Saving More Lives

Saving Lives through Mobility Technology

Whitepaper

Autoliv

Background

The burden of road traffic fatalities has gained substantial traction at the highest levels of political discussion since the First UN Ministerial Conference for Road Safety in 2009. This led to the first UN Global Decade of Action for Road Safety, and the formulation of an ambitious global target to reduce road fatalities by 50% over the decade 2011–2020. This target was reinforced through UN General Assembly Resolution 64/255 and subsequently 71/313. The latter introduced road safety as an integral part of the UN Sustainable Development Goals. However, the 50% reduction target was not achieved by 2020.

At the Third Ministerial Conference on Road Safety, a renewed declaration was signed, which served as the basis for the subsequent UN General Assembly Resolution 74/299 and the Second UN Global Decade of Action 2021–2030, with a new target of 50% reduction by 2030.

In 2023, the World Health Organization (WHO) estimated that 1.19 million lives are lost annually due to road traffic crashes, making it the leading cause of death for individuals aged 5–29. Progress towards the global target has varied significantly by region. The European region, primarily consisting of high-income countries (HIC), has seen the greatest reduction in fatalities. In contrast, the African region has experienced the highest increase in road traffic deaths (World Health Organization, 2023).

The rising number of fatalities in many low- and middle-income countries (LMIC) is exacerbated by the substantial increase in powered two-wheeler (PTW) riders and related fatalities. Globally, the number of PTW riders has tripled, with some regions witnessing up to a fivefold increase over the past decade (Bishop & Courtright, 2022; World Health Organization, 2023).

There is a need for bold policy changes and the implementation of countermeasures across all pillars of the Safe System if the 2030 goal is to be achieved in the face of increasing numbers of fatalities. Autoliv is a leader in automotive safety solutions and we have been dedicated to saving lives for over 70 years. In 2024, our products saved approximately 37,000 lives and reduced around 600,000 injuries. Recognising that over 50% of global fatalities involve vulnerable road users (VRUs: including pedestrians, cyclists, and PTW riders), we also develop safety solutions for motorcyclists. Our work and beliefs are deeply rooted in the Safe System approach, which has proven its effectiveness in several countries and is the backbone of the second decade of action.

In this whitepaper, we present insights from our research to highlight the impact of vehicle technology in saving lives and propose recommendations for reaching the global goal of halving road traffic fatalities.

Protecting Road Users

Car Occupants

Our research has shown that reducing vehicle speed significantly decreases crash severity. For example, Mroz et al. (2023) found that lowering speed from 100 km/h to 80 km/h in head-on collisions can reduce crash severity by up to 45% and compartment intrusion by up to 64%. Similarly, Lubbe et al. (2024) used injury risk curves to recommend safe speed limits of 80 km/h on undivided roads and 60 km/h at intersections, to maintain low injury risks. Their analysis shows that, at speeds from 65–90 km/h, there is a 10% risk of an MAIS 3+[1)] injury in a crash.

An expert consensus agreed that future automatic emergency braking (AEB) systems can reasonably reduce speeds in frontal head-on collisions by 20 km/h to allow a survivable head-on collision at 80km/h (Rizzi et al., 2023). Reducing speed is crucial for maintaining occupant compartment integrity[2)] and ensuring the effectiveness of restraint systems for all occupants. AEB can significantly reduce crash speeds, enhancing the effectiveness of restraint systems (Mishra et al., 2022; Puthan et al., 2022). Intelligent Speed Assist is another technology that can support drivers by maintaining speed limits, further supporting the effectiveness of restraint systems.

The vehicle structure and various protective safety technologies, such as seatbelts, airbags, and helmets, play an important role in dissipating and managing the violent forces during a traffic collision. The technologies have been extensively tested over the years in HICs, and the wealth of knowledge acquired can be applied in LMICs, where regulations and requirements are not yet as mature. The basic requirements for vehicle safety are integrated into the UN framework for road safety through two key UN agreements: the 1958 Agreement[3)] and the 1998 Agreement[4)]. These agreements, which enable countries to structure their standards to international best practices, should serve as the minimum level of vehicle safety.

Once this minimum level of vehicle safety is ensured, occupant characteristics such as age, size, and seating position can be considered to improve protection further. For example, older adults and females are more vulnerable to certain types of injuries (Ranmal et al., 2024). Due to human diversity and the variations in how we ride or sit in vehicles, virtual testing tools are essential to capture the differences in injury mechanisms and the variety of crash scenarios.

