2. Measures against Significant Incidents in Road Tunnels



Problem: Collisions and fires in road tunnels are incidents which require special attention, because they are or have the potential to develop into events with serious consequences to the health or life of people, to property, to infrastructure or to the environment.

Solution: Adopt measures preventing the occurrence of significant incidents, mitigating the consequences of the events, as well as measures supporting self-rescue and emergency.

Recommendation: It is important to adopt the integrated approach during the design of road tunnels. Establish the safety concept in an early design stage and provide it at all project stages.

Read More: [PIARC Road Tunnels Manual](#), [Technical report 2016 R35 “Experience with significant incidents in road tunnels”](#)

3. Road Tunnel Operators and Road Tunnel Safety



Problem: The proactive actions and reactions of those in charge of operating the road tunnels is a decisive factor in ensuring the safety of people during an incident.

Solution: Organize consultation and cooperation during the tunnel design process and define measures necessary to minimize the time required to mobilize the emergency services.

Recommendation: Specific and appropriate training is essential, as well as the establishment of proper protocols and post-crash intervention sequences.

Read More: [PIARC Road Tunnels Manual](#), [Technical report 2007 R4 “Guide for organizing, recruiting and training road tunnel operating staff”](#)

4. Existing Tunnel Assessment and Upgrade



Problem: Existing tunnels may not be in line with the current safety standards because of subsequent regulation updates.

Solution: A structured approach for assessing and preparing refurbishment programmes includes two tasks. The first task aims to assess the current situation of the tunnel in order to identify the current safety level. The second task aims to define the future

situation after any upgrade/refurbishment works, which should be acceptable in relation to the defined safety level goal.

Recommendation: Risk assessment can be used to address the specific safety features of a tunnel system and their impact on safety.

Read More: [PIARC Road Tunnels Manual](#), [Technical report 2012 R23 “Current practice for risk evaluation for road tunnels”](#)

3.3.4. Vulnerable Road Users

1. Safe System approach to Save VRUs



Problem: Each year, 1.35 million people are killed on the world's roads, and a further 50 million are injured, with the vast majority of these (over 90%) occurring in LMICs. A critical share of these fatalities are Vulnerable Road Users (VRUs)

Solution: Adoption of the Safe System approach is necessary to prevent fatal and serious crashes with dedicated road safety

facilities and provisions.

Recommendation: Key messages for road engineers and designers is to include vulnerable road users in the design process and include self-questions such as “what if a child /blind /elderly /disabled person is crossing.

Read More: [Addressing Road Safety Worldwide: Vulnerable Road Users, Human Factors & RS in LMIC](#)

2. Road Design for VRUs Crashes Reduction



Problem: VRU crashes occur due to careless crossing, disobeying traffic lights, jaywalking, misjudgment of speed gap and lack of proper facilities, but also due to driver inexperience, misjudgment, or driver disobeying and not giving right of the way to VRUs.

Solution: Key requirements include giving road users enough time, the road must provide a safe field of view for all road users. The

road environment must correspond with road user's perception logic, covering as many angles/points of view as possible.

Recommendation: Road design should include a self-explaining and failure-forgiving road addressing the safety, mobility and travel comfort needs of the road users.

Read More: [Vulnerable Road Users: Diagnosis of Design and Operational Safety Problems and Potential Countermeasures](#)

3. Protect VRUs in LMICs



Problem: LMICs have greater variety and intensity of traffic mixing the slow-moving and vulnerable non-motorized road users, as well as the motorcycles with fast-moving motorized vehicles.

Solution: Measures to enhance VRUs safety along road sections include: visual segregation by edge markings, wider and paved shoulder, appropriate traffic lane width, segregated footpath, segregated lane for cyclists or mopeds and proper crossing facilities.

Recommendation: To ensure compliance, measures of communication, education and enforcement, including special warning signs and campaigns should be employed.

Read More: [Addressing Road Safety Worldwide: Vulnerable Road Users, Human Factors & RS in LMIC, Proceedings of the PIARC International Seminar on: “Road Safety in Low- and Middle-Income Countries: Issues and Countermeasures”](#)

4. Road Safety Audits and Inspections for VRUs Safety



Problem: Fatalities amongst VRUs are higher in LMICs due to lack of resources to provide or maintain adequate and safe infrastructure, land use planning problems and unsafe users behavior, as well as post-crash response services.

Solution: Road Safety Audits and Inspections enhance safety. Target elements for RSA and RSI are the risk factors for crash occurrence or injury severity. The point of view of every kind of road user should be taken into consideration, along with the way interactions happen between different types of road users or transport modes. Post-crash care should be enhanced.

Recommendation: Checklists can be used to ensure safety aspects have not been overlooked.

Read More: [Proceedings of the Internal Workshop “Policies and Programs for Road Safety Management”](#)

3.3.5. Human Factors/Behavior

1. Drink-Driving Regulations and Enforcement



Problem: 5%-35% of road deaths are reported as alcohol-related.

Solution: Enforcement of drink-driving laws is one of the most effective interventions for reducing the number of lives lost due to unintentional crash injury. It has to be persistent and considerable.

Recommendation: Drink-driving may be indicative of broader health issues and should be considered when targeting drink-

driving reductions.

Read More: [Proceedings of the PIARC International Seminar on: “Road Safety in Low- and Middle-Income Countries: Issues and Countermeasures”](#)

2. Human Behavior Regulations and Enforcement for Road Safety in LMICs



Problem: Despite the progress made in improving legislation across the five key behavioral risk factors (speeding, drink-driving, helmet use, seat-belt use, distracted driving) enforcement remains a major challenge in most countries, especially in the LMICs.

Solution: Establish a dedicated enforcement agency, provide training and ensure adequate equipment for enforcement activities. Legislation must be both enforceable and consistently enforced to have effect.

Recommendation: LMICs need to be open to considering strategies that are tried and tested in other countries/regions. This might include adoption of novel technologies such as alcohol interlocks and seat-belt warning systems.

Read More: [Proceedings of the PIARC International Seminar on: “Road Safety in Low- and Middle-Income Countries: Issues and Countermeasures”](#), [Addressing Road Safety Worldwide: Vulnerable Road Users, Human Factors & RS in LMIC](#)

3. Road Design and Human Factors



Problem: Unless roads are designed and managed to account for human factors, it is unlikely that a Safe System can be achieved.

Solution: Road Safety Authorities must enact and enforce road safety legislation. It is equally important to ensure road infrastructure accounts for the needs of all road users and is designed to facilitate safe behaviors, including: clear road signage

and road markings that are intuitive, use of roundabouts and traffic calming designs such as speed humps, physical separation of road users including use of protected bicycle lanes and pedestrian only zones.

Recommendation: The road transport system needs to anticipate and accommodate for human errors and prevent consequent death or serious injury, in all sorts of environments and circumstances (e.g. even in temporal environments such as workzones).

Read More: [Road Safety Manual - Planning, Design & Operation - Designing for Road Users, Human Factors Guidelines for a Safer Man-Road Interface](#)

4. Roads Safety Evaluation Based On Human Factors Method



Problem: Crash occurrence due to human factors involves the 6-second rule (drivers need 4-6 seconds to adapt to a new driving environment), the field of view rule (safe field of view to correctly choose speed) and the logic rule (follow driver's perception logic).

Solution: Carry out safety evaluations based on human factors method, performing dedicated on-site inspections made by an interdisciplinary team of designers, safety engineers and human factors experts, following a specific inspection protocol.

Recommendation: This approach supports LMICs that are still at the starting phase of the road safety management process.

Read More: [Road Safety Evaluation based on Human Factors Method, The Role of Road Engineering in Combating Driver Distraction and Fatigue Road Safety Risks](#)

3.3.6. Speed

1. Speed Limit for Mixed Traffic



Problem: LMICs have greater variety and intensity of traffic mixing the slow-moving and vulnerable non-motorized road users, as well as the motorcycles with fast-moving motorized vehicles.

Solution: In urban areas where there is a mix of road users, a maximum speed limit of 30km/h should be established. It is possible that shared-space areas can be created this way, fostering more active travel.

Recommendation: Explore the potential benefits of speed control systems like ISA in cars, motorcycles and motor-tricycle.

Read More: [Setting Credible Speed Limits](#)

2. Road Improvements for Speed Reduction in LMICs



Problem: Speed is still considered at the core of the most important risk factors of crashes. Managing speed is critical to the effective implementation of the Safe System approach.

Solution: Low-cost countermeasures called slight road improvement engineering can help achieve effective speed reductions. Systems such as speed humps, lane narrowing, chicanes, new pedestrian crossing solutions, optimized cross section sharing with respect to flow-speed curves analysis and varying wearing course material are essential techniques in urban areas in LMICs.

Recommendation: Speed management is not only about regulating traffic speed but also planning and designing appropriate road layouts and networks for safe travel speeds.

Read More: [Proceedings of the “International Seminar and Workshop on Safer Roads by Infrastructure Design and Operation”](#)

3. Reduce Speed – Increase Road Safety



Problem: An increase of 15% over the mean speed (which is likely to be almost higher than limits in LMICs) induces an 88% increase in road crash fatalities.

Solution: Reducing operating speeds can be achieved by adding vibration deceleration marking at curved roads, using stone pavement sections at village entrances, narrowing lanes by turning the centerline to color wide solid line, setting up snapshot systems.

Recommendation: Speed limits must be credible, homogeneous, visible by day and by night, maintained over time and consistent to achieve driver compliance, ideally coupled with enforcement.

Read More: [Setting Credible Speed Limits](#)

4. Road Design for Safer Speeds



Problem: Risk of a road crash occurrence is mostly related to the difference between the speed defined as “safe” for the road and the speed actually held by the driver.

Solution: Self-explaining road ensures drivers perceive the right behavior to adopt and adjust their speed, reducing the gap between safe speeds and actual operating speeds. To achieve this road authorities should locally manage road environment to improve self-explanation and ensure that road characteristics match the drivers expectations. Reasons of reduced speed limits must be fully understandable by drivers.

Recommendation: Explore new enforcement strategies like section control, narrowings, woonerfs.

Read More: [Proceedings of the “International Seminar and Workshop on Safer Roads by Infrastructure Design and Operation”](#)

3.3.7. Vehicles

1. Legislation for Safe Vehicles



Problem: Vehicle safety features such as electronic stability control and advanced braking make a substantial contribution to reducing road traffic deaths and injuries. Despite these potential benefits, not all new and used vehicles are required to be equipped with these and other internationally recognized vehicle safety standards.

Solution: Governments should provide, through legislation, a minimum set of safety standards for vehicles.

Recommendation: A well-chosen combination of passive safety measures and new techniques like electronic stability control may give a strong benefit in LMICs' road safety.

Read More: [Road Safety Manual - Road Safety Management - The Safe System Approach](#)

2. Safety Vehicle Standards to Increase Road Safety



Problem: Vehicle safety is increasingly critical to the prevention of crashes and contributes to substantial reductions in the number of deaths and serious injuries on the road.

Solution: Ensure the adoption of high-quality harmonized safety standards, through mandatory certification and registration systems for new and used vehicles based on established safety requirements and combined with routine inspections. Implement regulations for the export and import of used vehicles that are accompanied by inspections at entry and exit points, and mandatory periodic technical inspection of vehicles. Build demand for safer vehicles by encouraging independent new car assessment programs

Recommendation: Apply harmonized legislative standards for vehicle design and technology to ensure a uniform and acceptable level of safety worldwide. Conduct periodic inspections for issuing required legal certificates and random inspections on the roads.

Read More: [Road Safety Manual - Road Safety Management - The Safe System Approach](#)

3. Reduce Overloading in LMICs



Problem: LMICs report very low compliance levels on overweight vehicle legislation due to overloading for cost saving and lack of enforcement. Overloading jeopardizes the safety performance of the overloaded vehicles.

