



SECTION 3

SAFER VEHICLES
AND ROADS

Policymakers must give more attention to making vehicles and roads safer

Electronic stability control (ESC) is effective at reducing crashes and saving lives but only 46 countries apply a mandatory ESC regulation.

Most countries fail to apply minimum UN safety standards to new cars

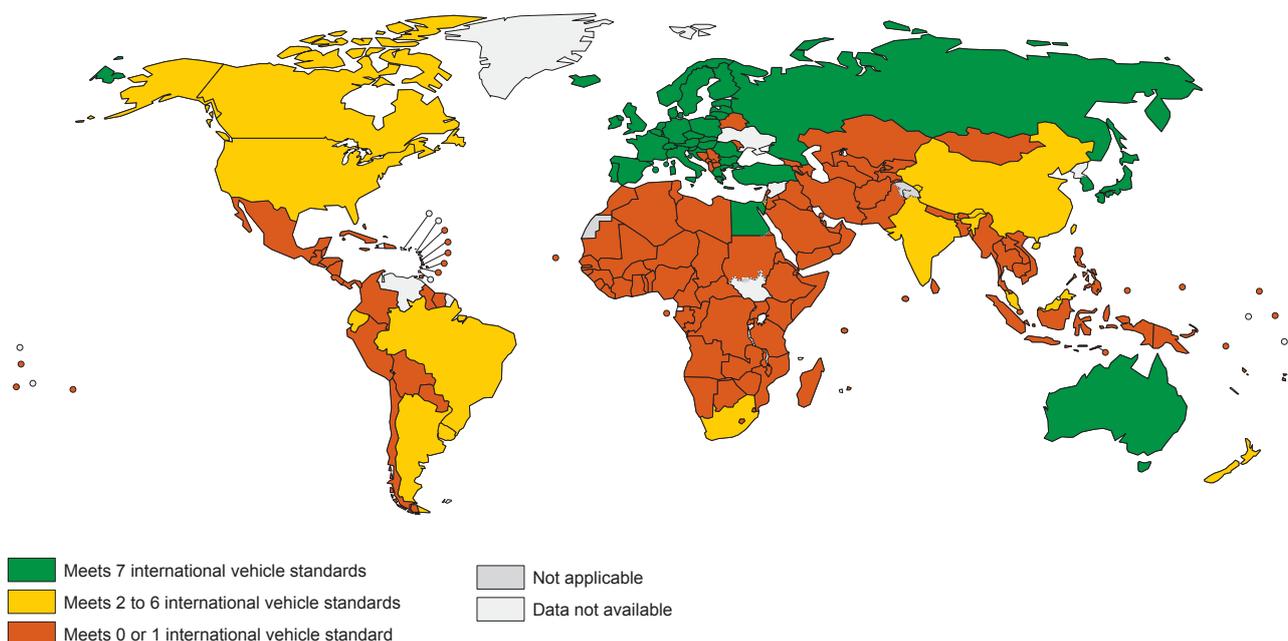
The massive investment in road infrastructure over the past decade has been accompanied by rapid global motorization (56). Indeed, this report shows that the past three years alone have seen a 16% increase in the number of registered motorized vehicles. This growth is highest in the world's emerging economies: in 2014 there were a record 67 million new passenger cars on the world's roads, with nearly 50% of these produced in middle-income countries (57).

Safe vehicles are an important part of the Safe Systems approach (see page 21), as they play a critical role both in averting crashes and reducing the likelihood of serious injury in the event of a crash.

Over the past few decades a combination of regulatory requirements and consumer demand has led to increasingly safe cars in many high-income countries. Many of the features that began as relatively expensive safety "add-ons" in high-end vehicles have since become much cheaper and – in some countries – are now mandatory requirements for all vehicles (40).¹ However, rapid motorization in low- and middle-income countries – where the risk of a road traffic crash is highest – and the growing manufacture and use of vehicles taking place in these emerging economies means there is an urgent need for these minimum vehicle standards to be implemented by every country.

¹ Note that this report focuses on safety regulations of new cars, although the need for these regulations to be extended to older cars in existing vehicle fleets is also very important. Some countries apply such standards to new cars as a first step and then phase-in their application to vehicles already in circulation.