The development of morphed human body models (MHBMs) marks a significant step in virtual testing. By accounting for individual differences in sex, height, and weight, these models offer more accurate injury predictions than previously possible. Virtual testing will be key to evaluating various crash configurations and developing restraint systems that are more adapted to these needs. Through MHBMs, researchers can acquire a deeper understanding of injury mechanisms and potential safety improvements. The study by Larsson et al. (2024) suggests that even a small set of MHBMs can be used for predicting injury outcomes for diverse populations: only five to seven models of each sex are required to create predictive models of injury outcomes in a large range of scenarios.

To further improve equitable occupant protection, the UN has established the Informal Working Group on Equitable Occupant Protection under WP29/GRSP[5)] to explore virtual crashes. There is an increasing interest in virtual testing, as it is a cost-effective procedure capable of evaluating a wider range of crash safety scenarios. However, establishing a regulatory framework, standards, and guidelines is essential to ensure the reliability of virtual testing with MHBMs.

The IWG's Terms of Reference include:

- Identifying issues for regulatory upgrades and research gaps.
- Proposing changes to crash safety regulations for greater diversity.
- Assessing virtual crash testing for improving equity in occupant protection.
- Identifying shortcomings in existing regulations and standards.

The IWG, with around active 70 participants, is continuously analysing research data and will continue its work through 2027.

1) The Maximum Abbreviated Injury Scale (MAIS) is a globally accepted trauma scale defined by the Association for the Advancement of Automotive Medicine used for classifying injury severity. MAIS 3+, corresponding to a serious or fatal injury, has been adopted as the definition for a serious injury in the European Union. Examples of AIS 3 injuries are serious injuries, for example a concussion with at least one hour unconscious, three or more rib fractures, bladder rupture, vertebral disc rupture, amputation of an arm between wrist and elbow, or an amputation of the leg between ankle and knee.

2) The occupant compartment is reinforced in modern cars to withstand the high forces present during a crash to prevent deformation that can seriously injure an occupant.

3) The UN 1958 Agreement is formally known as the Agreement concerning the Adoption of Harmonized Technical United Nations Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these United Nations Regulations.

4) UN 1998 agreement is formally known as the 1998 Agreement on UN Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles.

5) The WP.29 or World Forum for the Harmonisation of Vehicle Regulations is the UN Forum dedicated to the safety and environmental performance of motor vehicles.

Figure 1: Autoliv's Circle of Life.

Vulnerable road users

According to the WHO, VRUs represent more than half of all traffic-related deaths globally. Pedestrians and bicyclists represent approximately 25% of the total roadway fatalities globally (World Health Organization, 2023). VRUs are exposed to substantial risk in vehicle traffic accidents due to many factors, such as exposure to passenger vehicle traffic, pavement design, weather conditions, and limited availability of protective equipment.

Autoliv has developed innovative solutions to enhance the safety of VRUs. For instance, airbags can be deployed on cars to cover the hood and parts of the windscreen, significantly reducing the severity of pedestrian and cyclist head injuries (Fredriksson & Rosén, 2014; Lübbe, 2015). Autoliv has developed airbags integrated in helmets to mitigate injuries to bicyclists and motorcyclists (Pipkorn et al., 2022; Meng et al., 2023). Airbags can also be mounted externally on other parts of the car, such as along the B-pillar, to effectively mitigate injuries to PTW riders (Carroll, Enanger, et al., 2022). The effectiveness of these technologies in saving lives will be discussed in the later sections of this paper.

The Role of Data

In-depth crash databases, such as the German In-Depth Accident Study (GIDAS), are essential for developing technology and innovations that are effective in real-world scenarios (Carroll, Gidion, et al., 2022; Díaz Fernández et al., 2022; Lubbe et al., 2022).

Event Data Recorders (EDRs) are another important source of data, providing detailed information on crash kinematics. These devices record various factors within the vehicle, such as speed, braking, seatbelt usage, and airbag deployment, providing valuable insights into the dynamics of a collision which can be used in crash reconstruction.

These data sources give policymakers and technology innovators insights into what is happening on the roads, from crash types and configurations, statistics on collision partners, detailed information on crash kinematics, and injury causes.