Solution: Prevention and mitigation solutions for overloading include four steps: Legislation, well-formulated legal text with little room for interpretation among road users; Prevention and education; comprehensive information on potential consequences of overloading; Detection and enforcement, use of both static and movable scales along with law enforcement controls; Penalization, financial, operational or institutional penalties.

Recommendation: High-quality infrastructure that is well monitored and maintained is better able to withstand high loads. Inspections at key bottleneck areas, such as toll-posts, with the preferable capability of automation through cameras/weight sensors.

Read More: [Overweight Vehicles: Impact on Road Infrastructure and Safety](#)

4. Vehicle Automation for Road Safety



Problem: 94% of road crashes are caused by human distraction, errors and similar factors, autonomous vehicles could prevent such crashes caused by impaired driving or largely suppress them.

Solution: LMICs should start with small pilot deployments of the most mature automated services; safety-related automated services are preferable, as road safety is the highest motivation for deployment.

Recommendation: LMIC governments and transport industry should be prepared to avoid being caught off guard and to not get left behind the global community.

Read More: [Automated Vehicles – Challenges and Opportunities for Road Operators and Road Authorities](#)

3.3.8. Data

1. Data Collection for Road Safety Interventions



Problem: LMICs road administrations struggle to successfully adopt efficient ways to manage their assets and to utilize their capabilities due to limited resources.

Solution: Data is a key factor to evaluate investments. This is especially important with limited budgets, as effectiveness of road safety measures should be demonstrated and inefficient use of limited funding or an increase of crash risk should be known.

Recommendation: Improved access to data on the effectiveness and costs involved in establishing interventions can lead to ongoing improvements and support for their broader application.

Read More: [Road Safety Manual - Road Safety Management - Safety Data](#)

2. Data Quality to Increase Road Safety



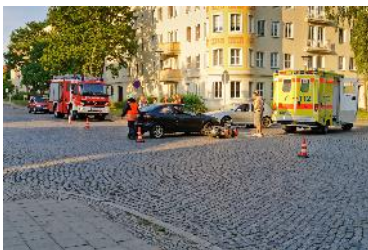
Problem: Data quality is important, as misleading data-points or other pieces of information can lead to wrong conclusions and ineffective decisions being made.

Solution: Strengthened data collection methods locally and nationally contributes to improved evidence-based policies, especially when specific subgroups require more attention such as vulnerable road users, professional drivers or new/inexperienced drivers.

Recommendation: Data collection and analysis can facilitate the maintenance and management of the road network and provide stress-free journey to road users, it is thus important to improve data quality. The more comprehensive the data set, the higher the reliability. Training of data entry staff and improving data collection tools can also contribute to the amelioration of data quality.

Read More: [Road related data and how to use it](#)

3. Crash Data Collection to Reduce Crashes



Problem: While some road crashes are predictable and thus preventable, efforts to reduce crashes in developing countries are further hampered by lack of accurate crash and casualty data.

Solution: Road condition data can be collected using in-vehicle sensors, drones, smart phones, recorded signals. For LMICs, crash data may not be reliable or available. Surveys and other data

sources to measure and monitor road safety are needed. When crash data is analysed, an understanding of the most crucial aspects of crash occurrence needs to be collected in a standardized manner. When using crash data for causation analysis, it is critical to examine multiple angles and aspects to define the cause-and-effect chain as appropriately as possible. Also, it is important to strictly define and in-depth analyse the crash locations and the time period to be investigated.

Recommendation: The main steps to improving data quality include: a review of variable definitions, ensuring they are simple to understand and apply; reinforcing the need to report crashes, e.g. by making it a legal requirement; improving data collection tools (e.g. crash report documents and apparatus, coding procedures); collecting accurate location information; improving training of police and data entry staff; ensuring the data collected is accurate and reliable through quality assurance measures.

Read More: [Road related data and how to use it](#)

4. Traffic Data Collection Can Improve Travel Experience



Problem: Traffic Congestion is a principal challenge due to increase in vehicle numbers and population and a changing balance of transport modes.

Solution: Collecting traffic related data aims for better support of traffic engineering actions for traffic to flow more smoothly and to keep travelers better informed. The data collection methods include traditional sensors, smart sensors that provide real-time traffic information, cameras Closed-Circuit Television (CCTV) systems and GPS signals, as well as Unmanned Aerial Vehicles (UAVs).

Recommendation: Smart Transportation is cost-effective and significant component of Smart Cities, new and emerging transport modes have to be taken into account and have a seat reserved for them in the design of the future transport ecosystems, which should include dedicated data collection schemes for them.

Read More: [Utilizing data to optimize road network operations. A PIARC collection of case studie](#)

3.4. ROAD SAFETY VIDEOS

International experts from PIARC, specializing in the eight critical road safety areas, were carefully chosen to present the valuable material developed within the project. Each of these experts recorded a video presentation focusing on the road safety domain that aligns with their particular area of expertise, which was based on the comprehensive presentations that were created as part of this project. The objective behind these video recordings was to share in-depth knowledge and insights with a global audience, thus contributing to the collective efforts to enhance road safety.

The majority of these video presentations were conducted in English and thoughtfully equipped with English subtitles to ensure accessibility and comprehension for a broad international viewership. This approach aimed to foster inclusivity and information dissemination across diverse linguistic backgrounds. However, it is worth noting that a couple of these recordings deviated from the English language. In a bid to cater to a more **extensive audience in LMICs and acknowledge the multilingual landscape**, Ana Luz Jimenez delivered her presentation on Vehicles in Spanish, while Kaouther Machta presented the subject of Data in French. This diversity in languages further enriched the knowledge-sharing campaign, acknowledging the global nature of road safety challenges.

All of the recordings were subsequently uploaded onto PIARC's official YouTube account, an accessible platform widely recognized for its ease of use and global reach. The knowledge-sharing campaign aimed to facilitate easy access to these informative resources for its members and a broader global audience, especially in LMICs. These videos served as a testament to the organization's dedication to promoting road safety in LMICs and the pivotal role of international collaboration in addressing road safety issues. By offering expert insights in multiple languages, PIARC has demonstrated a commitment to fostering comprehensive understanding and effective road safety strategies on a global scale.

PIARC Road Safety videos published until July 2023:

- [PIARC Road Safety Knowledge Exchange Introduction](#)
- [PIARC Road Safety Knowledge Exchange – Vehicles](#)
- [PIARC Road Safety Knowledge Exchange – Speed](#)
- [PIARC Road Safety Knowledge Exchange – Data](#)
- [PIARC Road Safety Knowledge Exchange – Vulnerable Road Users](#)

4. DISSEMINATION ACTIVITIES

4.1. KNOWLEDGE-SHARING CAMPAIGN

The PIARC Exchange project team comprises the National Technical University of Athens (NTUA) and the AIT Austrian Institute of Technology (AIT), two organizations with extensive experience and understanding of all aspects of road safety, a very good knowledge on road safety issues worldwide and a wide international network. Both organisations have been in close communication with PIARC during the whole duration of the project in order to better organize the dissemination activities and make the most of PIARC's network, experience and knowledge.

PIARC is the World Road Association existing since 1909. During all these years PIARC has produced a plethora of documents (case studies, literature reviews, technical reports) regarding all aspect of road transport. PIARC Exchange project aims to disseminate all of PIARC's road safety knowledge to LMICs through a variety of activities. The **role of PIARC** during the dissemination tentative is:

- To support the project tenderer organization, especially through continuous collaboration with the PIARC communication team during the organization of events.
- To attend the events and give the project presentation created by the tenderer organisation
- To inform the tenderer organization about the availability of the Technical Committee TC3.1 Members in order to better organize the events
- To inform the tenderer organization about more events, where presentations are needed.
- To provide contacts of their extensive network to participate in the dissemination activities.

NTUA and AIT have an extensive experience not only in road safety but also in dissemination activities. Both organisations have participated in a considerable amount of European and international projects, building a large network of organisations and experts. The tenderer organisations are also members in several international organisations. The **role of NTUA and AIT** during the project dissemination was (in cooperation with PIARC Communication team):

- To **organize** all dissemination activities.
- **Disseminate** project material to their network of partners, international organisations and experts.
- **Attend** events and present the project outcomes.
- Promote project events (webinars, in-person events) through the organisation's **social media and newsletters**.
- Include project material in scientific journals.

The project team **NTUA** and **AIT** are responsible for the organization of all dissemination activities which can be configured within a **year-long knowledge sharing campaign**. This endeavor extends across a year, encompassing a focused and sustained effort to promote road safety in low- and middle-income countries. The overarching theme of this year-long campaign is encapsulated under the banner "**PIARC is Boosting Road Safety in LMICs**" which reflects the project's commitment to enhancing road safety on a global scale.

The campaign unfolds throughout the year, with each month of 2023 marked by the release of a "**webitem**" dedicated to one of the road safety areas, studied during the project, following the timeplan presented in Table 1. These webitems are strategically circulated through various channels, including the **PIARC website, newsletters, and social media platforms**. Each webitem is

meticulously curated and designed to provide a rich and interactive experience for its readers. It features a visually engaging card featuring a picture of the PIARC member/expert on the road safety area, which not only adds a personal touch to the campaign but also highlights the collaborative nature of the project. The first and last month of the year an introduction and conclusion of PIARC Exchange project is circulated respectively. The material contained in the webitems and the other campaign activities are presented at the following sections.

Table 1: Dissemination Web-Activities 2023 Timeplan

RS Area	PIARC Member	Webitem
Introduction	Patrick Mallejacq (France)	23-02-2023
Vehicles	Ana Luz Jimenez (Spain)	13-04-2023
Speed	John Barrell (UK)	30-05-2023
Data	Kaouther Machta (Tunisia)	15-06-2023
VRUs	Lawrence Chauke (South Africa)	04-07-2023
Infrastructure	John Milton (USA)	10-2023
Tunnels	Ingo Kaundinya (Germany)	10-2023
Behavior	George Yannis (Greece)	11-2023
Management	Samanth Cockfield (Australia)	11-2023
Conclusion	Nazir Alli	12-2023
Total		10

4.2. WEBITEMS

The creation of each webitem is a process marked by meticulous curation and thoughtful design, intended to offer readers a truly immersive and informative experience. These webitems are carefully crafted to **engage the audience effectively**, combining both informative content and engaging visuals. Central to this design is the inclusion of visually striking cards, as illustrated in Figure 2. These cards prominently feature images of the PIARC member/ expert associated with the road safety area in focus. This highlights the real individuals who have contributed their expertise and insights to the road safety cause, forging a human connection that resonates with the audience and reinforces the sense of shared dedication to the project's goals.

One of the standout features of these webitems is the presentation of four key road safety messages in the form of a "drop-down" accordion-style display (figure 3), allowing users to access detailed information with a simple click. This design promotes **user engagement** and ensures that the campaign's messages are readily accessible and understandable. Furthermore, at the end of each webitem, essential links are thoughtfully added to the developed road safety presentations, factsheets, and videos. This creates a seamless and interconnected web of resources, making it easy for users to delve deeper into the road safety areas that pique their interest. Overall, this year-long knowledge-sharing campaign combines interactive design and rich content to ensure that the

mission of boosting road safety in LMICs remains at the forefront of global consciousness throughout the year.



Figure 2: Webitems released until July 2023

John Barrell, presents you the speed management for road safety. Watch now!

PIARC Technical Committee 3.1 "Road Safety"



Hop on our Exchange project aiming at sharing knowledge about road safety, especially with low and middle-income countries with limited resources but also with more developed economies with different needs and priorities. Thematically, the Road Safety Knowledge project will focus on the Safe System approach, addressing safe roads and roadsides, safe road users, safe vehicles and safe speeds. It is managed for PIARC by the National Technical University of Athens (NTUA) and the Austrian Institute of Technology (AIT).