FIGURE 15
Countries applying priority UN vehicle safety standards



Vehicle safety regulations function differently around the world. In some countries or regions they are extremely strict, while in others they are weak or non-existent. In the absence of appropriate standards automobile companies are able to sell old designs no longer legal in well-regulated countries. Alternatively, automobile companies may “de-specify” life-saving technologies in newer models sold in countries where regulations are weak or non-existent. For example, a global car manufacturer required to ensure that the vehicles it sells in high-income countries all have electronic stability control (ESC) can sell the same model to markets without this life saving technology if the country does not apply the ESC regulation.

Nonetheless, at the international level there are efforts to harmonize this system of regulations, ultimately facilitating the roll-out of best practice and making practices such as de-specification more difficult. The UN World Forum for Harmonization of Vehicle Regulations¹ is the primary global body responsible for the development of passenger car safety standards and its regulations provide a legal framework covering a range of vehicle standards for UN Member States to apply voluntarily. Through the World Forum, motor vehicles can now be internationally approved without further tests, provided they meet the relevant UN regulations that include both “crash-worthiness” (providing protection when an incident occurs) and “crash avoidance” (preventing a collision from happening at all) (58). This report considers seven priority regulations of the UN World Forum that apply to passenger vehicles. Figure 15 highlights countries applying the three regulations considered to be

the most important, as well as those applying all seven priority regulations.²

Standards protecting occupants in front and side impact crashes are poorly implemented

The World Forum’s most important crash-worthiness regulations help to protect occupants withstand front and side impact crashes.³ During simulated tests, energy absorbed by the crash-test dummy must be below a certain threshold for the car to pass the tests. However, these requirements are poorly implemented globally: 49 countries (27%) apply the UN frontal impact test regulation and 47 (26%) apply the side impact test regulation. These are predominantly high-income countries.

Electronic stability control is highly effective and should be mandatory in all vehicles

The most important UN regulation for crash avoidance is electronic stability control. ESC aims to prevent skidding and loss of control in cases of oversteering or understeering, and is effective at preventing different types of crashes (single car crashes, head-on and rollover crashes, and crashes involving multiple vehicles), reducing both serious and fatal injuries (59,60). The success of ESC has led to it rapidly becoming mandatory in many high-income countries.

Nonetheless, at a global level only 46 countries adhere to the UN regulation⁴

Pedestrians account for 39% of road traffic deaths in the African Region, yet only one African country has signed up to the UN safety standard that protects pedestrians in the event of a crash.

¹ Hosted by the United Nations Economic Commission for Europe (UNECE).

² The first is the most important minimum standard for crashworthiness, the second is the most important for crash avoidance, and the third is important for non-car occupants.

³ UN Regulations 94 and 95. In the USA the corresponding tests are FMVSS 208 and 214.

⁴ UN Regulation 13H. In the USA the equivalent requirement is FM126.

on ESC, of which the majority are high-income countries. The technology is also effective in commercial vehicles such as trucks, coaches and mini-buses. This suggests that there is enormous life-saving potential for this technology across the world's entire vehicle fleet that has yet to be tapped globally.

globally. The most serious pedestrian injuries are usually caused by the direct impact of the vehicle rather than by being thrown into the road. The severity of injury is influenced by factors such as speed and type of vehicle, and by the design of the front of the vehicle.¹

Vehicles can be built to better protect pedestrians

This report shows that pedestrians comprise 22% of all road traffic deaths – approximately 275 000 deaths a year

Until recently, vehicle design incorporated few features to protect pedestrians, but there is an increasing effort to include design elements that reduce the likelihood of pedestrian

¹ Severity is also influenced by biological factors.

BOX 12

New Car Assessment Programmes drive consumer demand for safer vehicles

New Car Assessment Programmes (NCAPs) are highly successful in promoting supply and demand for safer vehicles. Typically, NCAPs carry out crash tests on dummies in new cars to rate the vehicle's performance – five stars represent the top score. In some areas NCAPs use tests that meet UN regulations, but they can also test the extent to which cars perform above these minimum standards. For example, they can test frontal impact performance at speeds higher than those used in the UN regulation test.