An evidence-based, data-driven approach is critical for informing effective regulatory measures and technology development. For this reason, national governments must prioritise the collection of injury and accident/crash data. Making this data available to the research community and allowing it to inform national policies and legislation is vital. By doing so, we can ensure that regulatory measures and technological advancements are based on evidence, ultimately leading to safer roads for everyone.

This is also the foundation of Autoliv's Circle of Life, shown in Figure 1. Our products are developed based on extensive studies of in-depth data, working together with leading institutions to understand crash mechanics and injury causes. This data is used to develop, test and validate new technological solutions.

Scope

In this whitepaper, we aim to present our research within the context of the ongoing global effort to improve road safety into the next decade and beyond. We will begin by examining how many lives could be saved using both basic and advanced safety systems in vehicles. The specific challenges and priorities differ from country to country. For instance, in low- and middle-income countries (LMICs), we focus on basic safety features like seatbelts, airbags, and helmets, which can significantly save lives. In HICs, where road crash fatalities have significantly decreased over the years, our concern shifts to the long-term effects of crashes and ensuring equal protection for everyone in a crash.

The broad steps needed to reduce road fatalities worldwide are well known: they are outlined in the UN Global Plan for the Decade of Action for Road Safety 2021–2030 (World Health Organization, 2021). In this whitepaper, we focus on the impact of vehicle technology in saving lives, particularly passive safety technology. If everyone uses these technologies with 100% compliance and availability, how many lives could be saved? What actions are necessary to achieve this effect?

By addressing these questions, we aim to provide a comprehensive overview of the potential life-saving benefits of vehicle safety technologies and the steps required to maximise their impact globally.

Methods

India was used as a baseline for our calculations, and some assumptions were made to estimate the effect of life-saving technologies. We assumed that all LMICs look like India in terms of traffic environment, vehicle equipment, and seatbelt and helmet wearing. We applied a retrospective method to current accident data to predict how the implementation of different safety technologies can reduce the number of fatalities in LMICs. We know country-to-country (and region-to-region within a country) variations occur, but this simplified method yields an estimate that can be applied to all LMICs.

We used in-depth crash data from the RASSI (Road Accident Sampling System – India)[6] database, an in-depth crash database initiated by JP Research India and developed by an international consortium of automobile manufacturers and safety researchers. The database contains information from the scene of the crash, the vehicles and occupants involved, and any available reconstruction files. The data were collected through on-scene crash investigations conducted by trained crash investigators, from five key sample regions (Coimbatore, Pune, Ahmedabad, Kolkata, and Jaipur). The inclusion criterion for a crash is that at least one motorised vehicle is involved in a crash that occurs on a public road.

We have also used data published by the Transport Research Wing of the Ministry of Road Transport and Highways, India, which contains the analysis of road accidents in India (MoRTH, 2022). The report contains information about the number of accidents, road users, and fatalities. Our final data source was the WHO Global status report on road safety (World Health Organization, 2023) which estimated that 92% of road traffic deaths occur in LMICs.

By combining these data sources with the effectiveness of each technology, we can estimate how many lives can be saved in LMICs when different technologies are introduced.

6) Read more about RASSI database on: https://rassi.in/about.html

More Lives Saved

Recognising that crashes are inevitable, the Safe System aims to mitigate their severity. The human body has a limited tolerance for the violent forces experienced during a crash. The fundamental principle of the Safe System approach is to design the transport system in a way that limits human exposure to these forces.

As noted, the primary methods for reducing the impact of these forces comprise restraining occupants with seatbelts and mitigating the impact through energy-absorbing devices like airbags and helmets. Additional technologies such as AEB can significantly reduce the vehicle's speed before impact, thereby enhancing the effectiveness of seatbelts and airbags.

These basic safety technologies have been available for decades and have saved hundreds of thousands of lives. Their greatest impact has been observed in HICs over the past few decades; today, over 90% of road traffic fatalities occur in LMICs. In the following section, we answer the question: What would be the global impact of these technologies if their usage rates were as high in LMICs as they are in HICs?

1: Protecting vulnerable road users

The largest group of fatalities in LMICs is VRUs. Existing technologies, such as external airbags on vehicles and motorcycle helmets hold significant potential to enhance safety. In this section, we present the estimated life-saving potential of these technologies.