This month, let's focus on speed!

Speed Limit for Mixed Traffic



Road Improvements for Speed Reduction in LMICs



Reduce Speed - Increase Road Safety



Road Design for Safer Speeds



Figure 3: Example of Road Safety Messages in the webitem

4.3. WEBINARS

In the framework of the campaign “PIARC is Boosting Road Safety in LMICs” two webinars have been organized. **Each webinar was dedicated to 4 of the road safety areas** explored during the PIARC Exchange project. The invitation (Figure 4) to the webinars was uploaded on PIARC website, on PIARC LinkedIn, as well as on the NRSO website and newsletter.

Register for our two international webinars on Road Safety!

Published on 16 August 2023.

Join us online on 5 and 15 September, to discuss and share about road safety practices.

PIARC has an active role in the efforts to improve road safety worldwide through evidence-based studies, technical reports and other type knowledge products. PIARC Technical Committee 3.1 “Road Safety” recognises that 90% of traffic deaths occur in Low- and Middle-Income Countries, and uses this information to assess, identify and share best practices of road safety activities for LMICs through the development of documents and cases studies highlighting international practices and lessons learned. This Technical Committee is focused on making proven countermeasures that are effective in reducing the likelihood and severity of crashes, available to LMICs for consideration in safety project development.



Take part in two international discussions about the most important and challenging road safety areas. The two webinars will enable you to learn about safe infrastructure implementation, road tunnels design and safe operation, speed management, road safety data collection and analysis, management, human behaviour, Vulnerable Road Users, as well as and vehicles. Additionally, these webinars will provide you with solutions and recommendations to build road safety expertise in your country, in order to adopt the Safe System Approach and reduce fatal and serious crashes on your country's road network.

» Register for the Webinar on “Infrastructure, Tunnels, Speed, Data”
(5 September, 14:00 CET)

» Register for the Webinar on “Management, Behaviour, VRUs, Vehicles”
(15 September, 14:00 CET)

Figure 4: Webinars invitation on PIARC website

Both webinars had the same structure:

1. Introduction
2. RS Area A : 20min Topic presentation + 10min discussion
3. RS Area B : 20min Topic presentation + 10min discussion

4. RS Area C : 20min Topic presentation + 10min discussion
5. RS Area D : 20min Topic presentation + 10min discussion
6. Conclusions

The Experts that recorded the road safety videos, presented the road safety area of their expertise during the webinars. The experts could make the same presentation as the one recorded for the webitems, but they were also given the possibility to add more elements to their presentations that they considered relevant to the road safety area.

Participants had multiple avenues to engage in **interactive discussions** during the webinars. They had the option to pose their questions during the dedicated discussion session following each presentation. Additionally, an alternative route was available, where participants could type their questions directly into the Zoom meeting's chat box. This allowed for a seamless exchange of queries and insights. Presenters would subsequently address the collected questions comprehensively after the presentation. The chat box proved to be a dynamic forum for ongoing discussions, with some interactions continuing even after the formal presentation had concluded. Participants found this to be a valuable space for active engagement, with experts actively contributing by typing responses. This approach ensured that no question went unanswered, and the webinar's duration remained unaffected, delivering a satisfying and informative experience for all attendees (Figure 5).

15:53:51 From Francesca Zacchei : Reacted to "October 5th 14:00 ev..." with 🍌
 15:54:04 From Francesca Zacchei : Reacted to "you can book your pa..." with 🍌
 15:54:53 From Ingo KAUNDINYA, PIARC TC4.4 Chair : Replying to "What strikes me most..."

What we have done in Germany are Training Videos, a tunnel safety quiz, Questions in the driving Licence test and Flyers and short articles in the News (e.g. before the summer holidays
 15:55:56 From Alexandra Legendre : Replying to "What strikes me most..."

Excellent ideas
 15:56:18 From MD. ABUL QUASEM SIDDIQUE : May I request the presentation materials .
 15:56:25 From Francesca Zacchei : Reacted to "May I request the pr..." with 🍌
 15:56:40 From MD. ABUL QUASEM SIDDIQUE : e
 15:57:28 From Drago Dolenc : Replying to "thanks"

Hi Ingo. Very nice presentation with confirmation of my personal opinion, that EU Directive successfully upgraded Tunnel safety on acceptable & reasonable level. Question: do we need some additional measures or predominantly just maintain the actual?
 15:58:26 From Ingo KAUNDINYA, PIARC TC4.4 Chair : Replying to "how to effectively m..."

Yes, it is very important that tunnel users leave their car and evacuate in case of a fire. The tunnel Operator must inform the users with real-time communication (PA-Systems, Messages through Radio broadcast, etc.). In case of a fire tunnel users have just a few minutes to self-evacuate before they are caught in the smoke
 15:58:55 From Daniel Govender : Reacted to "All presentation mat..." with 🍌
 16:00:02 From George Yannis (NTU Athens) : Replying to "how to effectively m..."

All the presentations together with the webinar recording will be available at the PIARC website very soon; for both webinars.
 16:04:15 From Ingo KAUNDINYA, PIARC TC4.4 Chair : Replying to "thanks"

Hi Drago. Good to read from you. If the Hazards change, we have to think about the safety level in our tunnels. E.g. with the increasing number of vehicles powered by new energy carriers. I am more concerned regarding vehicles running on hydrogen (fuel cell vehicles) than about the Electric vehicles. And if the traffic composition and volume changed in an existing tunnel we also have to think About possible additional measures.
 16:05:12 From Drago Dolenc : Reacted to "Hi Drago. Good to re..." with 🍌
 16:09:25 From Jarurat Wititanapanit to George Yannis (NTU Athens)(Direct Message) : Hi George, I just join the meeting because in the beginning of the webinar, Zoom showed that this meeting has reached a maximum of participants. Is there any recording that I can catch up later. Thank you very much.
 16:09:43 From Drago Dolenc : Replying to "thanks"

Figure 5: Example of chat box discussion after the Tunnels session of the 1st webinar

In recognition of the **diverse global audience** attending the webinars, a thoughtful post-webinar e-mailing campaign was implemented. Following the conclusion of each webinar, all registrants were promptly provided with a comprehensive package of materials. This package included not only the recording of the webinar, but also all relevant presentation materials, ensuring that attendees had access to the complete wealth of knowledge shared during the session.

This approach was particularly crucial due to the challenging issue of time zone differences, which often made it logistically challenging for many registrants to participate in the webinars in real-time. By furnishing attendees with these resources, the project sought to **eliminate barriers to participation** and promote inclusivity. It enabled those who couldn't attend the live sessions to

catch up at their convenience, making sure that the project's insights reached as many individuals as possible, regardless of their geographical location or scheduling constraints.

The participation numbers for both webinars reveal an interesting trend in **attendee engagement** (table 2). In the first webinar, there were 570 registrants, with 165 participants. This indicates that approximately 29% of the registrants actively joined the webinar, which is a relatively high engagement rate. The second webinar had 540 registrants, and 135 participants, showing a similar engagement rate of about 25%.

Table 2: Webinar participants and registrants

	Registrants	Unique Participants
Webinar 1	570	165
Webinar 2	540	135
Total	700	250

When we consider both webinars collectively, with a total of 700 registrants and 250 participants, the engagement rate remains consistent at around 25%. What's especially noteworthy in this context is the global reach of these webinars, with registrants hailing from **98 different countries** (figure 6). This diverse international participation underscores the relevance and widespread interest in the topic of Road Safety in LMICs, making the webinars valuable platforms for knowledge sharing and networking on a global scale.

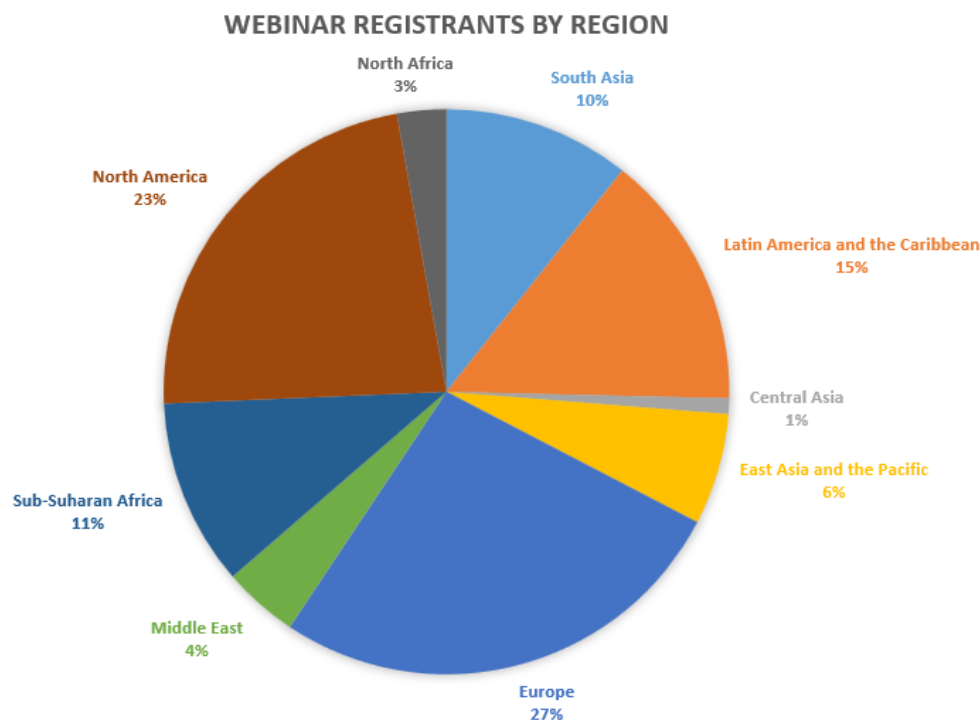


Figure 6: Webinar registrants by region

The distribution of webinar registrants, presented in Figure 7, with 3% originating from low-income countries, underlines the importance of addressing road safety concerns in regions facing unique challenges and often limited resources. While this group represents a smaller portion of the registrants, it signifies a dedicated focus on areas where road safety issues can be particularly acute. This figure emphasizes the webinar's relevance and its potential to deliver valuable insights and solutions tailored to low and middle-income countries, highlighting the commitment to improving road safety in regions where it is most needed. The majority, comprising 58% of the registrants, hailing from high-income countries, demonstrates the **global interest in the topic**. The significant representation from this category suggests that road safety is a concern not limited to low and middle-income nations alone but resonates globally. The 16% of registrants from upper-middle-income countries indicates a substantial presence of countries aspiring to improve their road safety infrastructure and practices. The 23% from lower-middle-income countries highlights the demand for knowledge and solutions in regions where road safety challenges may be more pronounced.