There are currently nine NCAPs or similar bodies around the world. Although all NCAPs use star ratings to rank vehicle safety, five stars do not necessarily represent the same level of car safety in all regions. For example, in some NCAPs, a five-star rating means the model has ESC, while in regions where ESC is not yet applied, a five-star NCAP rating does not include ESC.

NCAPs can play a powerful role in encouraging consumers to choose vehicles based on safety. For example, the Australasian NCAP (ANCAP) has crash-tested more than 490 vehicles and its results, published regularly, have been instrumental in pushing up the proportion of cars meeting ANCAP's five-star standard. A decade ago only 20% of cars tested by ANCAP achieved five stars, whereas in 2013 this figure had risen to 80%. Studies showing that the risk of being killed in a one-star vehicle are double those of a five-star have made ANCAP-tested vehicles a powerful consumer tool contributing to this progress.

In newer NCAP programmes, such as Latin America, results of the first NCAP programme in 2010 indicated that safety in top selling cars lagged 20 years behind North America and Europe. However, by 2014, five models were awarded five-stars and were well above regulatory requirements.

The Global NCAP organization supports new testing programmes in rapidly motorizing countries. In 2013, a testing project was initiated in India on five key models that together account for around 20% of all new cars sold in the country. The models were tested at both the UN frontal impact testing speed (56 km/h), and at the higher NCAP speed, 64 km/h. Four of the five models failed the UN regulation test and all scored zero at 64 km/h as a result of either poor structure or lack of air bags. Photographs of the tested cars – collapsed and showing high risks of life-threatening injuries to occupants – triggered important developments. Manufacturers have offered to adhere to particular standards to improve the safety of some of the tested vehicles, while discussions with the Government of India have led to pledges to apply UN-equivalent crash-test standards for front and side impact in two phases. A local NCAP (called the Bharat New Car Assessment Programme) is also being developed and will be operational when testing facilities are ready.



collision and/or reduce the severity of pedestrian injury in the event of a crash. Softer bumpers, combined with better bonnet area clearance and removal of unnecessarily rigid structures are required to reduce the severity of a pedestrian impact with a car. The UN regulation for pedestrian protection encourages the design of these more “forgiving” car fronts. However, only 44 countries apply this regulation and again, these are overwhelmingly high-income European countries. Indeed, only one African country (South Africa) applies this standard, and yet 39% of road traffic deaths in the African Region are among pedestrians.

Vehicle standards and fixtures are crucial to improving seat-belt and child restraint use

Seat-belts and child restraints are extremely effective at saving the lives of car occupants in the event of a crash. Ensuring that vehicle manufacturers fit seat-belts and the fixtures necessary for child restraints is therefore critical to reducing road traffic fatalities.

The seat-belt regulation that forms part of the UN’s vehicle standard regulations ensures that seat-belts are fitted in vehicles when they are manufactured and assembled; the anchorage regulation ensures that the seat-belt anchor points can withstand the impact incurred during a crash, to minimize the risk of belt slippage and ensure that passengers can be safely removed from their seats if there is a crash. Fifty-two countries apply regulations on seat-belts and seat-belt anchorages. The child restraint regulation means that instead of holding the child seat in place with the adult seat-belt, the vehicle is equipped

with ISOFIX child restraint anchorage points to secure the restraint that are attached directly to the frame of the vehicle. Forty-eight countries apply the regulation that supports the use of ISOFIX seats.¹

While much progress has been made in recent decades to make vehicles safer, there is enormous scope for many more lives to be saved if countries apply minimum safety standards to their manufacture and production.

The World Forum regulations are an important step in ensuring that this happens, and for rolling out good practice in vehicle safety. However, to date, only 40 countries meet all seven priority safety regulations surveyed in this report (and recommended by the Global New Car Assessment Programme),² and these are overwhelmingly high-income countries. There are also worrying disparities in where these regulations are applied: the Americas, Eastern Mediterranean, African and South East Asia regions are notably absent from applying these regulations (see Figure 15).

Given the increase in vehicle production in the emerging economies, it is important that these new vehicle-producing countries take steps to ensure basic standards for those to whom they sell cars. Similarly, ensuring that all low- and middle-income countries adhere to minimum vehicle safety regulations would make it difficult for automobile manufacturers to sell old models and de-specify safety technologies. Governments have a responsibility to take the steps needed to ensure their citizens have access to safe vehicles.