1.1 VRU protection airbag on cars

Alongside many other institutes, Autoliv has conducted detailed research on the collision scenarios when pedestrians and bicyclists are struck by diverse types of vehicles, including the kinematics of both the vehicles and the VRUs. These studies have led to the development of the Pedestrian Protection Airbag (PPA) and the Piston Hood Lifter (PHL), which are fitted to a striking car. These countermeasures mitigate head injuries resulting from impact to hard structures on the vehicle, such as the A-pillars, windscreen frame, and the section behind the vehicle hood in front of the windscreen (cowl area).

Passenger cars are the most common striking vehicles, and an injury to the head is one of the most common injuries in vehicle-to-pedestrian and vehicle-to-bicyclist collisions; the main source of contact is the windscreen area (the glass and surrounding frame). Head injuries from A-pillars and roof edges are also frequent, particularly when considering injuries of AIS 3+ severity. The area around the windscreen is stiffer than the central windscreen area due to the surrounding structures, so the risk of injury is higher for impacts to these parts.

Traumatic brain injuries (TBIs), which typically do not involve a penetration or fracture of the skull, are a clinically important feature of pedestrian and bicyclist injuries. Field data show that TBIs are the dominant AIS 3+ head injury, and concussions are the dominant AIS 2+ head injury. Head injury can be caused by linear or rotational loading or a combination of the two. Although head rotation is an important contributing factor in brain injury outcomes, the current head impact test methods used for pedestrian safety regulations and rating programs do not assess rotational loading.

The Pedestrian Protection Airbag (PPA) is an external airbag that deploys along the windscreen base and/or A-pillars of the vehicle. It mitigates the severity of the impact on these hard structures. The PPA may also be used to raise the rear of the hood; this important countermeasure improves head protection. The PPA has significant potential to protect bicyclists as well as pedestrians. As reported by Fredriksson and Rosén. as early as 2014, it was estimated that a deployable hood and a windscreen airbag could prevent 20-30% of pedestrian AIS 3+ head injuries, and when combined with AEB, it could prevent 60% of all AIS 3+ head and thorax injuries. In our estimation, we estimate about 25% of pedestrian fatalities involve a frontal collision with a car, resulting in the potential to **save approximately 11,000 lives annually** if all cars in LMICs are equipped with this technology.

1.2 Helmets for Motorcycle riders

Motorcycle riders are highly susceptible to severe injuries, particularly head injuries. Helmets play a crucial role in mitigating the severity of these injuries. Our analysis of data from in-depth accident studies indicate that head injuries are the most common serious injuries for riders in countries with low helmet usage rates, while in regions with higher usage rates, injuries to the lower extremities are more common than head injuries.

Motorcycle helmets are the most fundamental and effective protective gear available. They can transform potentially fatal injuries into survivable ones. Our tests reveal that full-face helmets can reduce brain strain by 38% and facial impact force by 61.5% compared to open-face helmets in facial impacts (Meng et al., 2023). Overall, helmets demonstrate a 37% effectiveness in preventing fatalities compared to riding without a helmet. However, it is essential that the helmet meets a minimum level of safety based on international best practices, such as those defined under United Nations Regulation No. 22[7].

Currently, motorcycle fatalities account for one-third of all traffic deaths in many LMICs, reaching as high as 52% in some regions (World Health Organization, 2023). These numbers, which are expected to continue growing rapidly, represent an urgent need to mobilise motorcycle safety. In a recent report published by the

7) Regulation No. 22 is regulation within the UN 1958 agreement and is formally known as UN Regulation No. 22 Uniform provisions concerning the approval of protective helmets, of their visors and of their accessories for drivers and passengers of motorcycles and mopeds.

FIA Foundation, Sub-Saharan Africa alone has seen a five-fold increase in motorcycles between the years 2010 to 2022 (Bishop & Courtright, 2022). Our analysis estimates that achieving 100% helmet adoption worldwide has enormous potential: it could save **approximately 72,000 lives annually in LMICs**. The number of lives saved would increase with the increasing number of motorcycles.

Kahane (2015) developed a model for calculating the potential additional lives saved each year assuming 100% helmet usage in the USA (Figure 2). For the years 1975 to 2017, the model shows how many lives were saved by helmets and how many additional lives would have been saved had helmets been mandatory[8].

2: Protecting in-vehicle occupants

Vehicle safety research and technology are advancing rapidly in many regions, with some countries making significant strides towards realising fully automated driving. However, in much of the world, fundamental safety challenges persist. These challenges range from the unavailability of essential technologies, such as airbags and three-point seatbelts, to the lack of regulations that mandate their use.