REGISTRANTS' COUNTRIES BY INCOME

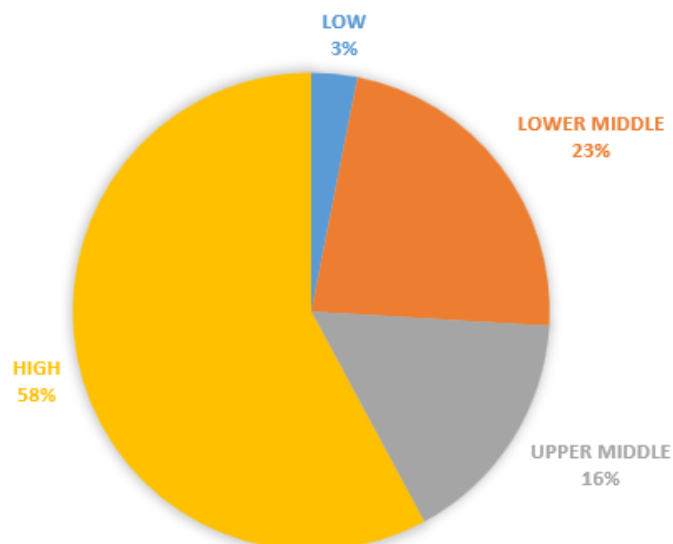


Figure 7: Webinar registrants by country income

4.3.1. 1st webinar

The first webinar was held on 5 September 2023 at 14:00-16:00CET. The program of the webinar was the following:

- Brief **Introduction**
- Road Safety **Infrastructure**: John Milton (Chair of the Technical Committee 3.1)
- Road **Tunnels**: Ingo Kaudinha (Chair of the Technical Committee 4.4)
- **Speeding**: John Barrell (Member of the Technical Committee 3.1)
- Road Safety **Data**: Kaouther Machta (Secretary of the Technical Committee 2.4)
- Discussion and **Conclusions**

The 1st webinar of the knowledge-sharing campaign "PIARC is Boosting Road Safety in LMICs" provided a comprehensive overview of critical aspects related to road safety in LMICs based on the PIARC material. The discussion began with a brief introduction, highlighting the significance of addressing road safety concerns in LMICs, where death rates due to road traffic injuries are three

times higher than in high-income countries (HIC), resulting also in severe economic losses. The session then delved into the importance of road safety infrastructure, emphasizing the need for well-designed road networks, proper signage, and pedestrian-friendly features to reduce accidents. It further explored the specific challenges and solutions associated with road tunnels, drawing attention to the importance of proper maintenance and safety measures. The webinar also addressed the issue of speeding, a major contributor to road crashes, stressing the implementation of speed limits, enforcement strategies, and public awareness campaigns. The significance of reliable road safety data collection and analysis was highlighted, as accurate data is essential for formulating effective policies and interventions. The discussion and conclusions of the webinar underscored the urgency of collaborative efforts, technological advancements, and policy changes to bolster road safety in LMICs, ultimately leading to a safer and more sustainable future for all road users in these regions.

4.3.2. 2nd webinar

The second webinar was held on 15 September 2023 at 14:00-16:00CET. The program of the webinar was the following:

- Brief **Introduction**
- Road Safety **Management**: Samantha Cockfield (Head of Road Safety at the TAC)
- **VRUs**: Lawrence Chauke (Member of the Technical Committee 3.1)
- Human Factors/**Behavior**: George Yannis (Professor at NTU Athens)
- **Vehicles**: Ana-Luz Jimenez Ortega (President of the Task Force 2.1)
- Discussion and **Conclusions**

The 2nd webinar of the knowledge sharing campaign "PIARC is Boosting Road Safety in LMICs" opened with a brief yet compelling introduction, underscoring the pressing need for comprehensive road safety measures in LMICs. Delving into the heart of the matter, the webinar addressed road safety management, paying special attention to Vulnerable Road Users (VRUs) who are often at greater risk in these countries. It emphasized the importance of policies and strategies that prioritize the safety of pedestrians, cyclists, and motorbike riders, highlighting the role of improved infrastructure and traffic management in protecting VRUs.

The discussion then shifted towards an exploration of human factors and behavior, drawing attention to the crucial role of vehicle design and maintenance in reducing accidents. The importance of enhancing public awareness and driver education to address human error and risky behavior on the road was emphasized. The final segment of the webinar was a thought-provoking discussion and conclusion session, which emphasized the necessity for holistic and sustainable approaches in mitigating road safety challenges in LMICs. It stressed the need for cross-sector collaboration, technology adoption, and policy innovations to create a safer and more sustainable road environment for all, ultimately paving the way for reduced crashes and saved lives.

4.4. IN-PERSON EVENTS

In-person events play a pivotal role in the multifaceted knowledge-sharing campaign "PIARC is Boosting Road Safety in LMICs." These events served as **dynamic platforms** that bring together experts, stakeholders, and practitioners in the field of road safety to engage in face-to-face interactions, discussions, and knowledge exchange. The power of in-person events lies in their ability to foster a sense of community, collaboration, and mutual learning. They provide a unique

opportunity for participants to delve deeper into the complexities of road safety, share real-world experiences, and form connections that transcend geographical boundaries.

These events served as a complement to the digital dissemination efforts, allowing for a more **immersive and interactive experience**. Whether it's a workshop, seminar or conference, in-person events provided a forum for in-depth exploration of road safety challenges and solutions. They facilitated hands-on learning, enabling participants to apply best practices and gain practical insights that can be directly implemented in their respective regions. In the context of "PIARC is Boosting Road Safety in LMICs", in-person events become a catalyst for turning knowledge into action, furthering the mission of enhancing road safety in low- and middle-income countries by fostering a vibrant community of road safety advocates and practitioners.

4.4.1. TRB AME40(1) Roadway System Management and Operations, Safety and Resilience Committee

The **Transportation Research Board (TRB)** organised with great success the 102nd Annual Meeting, which was held on 8-12 January 2023 in Washington DC. The meeting program covered all transportation modes, addressing topics of interest to policy makers, administrators, practitioners, researchers, and representatives of government, industry, and academic institutions. More than 600 workshops and sessions were presented. TRB was a great opportunity to present the key PIARC road safety recommendations for LMICs to a wide international audience.

The presentation on PIARC Exchange project outcomes was made as part of the AME40(1) **Roadway System Management, Operations, Safety, and Resilience Subcommittee Meeting**. AME40(1) Subcommittee provides a platform for transportation professionals in both developed and developing countries to share roadway oriented knowledge information for international development. The subcommittee also serves as AME40's knowledge base on roadway related research topics for developing countries. This subcommittee meeting features presentations and technical discussion from international development organizations, academia, governmental transportation agencies of both developed and developing countries on important and trending transportation topics.

4.4.2. NTUA – Road Safety Research Challenges Workshop

NTUA within the framework of the Seventh UN Global Road Safety Week organised with great success a Scientific Workshop titled "**Road Safety Research Challenges**" which was held in Athens (and online) on May 19th, 2023 (Figure 8). The objective of this Workshop was to highlight through an intensive flow of presentations the main findings and challenges of key road safety research projects carried out within the NTUA Department of Transportation Planning and Engineering. A 10 min presentation summarizing the **key road safety recommendations** for each road safety area, that derived from the literature review as part of the PIARC Exchange project, was made during the workshop. The presentation can be found [here](#).

Friday 19 May 2023 13:00-17:00

Workshop in the framework of **7th UN Global Road Safety Week**

StreetsforLife **#RethinkMobility**

2023 Road Safety Research Challenges

unroadsafetyweek.org

The objective of this Workshop is to **highlight**, through an intensive flow of presentations, the **main findings and challenges of key road safety research projects** carried out within the Dept. of Transportation Planning and Engineering of the National Technical University of Athens.

Programme

Register [Here](#)
Connect to Workshop

Opening (13:00)

1. NTUA Road Safety Observatory - **George Yannis**
2. National Road Safety Strategy - Greece 2030 - **Tassos Dragomanovits**

Traffic Automation and Road Safety (13:20)

3. Shared Automation Operating Models for Worldwide Adoption - **Show Maria Oikonomou**
4. Holistic Approach for Driver Role Integration into Automation - **Hadrian Marios Sekidakis**
5. Driver needs and behaviour in automated traffic - **Drive2theFuture Fotini Orfanou**

Driver Behaviour Telematics (13:50)

6. Driver-vehicle-environment interactions and safety tolerance zone - **i-Dreams Eva Michelaraki**
7. Smart city mapping for safer and eco driver behaviour - **SmartMaps Armira Kontaki**
8. Smartphone applications for driver safety behaviour support - **BeSmart Virginia Petraki**

Driver Safety Behaviour (14:20)

9. Predictive Approaches for Safer Urban Environments - **Phoebe Apostolos Ziakopoulos**
10. AI for Vision Zero in Road Safety - **Ivory Thodoris Garefallakis**
11. E-Survey of Road users' Attitudes - **ESRA3 Konstantinos Kaselouris**

Light Lunch (14:50)

Road Safety Data Systems (15:10)

12. Support to the European Road Safety Observatory - **ERSONext Marianthi Kallidoni**
13. Support of technical activities for the development and collection of Road Safety KPIs - **Trendline Katerina Folla**
14. National Access Point Coordination Organisation for Europe - **Napcore Alexandra Laiou**

Road Infrastructure Safety (15:40)

15. A Methodology for Network-wide Road Assessment - **NetSafety Tassos Dragomanovits**
16. Modelling road infrastructure safety - **i-SafeModels Dimitris Nikolaou**
17. Global Road Safety Knowledge Exchange - **Piarc Julia Roussou**

Mobility and Safety (16:10)

18. Micromobility Safety: Back to the Future - **Mimob Katerina Deliali**
19. Unsafe traffic events - **Ute Stella Roussou**
20. Promoting 30km/h speed limit in all Cities - **30 Marathons in 30 months George Yannis**

Reception (16:40-17:00)

Figure 8: Program of the Road Safety Research Challenges Workshop

4.4.3. Boosting Sustainable Road Safety Solutions in LMICs - Workshop XXVII World Road Congress

In the framework of the **XXVII World Road Congress** by PIARC, the team of the PIARC Exchange project organised a **3-hour workshop** with the title « **Boosting Sustainable Road Safety Solutions in LMICs** ». The workshop can be described as an unequivocal success. Divided into two informative 90-minute sessions, with a well-planned 30-minute break between them, the workshop offered a **comprehensive and insightful program** for attendees. Each session followed a consistent structure, commencing with a session moderator's introduction, followed by expert speakers delivering 15-minute presentations, and concluding with a 10-minute Q&A session, which fostered active engagement from the audience.

The workshop's content was highly relevant to the pressing **road safety challenges faced by LMICs**. The first session focused on the practical implementation of the Safe System Approach, the guidance of government actions through legislation, education, enforcement, and technology, and the crucial need to establish sustainable knowledge and research infrastructure in LMICs. It also delved into key road safety management practices and the significance of data analysis in formulating effective safety measures. The second session expanded on this foundation, offering valuable insights into successful case studies in LMICs, strategies for providing safer road infrastructure, considerations of human factors in road safety, and the management of speed for all road users. Additionally, the session provided an essential perspective on conducting road safety assessments on access routes to transit systems.

Overall, the workshop succeeded in delivering **practical and impactful solutions** to address road safety issues in LMICs. It served as a platform for knowledge exchange, best practices, and valuable

networking opportunities. The engagement of expert speakers, the thoughtful structure of the sessions, and the active participation of the audience made this workshop the cornerstone of the knowledge sharing campaign.

The complete structure of the workshop was the following :

Part 1: Effective Road Safety Management in LMICs

Chair/Moderator: Agnes Velez, Federal Highway Administration

- A1 Safe System Approach in practice, Stephen Perkins, Senior Counsellor ITF
- A2 Guiding government action through legislation, education, enforcement and use of technology, Nneka Henry, Head of UN Road Safety Fund
- A3 The need of building a sustainable knowledge and research infrastructure in LMICs Hans Godthelp, Road safety for all, TC 3.1
- A4 Key Road Safety Management Practices, Anastasios Dragomanovits, NTU Athens
- A5 Road safety Data and Analyses, Matts-Ake Belin, WHO
- Q&A

Part 2: Targeted Road Safety Solutions in LMICs

Chair/Moderator Robin Seville, PIARC Deputy Secretary General

- B1 Successful Case Studies in LMICs, Ahmed Ksentini, University of Sfax, TC 3.1
- B2 Providing safer road Infrastructure, John Milton, Washington SDoT, TC 3.1
- B3 Considering Human Factors in Road Safety, Isabela Erdelean, AIT
- B4 Managing Speed for all road users, John Barrell, International Consultant, TC 3.1
- B5 Conducting road safety assessments on access routes to transit systems, Edoardo Mazzia, FRED Engineering
- Q&A

4.4.3.1. Part 1: Effective Road Safety Management in LMICs

The first part of the workshop, titled "Effective Road Safety Management in LMICs," was a comprehensive session that took place from 9:30 to 11:00 CET. It was chaired and moderated by Agnes Velez from the Federal Highway Administration. The segment was structured to provide valuable insights into various aspects of road safety management, emphasizing its importance in LMICs.