¹ See Box 9, page 36.

² See <http://www.globalncap.org/>

Vehicles sold in
80% of all
countries fail
to meet priority
safety standards.

Making roads safer

High-performing countries explore how to make transport more sustainable

Road infrastructure has traditionally maximized mobility and economic efficiency at the expense of safety, particularly for non-motorized road users who are the most vulnerable. Indeed, as motorization increases worldwide, walking and cycling have become less common and more dangerous in many countries. The traffic mix in many countries means that pedestrians and cyclists share the road with high-speed vehicles, forcing them to negotiate dangerous situations and fast-moving traffic. Planning decisions have been made without sufficient attention to the needs of these groups – for example, cycle paths and footpaths are frequently not part of an integrated network. At the same time, traffic congestion resulting from rapid motorization means the transport and mobility demands of local communities are frequently not met.

Changes are now required to optimize the movement of people and freight with road safety in mind. This optimization needs to take into account the mix and safety of all road users. In many industrialized countries these changes are already taking place, generally at a local level where communities have been involved promoting safe public transport and non-motorized means of transport (61).

Measures to promote walking and cycling are also in line with other global moves to fight obesity and reduce noncommunicable diseases (such as heart disease, diabetes) and improve the quality of urban life. These changes are more pertinent than ever for low- and middle-income countries,

which are now moving rapidly towards much higher levels of motorization, increased levels of air pollution and more sedentary lifestyles.

This report found that 92 countries have policies to promote walking and cycling (of which 49% are high-income countries), but if these strategies are not accompanied by other measures – such as effective speed management and the provision of pedestrian and cycling safety measures – they could actually lead to increases in road traffic injuries. Data reported in Section 2 suggest that not enough is being done to reduce speeds. Indeed, only 30 of these 92 countries also have urban speed laws in line with best practice (see Section 2, page 22). Similarly, comparative data from 60 countries show that 82% of roads where pedestrians are present, and where speeds are 40 km/h or above, do not have footpaths (see Box 14). As indicated in Section 2, at speeds below 30 km/h, pedestrians and cyclists can mix with motor vehicles in relative safety. Harmonising lower urban speed limits across urban areas can also provide an environment that is conducive to increasing these non-motorized forms of transport. For example, Fribourg in southern Germany has lowered the speed limit to 30 km/h on 90% of its streets and provided extensive car-free residential areas. The effect of this strategy is that 24% of trips every day are on foot, 28% by bicycle, 20% by public transport and 28% by car (62).

A key strategy for achieving a safe traffic system for pedestrians and cyclists is to separate these different kinds of road use, eliminating conflicts between high-speed and vulnerable road users. Safety benefits of measures such as building separate cycle lanes

are positive. Danish studies, for example, showed a 35% reduction in cyclist casualties after cycle tracks were constructed alongside urban roads(2). Separating road users is also relevant for countries with high proportions of motorcyclists, notably those in the South-East Asian Region and the Western Pacific Region. Yet currently only half (91) of all countries in the survey have policies to separate vulnerable road users from high-speed traffic.

have been well managed. Aside from reducing road traffic injuries, there are positive health benefits that are associated with increased physical activity, reduced pollution, noise levels and greenhouse gas emissions, reduced congestion and more pleasant cities.

Safe road systems consider the needs of all road users

91 countries have policies to separate vulnerable road users from high-speed traffic.

Moving towards more sustainable modes of transport has positive effects if the associated road safety impacts

Improving road infrastructure is a key mechanism for making roads safer. In a number of high-income countries,

BOX 13

Amend works to keep Africa's school children safe

Child pedestrians are among the most vulnerable road users in sub-Saharan Africa. This is because, compared to their school-going peers in other regions, they are more likely to walk to school, and do so over long distances on roads that put them in dangerous proximity to traffic (63). Relatively inexpensive, strategically placed infrastructure measures can make pedestrians safer on roads.

Amend, a nongovernmental organization in sub-Saharan Africa, has developed the School Area Road Safety Assessments and Improvement (SARSAI) programme. The SARSAI programme focuses on reducing injuries around primary schools in urban African cities, where children are known to be at exceptionally high risk of a road traffic injury. Typically, these are schools where more than 2% of students are injured in road traffic crashes in any given year (63,64).