2.1 Seatbelts

Extensive scientific research and countless survivor stories have consistently shown that seatbelts save many lives. However, the WHO Global Status Report on Road Safety (2023) revealed that only 117 countries have laws mandating seatbelt use for both front and rear seats. Our estimates indicate that **achieving 100% seatbelt usage could save over 124,000 lives annually in LMICs.**

Further, advanced seatbelt technologies (such as pre-tensioners and load limiters) also play an important role in saving lives. According to our estimates, an additional 5000 lives could be saved by these technologies, based on current seatbelt usage rates. However, if 100% of the seatbelts were equipped with this technology, and seatbelt usage were 100% worldwide, **these technologies could save as many as 29,000 additional lives each year. Therefore, 100% usage of advanced seatbelts alone could save 153,000 lives.**

Figure 3 provides a cumulative estimate of the potential lives saved in the USA with 100% seatbelt compliance. Had the USA adopted mandatory seatbelt laws in 1976, over 760,000 lives would have been saved as of 2017.

Figure 2: Cumulative lives saved by helmets (dark blue) and additional lives that would have been saved with 100% helmet use (light blue) in the USA (adopted from Kahane & Simons, 2024).

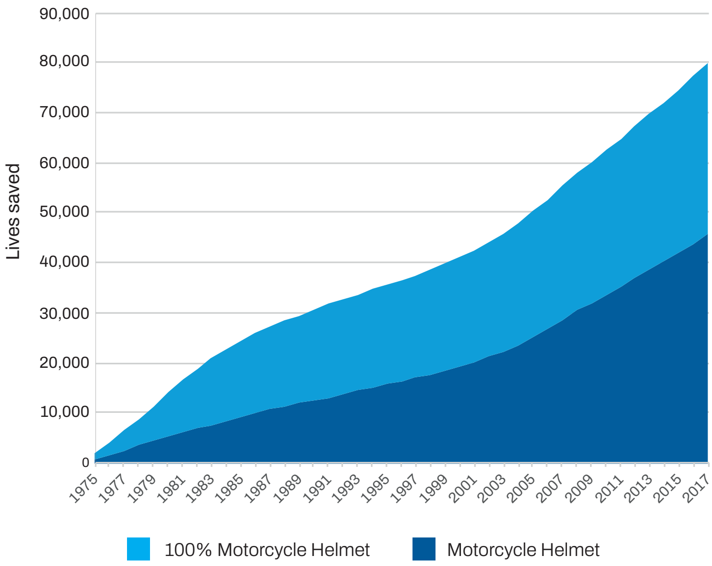
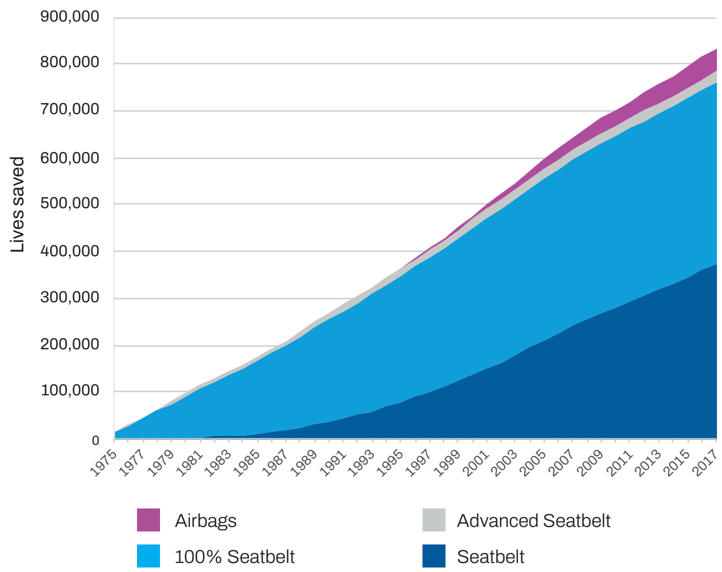


Figure 3: Cumulative lives saved by seatbelts (dark blue); additional lives that would have been saved with 100% seatbelt use (light blue), advanced seatbelts (grey), and airbags (red) in the USA (adopted from Kahane & Simons, 2024).