The first presentation, was delivered by Stephen Perkins, a Senior Counsellor from the International Transport Forum (ITF). He discussed the "Safe System Approach in practice," highlighting the practical applications of this approach in improving road safety. His presentation aimed to shed light on how the Safe System Approach can be effectively implemented to reduce road accidents and enhance overall safety.

The next presentation, made by Nneka Henry, the Head of the UN Road Safety Fund, revolved around "Guiding government action through legislation, education, enforcement, and the use of technology". She provided insights into the multifaceted role governments can play in enhancing

road safety, covering aspects such as legal frameworks, educational initiatives, law enforcement, and the utilization of technology to enforce safety measures.

Hans Godthelp, from Road Safety for All and PIARC TC 3.1, focused on "The need for building a sustainable knowledge and research infrastructure in LMICs." This segment emphasized the critical importance of gathering accurate data, conducting research, and establishing a knowledge base to address the unique road safety challenges faced by LMICs.

Anastasios Dragomanovits, from NTU Athens, discussed "Key Road Safety Management Practices." This presentation delved into the practices and strategies essential for effectively managing road safety, including risk management and interventions to reduce accidents.

Lastly, Matts-Ake Belin from the World Health Organization (WHO) focused on "Road safety Data and Analyses", highlighting the significance of data in making informed decisions and formulating evidence-based road safety policies. This presentation explored how data can be used to identify trends, risks, and areas for improvement.

This first part of the workshop concluded with a Q&A session, allowing participants to engage with the presenters, seek clarifications, and discuss practical applications of the concepts covered in the presentations. This interactive component provided a valuable opportunity for knowledge exchange and networking among the workshop's participants.

4.4.3.2. Part 2: Targeted Road Safety Solutions in LMICs

The second part of the workshop, titled "Targeted Road Safety Solutions in LMICs," was a crucial segment that took place from 11:30 to 13:00 CET. It was moderated by Robin Seville, the Deputy Secretary General of PIARC, who guided the proceedings. This part of the workshop was dedicated to addressing specific, targeted road safety solutions that are particularly relevant in the context of LMICs.

The first presentation was delivered by Ahmed Ksentini, an expert from the University of Sfax and TC 3.1. His presentation, "Successful Case Studies in LMICs," highlighted real-world examples of effective road safety initiatives implemented in LMICs. By examining these case studies, participants gained valuable insights into practical solutions that have yielded positive outcomes.

John Milton from the Washington State Department of Transportation (SDoT) focused on "Providing safer road Infrastructure." His presentation explored the importance of infrastructure improvements to enhance road safety, emphasizing the critical role of well-designed roads and transportation networks.

Isabela Erdelean from the AIT, addressed the theme of "Considering Human Factors in Road Safety." Her presentation delved into the behavioral aspects of road safety, shedding light on the human factors that contribute to accidents and how these can be addressed through targeted interventions.

John Barrell, an International Consultant and member of TC 3.1, delivered a presentation on "Managing Speed for all road users." His presentation centered on the significance of speed management in ensuring safety for all types of road users, emphasizing the need for appropriate speed limits and enforcement.

The last presentation of the workshop, was made by Edoardo Mazzia from FRED Engineering, and it revolved around "Conducting road safety assessments on access routes to transit systems". This

segment highlighted the importance of safety assessments in improving access routes to transit systems, offering practical guidance on ensuring safe transportation to and from transit hubs.

Similar to the first part of the workshop, the second part concluded with a Q&A session, enabling participants to engage with the presenters, ask questions, and engage in discussions about the specific targeted road safety solutions presented. This interactive element encouraged knowledge exchange and provided a platform for in-depth exploration of these important topics in the context of LMICs.

4.5. DISSEMINATION THROUGH NTUA ROAD SAFETY OBSERVATORY

The mission of the NTUA Road Safety Observatory (www.nrsso.ntua.gr) is to **support the Greek and the International Road Safety Community** with current key road safety knowledge and data, which are gathered, analysed and organised within the research activities of the Department of Transportation Planning and Engineering of the School of Civil Engineering of the National Technical University of Athens, as well as within co-operations with various national and international road safety organisations. The vision of the NTUA Road Safety Observatory is to contribute to the continuous reduction of the number of road accidents and related casualties in Greece, in Europe and worldwide through the scientific support of evidence based decision making for the necessary road safety policies, programmes and measures.

The NRSO website is a dynamic website containing state-of-the art road safety data and knowledge with a network of more than 5.500 road safety experts in Greece (1.500+) and worldwide (4.000+). All important road safety information in Greece, in Europe and globally are uploaded on the NRSO website, which is counting more than 2.100 items and 123 electronic newsletters. In the framework of PIARC Exchange project 6 items have been added on the NRSO website and 4 newsletters have been developed and sent to the wide audience of NRSO, in order to further disseminate the project campaign. All NRSO items and newsletters related to the “PIARC is Boosting Road Safety in LMICs” campaign include the links to PIARC website.

NRSO items until September 2023:

- [PIARC Webinars on road safety in LMICs September 2023](#)
- [PIARC Boosting Road Safety in LMICs focus on VRUs - July 2023](#)
- [PIARC Boosting Road Safety in LMICs focus on Data - June 2023](#)
- [PIARC Boosting Road Safety in LMICs focus on Speed - May 2023](#)
- [PIARC Boosting Road Safety in LMICs focus on Vehicles - April 2023](#)
- [PIARC Boosting Road Safety in LMICs Introduction - February 2023](#)

PIARC – Boosting Road Safety in LMICs



The [World Road Association – PIARC](#) launched an ambitious PIARC Knowledge Exchange project aiming at sharing knowledge about road safety, with the active contribution of [NTUA](#), especially within the Low and Middle Income Countries with limited resources but also in more developed economies with different needs and priorities. The

general theme of this month refers to **Boosting Road Safety**, as presented by the Secretary General [Patrick Mallejacq](#). Throughout the year, PIARC will focus on the Safe System approach, addressing safe roads and roadsides, safe road users, safe vehicles and safe speeds.  

Figure 9: Example of NRSO item

NRSO electronic newsletters until September 2023:

- [NRSO Road Safety Update – September 2023](#)
- [NRSO Road Safety Update – August 2023](#)
- [NRSO Road Safety Update – July 2023](#)
- [NRSO Road Safety Update – March 2023](#)



PIARC – Webinars on Road Safety in LMICs, September 2023



The [World Road Association – PIARC](#) is organising two webinars which will be held online on 5 and 15 September 2023. The topics of the Webinars will be: [Infrastructure](#), [Tunnels](#), [Speed](#), [Data](#) and [Management](#), [Behaviour](#), [VRUs](#), [Vehicles](#). The webinars will provide solutions and recommendations to build road safety expertise in all countries with focus on Low and Middle Income Countries, in order to adopt effectively the **Safe System Approach** and reduce fatal and serious crashes on road network.  Registration is open. 

Figure 10: Example of NRSO Newsletter

5. CONCLUSIONS AND NEXT STEPS

The PIARC Global Road Safety Knowledge Exchange Project has been a **collaborative and far-reaching effort** aiming at harnessing the wealth of knowledge and expertise within the organization and sharing it with the world. The extensive literature review conducted during the project has provided a comprehensive foundation, drawing from over 40 relevant PIARC documents spanning reports, seminars, proceedings, webinars, and manuals, all with a specific focus on road safety in low and middle-income countries. This review was instrumental in shaping the project's direction and the selection of the eight major road safety areas in alignment with the Safe System Approach.

The dissemination materials developed as part of this project are a testament to the commitment to knowledge-sharing and the **ambition to reach a global audience**. These materials, including presentations, factsheets, and road safety messages, have been thoughtfully crafted to convey the essence of the research findings effectively. The knowledge-sharing campaign, executed over a year and titled "PIARC is Boosting Road Safety in LMICs," serves as a **dynamic and engaging platform** to disseminate this wealth of PIARC knowledge. Each month, webitems were distributed via the PIARC website, newsletter, and social media, providing easily accessible insights into each of the eight road safety areas. Moreover, two dedicated webinars served as pivotal milestones in the campaign, addressing four of the road safety areas each, and reaching a broad audience. The in-person events organized as part of the "PIARC is Boosting Road Safety in LMICs" knowledge-sharing campaign served as a complement to the digital dissemination efforts, allowing for a more immersive and interactive experience.

This comprehensive approach, spanning literature review, dissemination material, and dynamic knowledge-sharing campaign, has marked a significant step forward in PIARC's mission to promote safer roads and share expertise worldwide. As the project continues to evolve and adapt to the changing needs of its members and partners, the legacy of the PIARC Global Road Safety Knowledge Exchange Project will endure, fostering a global community dedicated to road safety improvement in LMICs. **The knowledge sharing activities included in-person events, webinars, newsletters and social media posts.**

Even though the project is nearly completed, the PIARC road safety knowledge dissemination will continue. The team has started preparations for **TRA 2024** (Transport Research Arena), a significant event in the realm of transportation research and innovation. This event offers a prime opportunity to showcase the project's findings and further promote the road safety in LMICs agenda. Additionally, a **Special Issue in the esteemed Routes/Roads Magazine** is foreseen to conclude the campaign, containing summaries of all eight road safety areas. This presents a platform to share in-depth insights and research with a broader readership, extending the project's reach and influence within the road safety community. Last but not least, the **dissemination of PIARC road safety material will continue through the well-established communication channels of NTUA and AIT**. This includes their websites, newsletters, and social media platforms. This consistent effort ensures that the project's knowledge reaches an ever-expanding audience, fostering a global network of road safety advocates and enthusiasts.

6. REFERENCES

- [1] Deliverable 2.1 Literature Review
- [2] Deliverable 3.1 Dissemination Plan
- [3] Deliverable 4.1 Knowledge-sharing and dissemination tools and products

7. FACTSHEETS

See below.



PIARC GLOBAL ROAD SAFETY KNOWLEDGE EXCHANGE ROAD SAFETY MANAGEMENT

PIARC TECHNICAL COMMITTEE ON ROAD SAFETY

Technical Committee for Road Safety recognizes that 90% of traffic deaths occur in Low- and Middle-Income countries and uses this information to assess, identify and share best practices of road safety activities for LMICs by developing documents and case studies highlighting international practices and lessons learned. In addition, the technical committee is focused on making proven countermeasures that effectively reduce the likelihood and severity of crashes, available to LMICs for consideration in safety project development.

PIARC ROAD SAFETY MANAGEMENT

A key dissemination tool for road safety developed by the PIARC Road Safety Technical Committee is the Road Safety Manual (RSM). The PIARC RSM is designed to help countries at every stage of infrastructure development fulfill road safety objectives. The Road Safety Management section of the RSM presents strategies for delivering targeted improvements and detailed guidance on planning, designing, prioritizing, implementing and managing these interventions within a country's road network. Additionally, to highlight the importance of road safety management, PIARC has produced various reports, case studies and documents available to all Road Authorities and Stakeholders.



Road Safety Management Fundamentals



Institutional management provides the foundation for improving road safety.

87% of LMICs have established a lead agency to guide the national road safety efforts.