SARSAI systematically assesses areas around schools and identifies and implements measures to improve road safety, including:

- small-scale infrastructure improvements, such as
 - road humps (to reduce vehicle speeds at crucial points)
 - bollards (to separate walkways from vehicles)
 - improved sidewalk areas (so children do not need to walk on the roads)
 - the relocation of school gates (so that children do not exit directly onto busy roads)
 - zebra crossings (to provide demarcated places for children to cross roads);
- signage to alert drivers to the presence of schools;
- road safety education for children and communities about the new infrastructure and its purpose.

At five primary schools where Amend implemented SARSAI in Dar es Salaam, Tanzania there was one death and eight injuries in road traffic among the student population in the 12 months preceding the implementation of SARSAI and just one injury in the 12 months following implementation. Amend is currently conducting a multi-year, population-based control impact evaluation of SARSAI in partnership with the US Centers for Disease Control, gathering data at 18 school areas in the country.

Once infrastructural improvements around a school have been made as part of the programme, ongoing upkeep is transferred to local government authorities in charge of the roads: the evaluation data collected over the implementation period will be important in advocating for the sustainability of the project.



138 countries currently assess parts of existing road safety networks.

decades of analysing the road network and determining where road crashes occur has helped identify how poor infrastructure contribute to road traffic injuries. Furthermore, an extensive evidence base has been built up about infrastructure countermeasures that can save lives. As a result, many high-performing countries have made significant investments in safer infrastructure. These include designing safer new road projects but also upgrading existing roads with proven interventions. Action across both these areas has contributed to declines in road traffic deaths in these countries.

Rapid urbanization, economic growth and the need for improved mobility have led to increased motorization in many low- and middle-income countries, and road infrastructure has not kept pace. This means that poor roads are the norm in many of the countries where the risk of road traffic death is highest, and are often built without sufficient planning to take into consideration the safety needs of vulnerable road users and the communities through which they pass.

Safety through design

Ensuring safety measures are implemented when road infrastructure projects are designed can result in important safety gains for all road users. This is particularly true where road design and maintenance are underpinned by a Safe System approach, that makes allowances for human error. The use of infrastructure treatments to help manage speed and reduce the likelihood of a crash (for example through widening of the

road, or raised pedestrian crossings), and treatments to mitigate the severity of the crash infrastructural (for example, using roadside barriers and roundabouts) all contribute to less death and injury on the road.

Decisions made at the design stage of a project can have a significant impact on the level of death and injury of the road. Specifying safety standards and acting on findings of a road safety design audit can all identify if further design modifications can increase safety. Currently 147 countries require some type of road safety audit on new roads, although these vary greatly in what they cover, and thus in quality. Existing road infrastructure should also be regularly assessed for safety, with a focus on roads with the highest crash risk: 138 countries currently assess parts of existing road safety networks.

Best practice road safety audits assess safety for all road users, including pedestrians, cyclists and motorcyclists. A key part of the solution for improving road infrastructure is assessing the road network – identifying which are the most dangerous roads, who uses these roads and which road users are most likely to be injured can all help to determine which affordable engineering countermeasures are most essential for upgrading the road and making it safer (see Box 14).

To reduce road deaths, simultaneous action is needed at national and local level on vehicle safety, road user behaviour and road design. Lessons on how infrastructure can impact road safety – learned over decades in developed countries – must be translated urgently into best practice in low- and middle-income countries.

BOX 14

Five-star roads: iRAP road assessments

International Road Assessment Programme (iRAP) safety assessments use road inspection data to provide star ratings for roads: five stars indicate the safest roads and one star the least safe. Star ratings are provided for vehicle occupants, motorcyclists, pedestrians and cyclists, while countries' roads are assessed for the percentage that meet certain star ratings for each type of road user. Star ratings alone have now been applied on over 500 000 km of road across 62 countries. The results show:

- less than 20% of roads are three-star or better for pedestrians in most regions of the world;
- 50% of roads assessed in the Region of the Americas, European Region and Western Pacific Region are three-star or better for vehicle occupants;
- for motorcyclists in South-East Asia, less than 20% of roads are three-star or better.