8) Estimations based on data published by National Highway Traffic Safety Administration's Traffic Safety Facts Annual Report. Read more on: https://cdan.dot.gov/tsftables/tsfar.htm

2.2 Airbags for protecting car occupants

While seatbelts are the primary restraint mechanism inside a vehicle, their effectiveness in preventing severe injury and death can be significantly enhanced by airbags. Airbags serve as a secondary restraint system, cushioning the occupants and providing an additional layer of protection during collisions.

Frontal airbags for the driver and front-seat passenger are designed to deploy within milliseconds of a frontal impact. If all countries were to mandate these airbags and there were 100% market penetration, **51,000 lives would be saved annually**.

Side airbags, typically installed in the seats, are designed to protect the thorax and pelvis during a side collision. Inflatable curtain airbags deploy from the roof lining and cover the side windows, protecting the head as well as preventing occupants from being ejected from the vehicle. In our estimate, together these airbags would save **an additional 17,000 lives annually**. This estimate is conservative, since it is based only on side impacts and front-seat occupants; it does not account for rear-seat passengers (although we provide coverage extending to the rear seats) or oblique crashes (although we design inflatable cushion protection for these crashes).

The combination of seatbelts and a comprehensive airbag system increases the overall safety of vehicle occupants greatly, offering a higher chance of survival and reducing the severity of injuries in the event of a crash. Figure 3 shows the number of additional lives that could have been saved in the USA if frontal airbags had been mandated in 1987.

2.3 Reducing long term consequences and injuries

Despite a decrease in road fatalities in high-income countries, injuries leading to permanent medical impairment remain a significant issue. Studies have found that over 10% of car occupants with AIS 1[9] injuries sustain permanent medical impairment[10], primarily to the cervical spine and extremities (Malm et al. 2008; Stigson et al., 2015). Frontal collisions cause most long-term head injuries. Arms and legs are also frequently affected, with shoulder and ankle injuries in particular posing a high impairment risk. Women are at a higher risk for long-term consequences, particularly affecting the neck and extremities. Low- and medium-severity collisions can also result in permanent neurological disorders due to their high frequency.

Currently, no standardised method exists for evaluating solutions intended to reduce long-term impairments. Addressing this gap requires:

- An international system for classifying both injuries that lead to long-term consequences and follow-up methods.
- Validated mechanisms of injuries that lead to significant long-term consequences.
- Validated tools and methods for assessing long-term injuries, such as upgraded virtual human body models.
- Enhanced protection for all road users through robust countermeasures.

More work is needed to develop and adopt an international system for classifying long-term consequences, which will aid in creating protective solutions and policies. Linking long-term consequences to original injuries and deducing injury mechanisms will require new in-depth crash data and long-term injury follow-up.

9) An AIS 1 injury is a minor injury (for instance, superficial lacerations).

10) An injury is typically assessed as permanent after three years for adults, unless it is evident earlier. Impairment refers to persistent symptoms that affect daily activities and are associated with at least one of the following aspects: loss of motion, pain, or cognitive influence.

More Life Lived

Effective energy absorption technologies hold immense potential to save lives and significantly reduce road traffic fatalities. Existing passive safety products such as airbags, seatbelts, and helmets have been shown to play an essential role in ensuring that individuals not only travel safely but also live life to the fullest.

Our analysis indicates that the full implementation and utilisation of these basic passive safety features—alongside advanced technologies such as VRU airbags—make it possible to save over 300,000 lives annually. This accomplishment would represent a 25% reduction in global road traffic fatalities.

A reduction in collision speed can improve the effectiveness of seatbelts and airbags and thereby save even more lives than estimated by our model. Thus, setting speed limits based on global best practices which are based on the injury risk and type of vehicle interaction is key to enhancing the effectiveness of safety technologies.. For instance, Lubbe et al. (2024) and Rizzi et al. (2023) state that the speed limit should be 60km/h when there is a possibility of car-to-car head-on collision, but can be as high as 80km/h if AEB can reduce speeds by at least 20km/h. Lubbe et al. (2022) found that in situations where there is a chance of car-to-pedestrian impact, the driving speed should be limited to 25 km/h; similarly, where car-to-bicyclist or car-to-motorcycle impacts are the concern, the speed limit should be limited to 20–25 km/h. The study further recommends a maximum speed limit of 60 km/h when there is a risk of side impact between cars, such as at intersections.