66% of Low and Lower-Middle and 72% of Upper-Middle Income Countries fund the lead agency with the national budget.

63% of the Low and 75% of the Middle-Income Countries have a national strategy for road safety.

Road Safety Management Issues

Achieving global and national road safety goals and targets requires appropriate management capacity. In many LMICs the organizational structure of the management system may suffer from deficiencies: lack of leadership, lack of political priority, lack of funding, and lack of expertise. These deficiencies are weakening the institutional functions and the respective performance across key road safety players.



The success and effectiveness of road safety lead agencies (RSLAs) in coordinating preventative road safety interventions in developing countries are dependent on the following key elements:

- Lead agencies with full-time expert staff, legally endowed powers, permanent funding, political support, and access to relevant data
- Road safety strategies with clear intermediate and final targets and outcomes.
- Funding dedicated to road safety
- High quality road crash and other complementary data
- Understanding of the causes and circumstances at road crash locations.

United Nations Decade of Action for Road Safety



The United Nations' (UN) Second Decade of Action for Road Safety aims to reduce road traffic deaths and injuries by at least 50% until 2030. The Global Plan for the Decade of Action for Road Safety 2021-2030 rejects business as usual and calls on governments and stakeholders to take a new path that prioritizes

and implements an integrated Safe System approach that squarely positions road safety as a key driver of sustainable development. The system design and operation must become forgiving of routine human error. Dealing with human behavior by proactively and integrally creating an environment for safe human behavior should be prioritized. An efficient management system and leadership body are essential for the implementing of an effective road safety improvement program.

Road Safety Management Measures

Adopting a country-wide management system framework is crucial to improving country /jurisdictional road safety performance. This management system is developed in three levels: (i) institutional management functions, (ii) targeted interventions and (iii) desired results.

The performance management framework is delivered primarily by Government Agencies with core road safety responsibilities in government partnerships with civil society and businesses, with the support of the research and professional community.



LMICs should exercise caution in establishing complex targeted strategies and plans until data and appropriate management capabilities are available. They should allow support and power but also enforce good oversight of the agencies.

Road Safety Management Recommendations



Building awareness of Safe System possibilities and application is critical for LMICs.

A small percentage of roads account for a large percentage of deaths and serious injuries – these routes should be identified and addressed at the programme-level. For countries with limited resources or lacking adequate data across the network, these locations are the most important.

To ensure road safety management and leadership and to build road safety expertise, LMICs should:

- Develop a strong lead agency (expert staff, legally endowed powers, funding, political support)
- Develop a robust road safety data system
- Develop a robust set of local guidelines and regulations
- Develop university road safety programs at the bachelor and master's level
- Connect to regional road safety observatories, international networks of universities, and centers of excellence
- Build centers of road safety excellence to develop road safety management and research capacity through institutional reforms.

Read More

- [Road Safety Manual. Road Safety Management](#)
- [Proceedings of the PIARC International Seminar on: "Road Safety in Low- and Middle-Income Countries: Issues and Countermeasures"](#)
- [Proceedings of the Internal Workshop "Policies and Programs for Road Safety Management"](#)
- [Review of Global Road Safety Audit Guidelines with Specific Consideration for Low and Middle Income Countries](#)
- [Well-prepared projects. A PIARC collection of case studies](#)

An aerial photograph of a complex highway interchange with multiple lanes and overpasses. Overlaid on the image is a glowing blue and white digital network of interconnected nodes and lines, resembling a data or communication network. The text is centered over this image.

PIARC GLOBAL ROAD SAFETY KNOWLEDGE EXCHANGE ROAD SAFETY INFRASTRUCTURE

PIARC TECHNICAL COMMITTEE ON ROAD SAFETY

Technical Committee for Road Safety recognizes that 90% of traffic deaths occur in Low- and Middle-Income Countries, and uses this information to assess, identify and share best practices of road safety activities for LMICs through developing documents and case studies highlighting international practices and lessons learned. In addition, the technical committee is focused on making proven countermeasures that effectively reduce the likelihood and severity of crashes available to LMICs for consideration in safety project development.

PIARC ROAD INFRASTRUCTURE

A key dissemination tool for road safety developed by the PIARC Road Safety Technical Committee is the Road Safety Manual (RSM). The PIARC RSM is designed to help countries at every stage of infrastructure development fulfill road safety objectives. In addition, PIARC has produced many infrastructure-related reports, case studies, and documents available to all road authorities and stakeholders. The produced documents include detailed information and up-to-date recommendations on the planning, design, implementation, operation and maintenance of road infrastructure according to the Safe System Approach.



Road Infrastructure Fundamentals



Road infrastructure is often the single most significant factor that contributes to the severity outcome(s) of a crash. In most countries, and especially in urban areas, more than half of all road fatalities and severe injuries happen on less than 10% of the total road network length.

88% of pedestrian travel is on 1-or 2- star roads.

86% of bicycle travel is on 1- or 2- star roads.

67% of motorcyclist travel is on 1- or 2- star roads.

Road Infrastructure Issues

Fatalities and serious injuries are unacceptable consequences of mobility and the design of road transport system worldwide. Current barriers to effective infrastructure treatments include:

- Cost
- Issues in acceptance/compliance
- Design issues
- Implementation issues
- Maintenance



Monitoring, analyzing, and evaluating road networks are usually omitted, although they are equally critical to ensure expected outcomes are met. Likewise, assessment of the safety performance and impact of changes is often overlooked. Acceptance of road safety treatments and countermeasures by road users is a significant issue in LMICs; it is likely that the treatment effectiveness will be higher due to increased compliance.

United Nations Decade of Action for Road Safety



The United Nations' (UN) Second Decade of Action for Road Safety aims to reduce road traffic deaths and injuries by at least 50% from 2021 to 2030. According to the Safe System Approach, road infrastructure must be planned, designed, built and operated to enable multimodal mobility, including shared/public transport and walking and cycling. Focus on

improvements in infrastructure and vehicle safety over the medium to long term will be essential in providing a forgiving system.

Road Infrastructure Measures

Clear and well-defined policies related to the delivery of Safe System Infrastructure are required to drive road safety improvements. Standards, guidelines, and tools are mechanisms to translate policy into action. Care should be taken when borrowing policy from other countries to ensure that it fits local conditions.



Risk assessment should be undertaken analytically by road authorities for each segment and the road network as a whole. For existing road networks, where data is available, assessment of crash data should be undertaken to identify high-risk locations.

Regarding vehicle automation, LMICs should prepare roads for automation making as many roads as possible smarter, starting with the main highways and corridors. This action would imply road infrastructure improvements related to: lane markings, lavements (distress, irregularities), visibility of vertical signs etc, leading to safer roads for both human-driven and automated vehicles.

Road Infrastructure Recommendations



Road Safety Audits (RSA) and Inspections (RSI) enhance safety. Undertake road safety audits on all sections of new roads (pre-feasibility through to detailed design) and complete assessments using independent and accredited experts to ensure a minimum standard of three stars or better for all road users. Also, complete assessment with road safety inspections on critical locations of existing

roads. iRAP provides an affordable solution for RSA and Road Safety Inspections (RSI) and is recommended especially for LMICs.

The costs of road improvements are manageable in context. Studies indicate that as little as 1-3% of road construction budgets are needed to make significant road safety improvements. Furthermore, when the value of lives saved, and serious injuries prevented are considered, the return on investment is positive.

Read More

- [Road Safety Manual. Planning, Design & Operation. Infrastructure Management](#)
- [Proceedings of the "International Seminar and Workshop on Safer Roads by Infrastructure Design and Operation"](#)
- [Documents Relevant to Road Infrastructure and Transport Security A PIARC Literature Review](#)
- [Proceedings of the PIARC International Seminar on: "Road Safety in Low- and Middle-Income Countries: Issues and Countermeasures"](#)
- [Proceedings of the Internal Workshop "Policies and Programs for Road Safety Management"](#)
- [Smart Roads Classification](#)
- [Review of Global Road Safety Audit Guidelines with Specific Consideration for Low and Middle Income Countries](#)
- [Well-prepared projects. A PIARC collection of case studies](#)



PIARC GLOBAL ROAD SAFETY KNOWLEDGE EXCHANGE ROAD TUNNELS

PIARC TECHNICAL COMMITTEE ON TUNNELS

PIARC Technical Committee on Tunnels observes the construction and maintenance of tunnels. The primary purpose of the Tunnels Technical Committee is to develop best-practice approaches and successful solutions that will ensure the safe operation of heavily trafficked urban tunnels. The Tunnels Technical Committee and the Road Safety Committee work together on items related to the road safety in tunnels.

PIARC ROAD TUNNELS SAFETY

The construction and the maintenance of a tunnel are always a challenge, and their realization requires the use of techniques and tools that are increasingly sophisticated and complex. PIARC has responded to the need to bring together the experiences gained in the field of tunnel operations by addressing a range of issues related to the use of road tunnels, such as geometry, equipment and its maintenance, operation, safety, and the environment. PIARC has produced various reports, case studies, and documents available to all Road Authorities and Stakeholders. The PIARC Road Tunnels Manual groups together, summarizes and updates the vast amount of information contained in these various reports and articles.



Significant Incidents in Road Tunnels



Collisions, fires and releases of dangerous materials in road tunnels are incidents that require special attention, because they are, or have the potential to develop into, events with serious consequences. They can endanger people's health, or cause property, infrastructure or environmental damage. Their analysis is also fruitful for the examination of underlying core risk factors.

Road Tunnels Safety Issues

Incidents such as crashes in road tunnels may be no more frequent than those on the open road, as tunnels can provide a safer, more controlled driving environment for road users. However, the consequences of major incidents in the confined tunnel environment are potentially significantly more severe than on the open road and usually raise stronger reactions from the public.



Tunnels are enclosed structures with confined space that can cause, for some users, feelings of anxiety and particular behavior especially during a collision. Therefore, the proactive actions and reactions of those in charge of operating the road tunnels is a decisive factor in ensuring the safety of people during an incident.

Existing tunnels require specific approaches and tools to identify and evaluate the need for safety upgrade programs. Even where previous improvement programmes have been carried out, Existing tunnels may not be in line with the current safety standards because of subsequent regulation updates.

Human Factors for Tunnel Road Safety



Drivers need to be more aware of how they should behave in tunnels. A long stretch of road (150-200m) before the tunnel should not contain too many traffic signs or signals. The tunnel safety facilities should be easily recognizable even in normal traffic. Alarm signals should be provided by multiple-redundant sources (e.g. public address systems and variable message signs).

The proactive actions and reactions of those in charge of operating the road tunnels are decisive factors in ensuring the safety of people during an incident. Therefore, it is essential to organize consultation and cooperation during the tunnel design process and define measures necessary to minimize the time required to mobilize the emergency services.

Tunnel Road Safety Measures

A safe tunnel environment can only be achieved by an optimized and balanced interaction of all aspects influencing safety, including infrastructure, equipment, user behavior, operational practices, and emergency response procedures. In addition it is necessary to adopt measures preventing the occurrence of significant incidents, mitigating the consequences of the events, as well as measures supporting self-rescue and emergency.



A structured approach for assessing and preparing refurbishment programs for existing tunnels includes two tasks. The first task aims to assess the current situation of the tunnel to identify the current safety level. The second task aims to define the future situation after any upgrade or refurbishment works which should be acceptable in relation to the defined safety level goal.

Tunnel Road Safety Recommendations



It is important to adopt the integrated approach during the design of road tunnels. There is a need to establish the safety concept in an early design stage and provide it at all project stages. Risk assessment can be used to address the specific safety features of a tunnel system

and their impact on safety.

Specific and appropriate training is essential, as well as establishing proper protocols and post-crash intervention sequences. The design of tunnels and their operation should take account of human factors, as it should ensure that the measures implemented are likely to be well understood and adopted by the users.