Star ratings are increasingly used to set targets for improvements within national road safety policies. For example Highways England has a 90% target for travel on three-star (or better) roads by 2020, while the Netherlands aims to eliminate all one- or two-star roads by 2020. And in terms of design, the World Bank has set minimum three-star targets for all road users as part of new road designs in India – a road upgrade programme worth an estimated at US\$ 4 billion.

While most countries carry out road safety audits on new and some existing road infrastructure, the rating by road users within iRAP assessments allows comparisons between and within countries that help reveal that in many countries there is poor provision for the most vulnerable road users in terms of infrastructure safety on a large part of the road network. This should be used to mobilize support for implementation of necessary countermeasures.





Conclusions and recommendations

This report shows that 1.25 million people are killed each year on the world's roads, and that this figure has plateaued since 2007. In the face of rapidly increasing motorization, this stabilization of an otherwise projected increase in deaths is an indication of the progress that has been made. However, efforts to reduce road traffic deaths are clearly insufficient if the international road safety targets set for the Sustainable Development Goals – a halving of deaths by 2020 – are to be met.

A multifaceted approach is required for the most effective and long-lasting changes to be made to national road safety. Such changes have been achieved in a number of high-performing countries that have taken on the Safe System approach, and have seen reductions in road traffic deaths and injuries despite increasing motorization. The challenge today is for the downward trends in road traffic deaths seen in these countries to be replicated in other (mainly low- and middle-income) countries, but in a shorter timeframe. Political will is crucial to driving such changes, but this report shows that action is particularly necessary on a number of specific issues:

- Changing road user behaviour is a key component of the Safe Systems approach. Setting and enforcing good laws relating to key behavioural risk factors can be effective at realizing such change. Although some progress has been made over the past three years with 17 countries (representing 5.7% of the world's population) improving legislation on key risk factors, many countries lag far behind in terms of

making sure their laws are in line with best practice.

- Lack of enforcement frequently undermines the potential of road safety laws to reduce injuries and deaths. More work is needed to explore the best ways to optimize enforcement of existing road safety laws. Social marketing campaigns need to be conducted to support and maximize the effects of enforcement.
- Insufficient attention has been paid to the needs of pedestrians, cyclists and motorcyclists, who together make up 49% of all global road traffic deaths. Making the world's roads safer will not be possible unless the needs of these road users are considered in all approaches to road safety – including the way roads are built and the way vehicles are manufactured. Making walking and cycling safer will also have other positive co-benefits if these non-motorized forms of transport become more popular, including more physical exercise, reduced emissions, and the health benefits associated with such changes.
- Making cars safer is a critical component of saving lives on the roads. Vehicle technology has advanced enormously, yet while cars in high-income countries are increasingly safe, this report shows that almost 75% of countries around the world – notably low- and middle-income countries – fail to meet even the most basic international standards on vehicle safety. And these standards are not only important to protecting car occupants involved in a

The Sustainable Development Goals include a target of
50%
reduction in road traffic deaths and injuries by 2020

crash but are also essential to protecting pedestrians, cyclists and motorcyclists. The lack of such standards in middle-income countries that are increasingly becoming major car manufacturers also risks jeopardizing global efforts to make roads safer. Governments must urgently sign up to the minimum international vehicle standards as requirements for manufacturers and assemblers, and limit the importing and sale of sub-standard vehicles in their countries.

The report also highlights a number of other areas that countries need to address in order to improve road safety. These include improving the quality of their data on road traffic injuries, having a lead agency with the authority and resources to develop a national road safety strategy whose implementation they oversee, as well as improving the quality of care available to those who suffer a road traffic injury.

Looking ahead: the SDG target to halve road deaths by 2020

These data represent the road safety situation 3 years into the Decade of Action for Road Safety. Despite a strong evidence base around what works, it shows insufficient attention has been paid to road safety and that a heavy price is being paid in terms of lives lost, long-term injury and pressure on health-care services. The international attention promised to the issue of road safety by the new Sustainable Development Goal target to halve deaths and injuries from road traffic crashes by 2020 presents a golden opportunity for much needed action, and one that must be seized by all countries. Through this, the pace of progress can be accelerated and an actual decline in global road traffic deaths realized.

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