These speed recommendations have profound implications, since they call for changes to the current infrastructure through, for instance, traffic calming measures (in line with national codes and regulations) or traffic separation. This is likely to increase travel time on rural roads, where there is a high probability of interaction between motorcycles or bicyclists and cars. Before these changes can be implemented, it is essential to conduct thorough road network audits to better understand what changes are necessary to enhance safety and meet global best practices. The International Road Assessment Programme (iRAP) provides a framework for these audits which elucidates high-risk areas and prioritises safety improvements.

Continuing to develop and implement basic vehicle safety systems can also continue to significantly improve road safety. Modern seatbelts that meet standards such as the UN R16 regulation are already effective at reducing fatalities; advanced seatbelt technology, such as pretensioners and load limiters, offer an important opportunity to further prevent serious life-threatening or disabling injuries.

Accelerating the fitment of proven safety technologies in developing countries, through a combination of national NCAPs to guide consumers towards safety and mandatory regulations using harmonised standards, is essential. This has proven to be difficult, so a priority is addressing the socio-economic and structural barriers preventing successful adoption and implementation of UN conventions and harmonised technical regulations is crucial.

Another important area to be addressed is occupant diversity, which includes all factors affecting physiology, such as age, stature, weight, sex, and body shape. Children and older adults must be given priority and new, effective restraint systems should continue to be developed.

There must also be a more concentrated effort to understand the long-term consequences of injuries better.

VRU fatalities account for half of global road fatalities and with the shift towards more active modes of travel to address climate concerns, the safety of VRUs will continue to grow in importance. There is a need—and an opportunity—to strengthen performance requirements at both the vehicle and transport system levels to protect unprotected road users in both mature and developing regions.

Improving VRU requires a holistic approach with multiple measures. For instance, significant improvements for motorcycle rides can be achieved by addressing rider behaviour, on-bike safety systems (both passive and active), on-person wearable protection, head protection, and passive and active safety devices fitted to cars and trucks. On-bike systems include: airbags on powered two-wheelers, which provide protection in specific scenarios, such as frontal impacts; AEB technology to reduce speed and mitigate the severity of the crash; and anti-lock braking systems to help drivers maintain control during emergency braking. On-person technologies can offer some protection from ground impact. Adapting rider behaviour also plays an important role. While this is potentially the most cost-effective and wide-reaching intervention, it is also the hardest to engineer.

The full adoption and implementation of the Safe System approach is required for these technologies to demonstrate their true potential. However, it is important to point out that merely implementing basic restraint usage laws and adequately enforcing them can have an immediate, dramatic impact on road safety. The impact of other technologies will become apparent over time as they are phased in. Working in parallel on other facets of the Safe System, such as safer infrastructure, safe road user behaviour, and safe speeds, would further enhance the life-saving potential of these products. Furthermore, making effective progress in safety relies on the capacity to systematically track and understand crash causation. A full awareness of crash causation is critical for policymakers, regulators, and technology providers to be able to address important gaps and ensure safety measures meet demanding (and relevant) standards.

The path to achieving a global reduction of road traffic fatalities by 50% may seem long and challenging, but the stakes have never been higher. We are at a critical juncture, and without immediate action, we are likely to miss the 2030 target. The time for bold policy changes is now. We have a wealth of success stories from past decades that demonstrate that progress can be made, and this should serve as inspiration to accelerate progress. The key to this continuous improvement is using real-world data, which are at the core of Autoliv and is highlighted through our Circle of Life where we develop lifesaving products based on real-world crash data.

To address safety needs in LMICs, there is a great need for collaboration to develop innovative, affordable safety solutions with high performance. Achieving scale will be vital to reduce costs and provide a viable market proposition. Collaboration is key to this process. By fostering a shared responsibility and increasing local and international collaboration between governments and the private sector, NGOs, and academia, we can ensure reliable data collection and drive the national road safety targets. The power of the triple-helix model of collaboration to support and foster economic and social development has been demonstrated over the years. The model ensures that private sector innovation aligns with societal needs for maximum impact, and that regulations and policies leverage the opportunities offered by technology. At a national level, it is crucial that responsibility is clearly defined and that all stakeholders feel accountable for making our roads safer.

Together, we can reduce the burden of road traffic injuries; together we can have More Lives Saved so that we can ensure More Life Lived.

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