Read More

- [PIARC ROAD TUNNELS MANUAL](#)
- [Technical report 2012 R23 "Current practice for risk evaluation for road tunnels"](#)
- [Technical report 2016 R35 "Experience with significant incidents in road tunnels"](#)
- [ROAD SAFETY IN TUNNELS](#)
- [Technical report 2016 R06 "Improving safety in road tunnels through real-time communication with users"](#)
- [Technical report 2008 R02 "Risk analysis for road tunnels"](#)
- [Technical report 2008 R17 "Human factors and road tunnel safety regarding users"](#)

An aerial photograph of a complex highway interchange with multiple lanes and overpasses. Overlaid on the image is a glowing blue digital network of interconnected nodes and lines, resembling a data or communication network. The text is centered over this image.

PIARC GLOBAL ROAD SAFETY KNOWLEDGE EXCHANGE VULNERABLE ROAD USERS

PIARC TECHNICAL COMMITTEE ON ROAD SAFETY

PIARC's Technical Committee for Road Safety recognizes that 90% of traffic deaths occur in Low- and Middle-Income Countries, and uses this information to assess, identify and share best practices of road safety activities for LMICs by developing documents and case studies highlighting international practices and lessons learned. In addition, the technical committee is focused on making proven countermeasures that are effective in reducing the likelihood and severity of crashes, available to LMICs for consideration in safety project development.

PIARC VULNERABLE ROAD USERS (VRUs) SAFETY

For years, pedestrians, children, elderly, disabled persons, cyclists, moped riders, and other VRUs have been considered in the PIARC guidelines on road safety. PIARC has established a definition for VRUs, focusing on road users who are at great risk because of insufficient physical protection or because of a relatively high- speed difference with potentially conflicting modes. PIARC has provided a detailed presentation of the relevant safety issues and with an overview of possible design and remedial measures for each type of VRUs sub-group. PIARC has also produced various reports, case studies, and documents on VRUs Safety, which are available to all Road Authorities and Stakeholders.



VRU Safety Fundamentals



Each year, 1.35 million people are killed on the world's roads, and a further 50 million are injured, with the vast majority of these (over 90%) occurring in LMICs. A critical share of these fatalities (over 54%) are VRUs. Death rates due to road traffic injuries in LMICs are three times higher than in high-income countries (HIC). In most LMICs, the majority of road users are vulnerable road users –

pedestrians, cyclists and those using motorized two or three-wheelers. Despite the increased global attention and progress in policymaking at the national level, the number of road casualties increased in 87 LMICs since 2013.

VRU Safety Issues

Low- and Middle-Income Countries (LMICs) have greater variety and intensity of traffic, mixing the slow-moving and vulnerable non-motorized road users, and motorcycles with fast-moving motorized vehicles compared to high-income countries. Fatalities amongst VRUs are higher in LMICs due to lack of resources to provide or maintain adequately safe infrastructure, land use planning problems and lack or inadequacy of post-crash response services as well as unsafe users' behavior due to a lack of proper training and education.



VRUs may put themselves at risk or even be a threat to others. VRU crashes occur due to the following:

- Careless crossing, jaywalking,
- Disobeying traffic lights / misjudgment of speed gaps,
- Lack of proper facilities,
- Driver inexperience or misjudgment.

United Nations Decade of Action for Road Safety



The United Nations (UN) Second Decade of Action for Road Safety aims to reduce road traffic deaths and injuries by at least 50% until 2030. The Global Plan for the Decade of Action for Road Safety 2021-2030 rejects business as usual and calls on governments and stakeholders to take a new path that prioritizes and implements an integrated Safe System approach

that squarely positions road safety as a key driver of sustainable development. The system design and operation must become forgiving of routine human error from all sides of the road. Designers and operators should deal with human behavior proactively and integrally by creating an environment for safe human behavior.

VRU Safety Measures

Measures to enhance VRU safety along road sections include: visual segregation by edge markings, wider and paved shoulder, appropriate traffic lane width, segregated footpath, a segregated lane for cyclists or mopeds and proper crossing facilities.

A key requirement of road design for reduction of VRU crashes includes providing a safe field of view for all road users. Additionally, the road environment must correspond with the road user's perception logic, covering as many angles/points of view as possible. Road Safety Audits (RSA) and Inspections (RSI) enhance safety. Target elements for RSA/RSI are the risk factors for crash occurrence or injury severity. The point of view of every type of road user should be considered, along with the way interactions happen between different types of road users or transport modes. Post-crash care should be enhanced.



VRU Safety Recommendations



Road design should include a self-explaining and failure-forgiving road according to the needs of the road users. Therefore, a paradigm shift from designing roads for cars to focusing on VRUs is needed. A key message for road engineers and designers is to consider VRUs in the design process and include self-questions such as “what if a child/blind/elderly/disabled person is crossing”.

Checklists can be used in the design process to ensure that safety aspects are not overlooked.

IRAP star rating is a tool that indirectly measures the safety of roads, and allocation should be provided to ensure that most of the roads are at least 3 stars and above.

To ensure compliance, measures of communication, education, and enforcement, including special warning signs and campaigns, should be employed.

Read More

- [Vulnerable Road Users: Diagnosis of Design and Operational Safety Problems and Potential Countermeasures](#)
- [Addressing Road Safety Worldwide: Vulnerable Road Users, Human Factors & RS in LMIC](#)
- [Proceedings of the PIARC International Seminar on: “Road Safety in Low- and Middle-Income Countries: Issues and Countermeasures”](#)
- [Review of Global Road Safety Audit Guidelines with Specific Consideration for Low and Middle Income Countries](#)
- [Road Safety Catalogue of Case Studies](#)



PIARC GLOBAL ROAD SAFETY KNOWLEDGE EXCHANGE HUMAN FACTORS & BEHAVIOR

PIARC TECHNICAL COMMITTEE ON ROAD SAFETY

PIARC's Technical Committee for Road Safety recognizes that 90% of traffic deaths occur in Low- and Middle-Income Countries and uses this information to assess, identify and share best practices of road safety activities for LMICs through the development of documents and case studies highlighting international practices and lessons learned. In addition, the technical committee is focused on making proven countermeasures that effectively reduce the likelihood and severity of crashes available to LMICs for consideration in safety project development.

PIARC HUMAN FACTORS AND BEHAVIORAL SAFETY

A key dissemination tool for road safety in the PIARC Technical Committee on Road Safety, is the Road Safety Manual (RSM). PIARC's RSM is designed to help countries at every stage of infrastructure development to fulfill road safety objectives. In addition, PIARC has highlighted the importance of understanding human factors to increase road safety levels. PIARC has also produced various reports, guidelines, case studies, and human factor documents that are available to all road authorities and stakeholders.



Human Factors

Human factors causing crashes involve:

- The 6-second rule: The average driver needs 4-6 seconds to adapt to a new driving requirement.
- The Field of View Rule: The road must offer road users a safe field of view and pre-program the correct choice of speed.
- The Logic Rule: The road has to follow the driver's perception logic, formed by their experience and recent perceptions.



Critical locations include:

- Junctions, intersections, or crossings
- Lane splits/merges
- Bus/tram stops
- Motorway entrances/exits
- Monotonous approaching sections/surroundings
- Discontinuous bends in roads

Human Behavioral Risk Factors



Despite the progress in improving legislation across the five key behavioral risk factors (speeding, drink-driving, helmet use, seatbelt use, and distracted driving), enforcement remains a major challenge in most countries, especially LMICs.

For example, 5%-35% of road deaths are reported as alcohol-related.

Wearing a seatbelt reduces the risk of death and serious injury among drivers and front seat occupants by 45%-50% and among rear seat occupants by 25%.

United Nations Decade of Action for Road Safety



The United Nations (UN) Second Decade of Action for Road Safety aims to reduce road traffic deaths and injuries by at least 50% until 2030. In addition, the road transport system must anticipate and accommodate human errors and prevent consequent death or serious injury. The development of an

effective road safety strategy starts from the adoption of the Safe System approach, to prevent fatal and serious crashes. However, a Safe System cannot be achieved unless roads are designed and managed to account for human factors and human risk-taking behaviors.

Safe Road Use Measures

It is important to ensure that road infrastructure accounts for the needs of all road users and is designed to facilitate safe behaviors, including clear road signage and road markings that are intuitive, use of roundabouts and traffic calming designs such as speed humps, physical separation of road users including use of protected bicycle lanes and pedestrian -only zones.



Safety evaluations should be based on human factors and behavior methods. Dedicated on-site inspections should be performed by an interdisciplinary team of designers, safety engineers, behavioral safety, and human factors experts; following a specific inspection protocol is essential. Road Safety Authorities must enact and enforce road safety legislation to deter and address risk taking behaviors. Establish a dedicated enforcement agency, provide training, and ensure adequate equipment for enforcement activities. Legislation must be consistently enforced and adjudicated in order to be effective.

Human Factors Safety Recommendations



The road transport system needs to anticipate and accommodate human errors and prevent consequent death or serious injury, in all types of road environments and circumstances (e.g., even in temporary environments such as work zones).

An improved approach to implement road safety inspections and assessments is to perform a road safety evaluation based on the Human Factors Method (RSE_HF presented in the PIARC report “Road Safety Evaluation based on Human Factors Method”), mainly by including human factor experts in the RSI team. This approach supports LMICs that are still at the starting phase of the road safety management process. LMICs must be open to considering strategies that are tested or have been successfully implemented in other countries and regions. This might include the adoption of novel technologies such as alcohol interlocks and seat-belt warning systems.

Read More

- [Road Safety Manual. Planning, Design & Operation. Designing for Road Users](#)
- [Road Safety Evaluation based on Human Factors Method](#)
- [The Role of Road Engineering in Combating Driver Distraction and Fatigue Road Safety Risks](#)
- [Addressing Road Safety Worldwide: Vulnerable Road Users, Human Factors & RS in LMIC](#)
- [Human Factors Guidelines for a Safer Man-Road Interface](#)
- [Proceedings of the PIARC International Seminar on: “Road Safety in Low- and Middle-Income Countries: Issues and Countermeasures”](#)

An aerial photograph of a complex road interchange with multiple lanes and overpasses. Overlaid on the image is a glowing blue and white digital network of interconnected nodes and lines, resembling a data or communication network. The text is centered over this graphic.

PIARC

GLOBAL ROAD SAFETY

KNOWLEDGE EXCHANGE

SPEED SAFETY

PIARC TECHNICAL COMMITTEE ON ROAD SAFETY

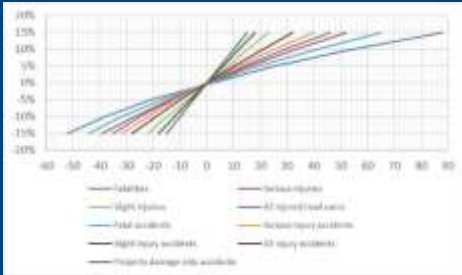
PIARC's Technical Committee for Road Safety recognizes that 90% of traffic deaths occur in Low- and Middle-Income Countries, and uses this information to assess, identify and share best practices of road safety activities for LMICs by developing documents and case studies highlighting international practices and lessons learned. In addition, the technical committee is focused on making proven countermeasures that are effective in reducing the likelihood and severity of crashes, available to LMICs for consideration in safety project development.

PIARC SPEED SAFETY

A key dissemination tool for road safety developed by the PIARC Road Safety Technical Committee is the Road Safety Manual (RSM). The PIARC RSM is designed to help countries at every stage of infrastructure development to fulfill road safety objectives. PIARC has highlighted that managing speed is critical to the effectively implementing the Safe System Approach. PIARC has produced a variety of speed-related reports, case studies and documents available to all Road Authorities and Stakeholders. Therefore, produced documents include detailed information and up-to-date recommendations on the planning, enforcement, and implementation of speed limits and speed control systems.



Speeding Safety Basic Facts



Speed is consistently considered at the core of the most important risk factors of road crash occurrence. For example, a 15% increase in the mean speed induces an 88% increase in road crash fatalities. On the other hand, a 15% reduction in the mean speed leads to a 52% reduction in road crash fatalities.

The highest impact speed at which a driver can survive is:

- 80km/h for a head-on collision,
- 60km/h for a side-impact collision,
- 30km/h without the use of any safety equipment.

Speeding Safety Issues

Crash occurrence is connected to the difference between the speed defined as “safe” for the road and road user mix and the speed chosen by the driver. LMICs have greater variety and intensity of traffic, mixing the slow-moving and vulnerable non-motorized road users, and the motorcycles with fast-moving motorized vehicles.



Behavioral issues also lead to conscious violation of traffic rules and regulations, deliberately exceeding the speed limit. Other behavioral issues leading to speeding are:

- Difficulty in understanding complex infrastructure and traffic situations,
- Slow reaction times,
- Stress,
- Fatigue,
- “Crowd behavior”.

United Nations Decade of Action for Road Safety



The United Nations (UN) Second Decade of Action for Road Safety aims to reduce road traffic deaths and injuries by at least 50% from 2021 to 2030. The Safe System approach – a core feature of the Decade of Action – recognizes that road transport is a complex system and places safety at its core. It also recognizes that humans, vehicles and the road

infrastructure must interact in a way that ensures a high level of safety. Managing speed is critical to the effective implementation of the Safe System approach. In urban areas where there is a mix of road users, a maximum speed limit of 30km per hour should be established

Speed Safety Measures

Low-cost countermeasures, such as ‘soft/light engineering’ interventions, can help achieve effective speed reductions. Systems such as speed bumps, lane narrowings, chicanes, new pedestrian crossing solutions, optimized cross section sharing to flow-speed curves analysis, and varying wearing course material are essential techniques in urban areas in LMICs.



Self-explaining roads ensure that drivers perceive the right behavior being asked of them and adjust their speed accordingly. In doing so, the gap between safe speeds and actual operating speeds is reduced to the greatest extent possible. To achieve this, road authorities should locally manage within the context and needs of the given road environments, so that the road is self-explaining. For example, managing speeding through behavioral change or speed compliance regulations could be done by enforcement, education, demerit points and fines to road users.

Speed Safety Recommendations



Speed limits must be credible, homogeneous, and visible by day and night, maintained over time, and consistent with achieving driver compliance, ideally coupled with enforcement.

Speed management is about regulating traffic speed and planning and designing appropriate road layouts and networks for safe travel speeds for all road users.

With the help of technology, speed management is now more manageable through speed-limiting technology or intelligence speed adaptation where speed limiters and data recorders are involved.

Road authorities should consider new enforcement strategies like section control, woonerfs, as well as explore the potential benefits of speed control systems like ISA in cars, motorcycles, and motortricycles.

Read More

- [Road Safety Manual. Planning, Design & Operation. Roles, Responsibilities, Policy Development and Programmes](#)
- [Proceedings of the "International Seminar and Workshop on Safer Roads by Infrastructure Design and Operation"](#)
- [Road Safety Manual. Planning, Design & Operation. Designing for Road Users](#)
- [Road Safety Manual. Planning, Design & Operation. Intervention Selection](#)
- [Setting Credible Speed Limits](#)
- [Proceedings of the "International Seminar and Workshop on Safer Roads by Infrastructure Design and Operation"](#)
- [Proceedings of the PIARC International Seminar on: "Road Safety in Low- and Middle-Income Countries: Issues and Countermeasures"](#)



PIARC GLOBAL ROAD SAFETY KNOWLEDGE EXCHANGE VEHICLE SAFETY

PIARC TECHNICAL COMMITTEE ON ROAD SAFETY

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PIARC VEHICLES SAFETY

One of the most important purposes of the PIARC Road Safety Technical Committee is to update the Road Safety Manual. The PIARC RSM is designed to help countries at every stage of infrastructure development fulfill road safety objectives. PIARC has highlighted the contribution of safe vehicles increasing road safety. For this purpose, PIARC has produced reports, case studies, and documents related to vehicle safety, available to all road authorities and stakeholders.



Vehicle Safety Fundamentals



In vehicles, active safety systems play a preventive role in mitigating crashes by providing an advance warning or by providing the driver with additional assistance in steering/controlling the vehicle. On the other hand, passive safety systems intend to limit the damage caused to occupants of a vehicle and other road users in the event of a road crash.

The UN has prioritized 8 Vehicle Safety Standards:

1-2: Frontal impact protection and side impact protection (R94 and R95)

3: Electronic stability control (R140)

4: Pedestrian protection (R127)

5-6: Seat-belts and seat-belt anchorage (R14 and R16)

7: Child restraints (R129)

8: Motorcycle anti-lock braking systems (R78)

No Low-income Countries have implemented any of the eight priority UN vehicle safety standards.

Only 4% of Lower Middle-income Countries have implemented the priority UN vehicle safety standards R94, R95, R140, R127 and R78.

Vehicle Safety Issues

The various vehicles' safety features have penetrated countries to different extents. "Standard equipment" in new vehicles differs between countries. In many LMICs vehicle safety is not effectively regulated through design standards or maintained through mandatory vehicle inspection schemes. Depending on regulations in place per destination market, vehicles are produced with different safety features. Automobile companies frequently "de-specify" life-saving features in newer models sold in countries where regulatory frameworks do not require these features.



United Nations Decade of Action for Road Safety



The United Nations (UN) Second Decade of Action for Road Safety, aims to reduce road traffic deaths and injuries by at least 50% from 2021 to 2030. The Safe System approach – a core feature of the Decade of Action – recognizes that road transport is complex and places safety at its core. It also recognizes that humans, vehicles and the road infrastructure

must interact in a way that ensures a high level of safety. Based on the Safe System Approach vehicle safety is increasingly critical to preventing crashes and contributes to substantial reductions in the number of deaths and serious injuries on the road. Therefore, vehicles should be designed to ensure the safety of those inside and those outside them.

Vehicle Safety Measures

Governments may provide, through legislation, a minimum set of safety standards for vehicles. It is necessary to ensure the adoption of high-quality harmonized safety standards, through mandatory certification and registration systems for new and used vehicles based on established safety requirements and combined with routine inspections. Regulations for the export and import of used vehicles that are accompanied by inspections at entry and exit points, and mandatory periodic technical inspections of vehicles, are of critical importance for LMICs. Furthermore, building demand for safer vehicles by encouraging independent new car assessment programs could increase road safety. Regarding automated vehicles, LMICs should start with small pilot deployments of the most mature automated services; safety-related automated services are preferable, as road safety is the highest motivation for deployment.



Vehicles Safety Recommendations



Providing a safe operating environment for road users is a primary responsibility of the governments and industry-focused organizations that design, build, maintain, and regulate roads and vehicles. Harmonized legislative standards for vehicle design and technology should be applied to ensure a uniform and acceptable level of safety worldwide.

Also, periodic inspections for issuing required legal certificates and random inspections on the roads should be conducted.

A well-chosen combination of passive safety measures and new techniques like electronic stability control may give a strong benefit to LMICs' road safety. Regarding vehicle automation, LMIC governments and the transport industry should be prepared to avoid being caught off guard and not to get left behind by the global community.

Read More

- [Road Safety Manual - Road Safety Management - The Safe System Approach](#)
- [Automated Vehicles – Challenges and Opportunities for Road Operators and Road Authorities](#)
- [Overweight Vehicles: Impact on Road Infrastructure and Safety](#)



PIARC GLOBAL ROAD SAFETY KNOWLEDGE EXCHANGE DATA

PIARC TECHNICAL COMMITTEE ON ROAD SAFETY

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PIARC DATA

A key dissemination tool for road safety developed by the PIARC Road Safety Technical Committee is the Road Safety Manual (RSM). The PIARC RSM is designed to help countries at every stage of infrastructure development to fulfill road safety objectives. PIARC recognizes the importance of data collection, analysis and evaluation to increase road safety levels, better plan transport interventions and improve travel experience. Therefore, PIARC has produced and made available data-related reports, case studies and documents. The documents include detailed information and up-to-date recommendations on the collecting, processing and using all types of road-related data.



Data Fundamentals



Efforts to reduce crashes in developing countries are hampered by a lack of accurate crash and casualty data which hampers the ability to effectively plan, design and operate the road system safely. In addition, LMIC road administrations struggle to successfully adopt efficient ways to manage their assets due to limited resources. Data collection helps

governments prioritize funding more effectively, monitor the impact of investments, and strengthen inter-agency collaboration and efficiency. Data quality is important, as misleading data points or other pieces of information can lead to wrong conclusions and ineffective decisions.

Data Types and Collection Methods

The relevant data types to increase road safety and better plan transport systems are:

- Crash Data: Collected through police, emergency, and trauma data
- Road and Roadside data, collected through an inventory of data, including in-field reviews, light detection and ranging (LiDAR) data collection, video, photo and other digital methods
- Road condition and Maintenance related data: collected via in-vehicle sensors, smartphones, unmanned aerial vehicles (UAVs), and recorded sound levels.
- Traffic-related data: collected using traditional sensors, smart sensors, CCTV systems, GPS signals, and UAVs.
- Large-scale data on travelers behaviors: collected via GPS systems, cellular networks, social media services, Automated Fare Collection Systems.
- Road safety-related data: collected via sensors, smartphones, ultrasonic sensors, GPS, and GMS.
- Data from connected and automated vehicles.
- Data related to road technology applications.

The United Nations Decade of Action for Road Safety



The United Nations (UN) Second Decade of Action for Road Safety aims to reduce road traffic deaths and injuries by at least 50% until 2030. The Safe System approach – a core feature of the Decade of Action – recognizes that road transport is a complex system and places safety at its core. It also recognizes that humans, vehicles and the road infrastructure must

interact in a way that ensures a high level of safety. Data collection and analysis can accelerate the development of an effective road safety strategy based on the notion of the Safe System approach, to prevent fatal and serious crashes. Additionally, data collection and analysis can facilitate the maintenance, operation and management of the road network and provide stress-free journeys to road users. Strengthened data collection methods locally and nationally contribute to improved evidence-based policies on vulnerable road users.

Data Measures

For LMICs, crash data may not be reliable or available. Surveys and other data sources to measure and monitor road safety are needed. When crash data is analyzed and evaluated, an understanding of the most crucial aspects of crash occurrence needs to be collected in a standardized manner.



The main steps to improving data quality include: a review of variable definitions, ensuring they are simple to understand and apply; reinforcing the need to report crashes; improving data collection tools; collecting accurate location information; improving training of police and data entry staff; ensuring the data collected is accurate and reliable through quality assurance measures.

Data Recommendations



Improved access to data on the effectiveness and costs of establishing road safety interventions can lead to ongoing improvements and support for their broader application.

Data is a key factor in analyzing and evaluating investments. This is especially important with limited budgets, as the effectiveness of road safety

measures should be demonstrated and inefficient use of limited funding or an increase in crash risk should be known.

Read More

- [Road Safety Manual. Road Safety Management. Safety Data](#)
- [Road related data and how to use it](#)
- [Utilizing data to optimize road network operations. A PIARC collection of case studies](#)
- [Proceedings of the PIARC International Seminar on: “Road Safety in Low- and Middle-Income Countries: Issues and Countermeasures”](#)
- [Proceedings of the World Road Congress 2019](#)
- [Proceedings of the Internal Workshop “Policies and Programs for Road Safety Management”](#)



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