

GLOBAL MOBILITY REPORT 2017

Tracking Sector Performance



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4.1 METHODOLOGICAL CHALLENGES IN MEASURING SAFETY

Historically, reliability, timeliness, costs, and volume of people and goods transported have taken priority over safety when planning transport. Also, transport costs and the benefits of transport projects are often calculated excluding the costs of fatalities, injuries, and crashes, because measuring safety has proven quite challenging. We are still far from having comprehensive, universally agreed upon data to measure and monitor transport incidents, their risk factors and their consequences as they happen around the world on an everyday basis. For example, suicides are included in railways statistics but they are excluded from road-related statistics.

While the various aspects of road safety are well measured, there are challenges in measuring safety. For example, the definition of road crash death varies in practice across countries, from death at the crash scene to deaths within 30 days of a crash from injuries received. Added to this is the difficulty of collecting and collating the comprehensive crash data required for measuring and monitoring road crashes in low- and middle- income countries, which suffer most of the total transport death and injury burden. Finally, it is difficult to collect reliable intermediate outcome data critical to safety in low-and middle-income countries, such as exposure (the number of kilometers traveled in each transport mode), vehicle or boat or ship safety features and maintenance, levels of risky behavior, such as drunk-driving or impaired captancy, and collection of data on road crashes in urban areas of low-and middle-income countries. However, intermediate data on some factors is improving, with more observational data on seat belt use, helmet use, and speeds, in addition to road infrastructure star ratings and risk mapping.

4.1.1 Definition of safety

First and foremost, safety relates to the prevention of deaths. But it also includes the prevention of serious injuries and property damage. The scope of the Safety

objective encompasses all modes of transport—air, waterborne, rail, and road transport safety for all users, including passenger and freight transport. However, in practice the focus of the objective is on roads, because deaths and serious injuries from road crashes far outnumber the deaths and injuries from other modes. Further, there are large variations in risk among road users, with pedestrians, cyclists and motorized two-wheeler riders bearing the largest risk of all.

To improve the safety of mobility, we need to design, construct, and operate the transport systems in such a way that fatalities and injuries to users and non-users can be minimized. However, there is still insufficient appreciation by road planners and builders, vehicle manufacturers, and by both urban and rural transport planners, of the importance of incorporating the safety of all users as a critical strategic objective. Society needs the commitment of all stakeholders to have safer roads and responsible behavior by all road users. All modes of transport have some data on fatalities and less data on injuries. However, there are fundamental differences in the management and operation between transport modes and the way to measure safety. The waterborne, rail, and air transport sectors are managed differently from road transport. For example, the road systems are open, with many government actors that manage them, while the other modes are generally closed, and thus have few professional actors with strong traditions of regulations, laws, and inspections.¹

4.1.2 Safety in various global agendas

Road transport

Despite the preventable nature of road traffic injuries, road safety was neglected by global health and development agendas until 2004. The WHO then set up the UN Road Safety Collaboration (UNRSC) to facilitate international cooperation and strengthen global and regional coordination among UN agencies and other international partners to carry out actions aimed at

¹ European Transport Safety Council, ETSC 2001.



decreasing road fatalities.² The Global Road Safety Partnership at the International Red Cross was one of the few initiatives before 2004.

With the support of member countries, the UN Decade of Action for Road Safety 2011-2020 was launched with a UN General Assembly resolution in 2010. Its objective is to reduce and stabilize the increasing trend in road fatalities from the current forecast of 1.9 million per year to fewer than one million per year—a 50 per cent reduction.

The importance of safer roads is recognized specifically in the following two SDGs:

- 3.6: By 2020, halve the number of global deaths and injuries from road traffic accidents.
- 11.2: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities, and older persons.

Other recent key global initiatives include the appointment of a UN Special Envoy for Road Safety, the creation of the High Level Panel for Road Safety (HLP) supported by the FIA, the creation of the Global Road Safety Facility at the World Bank, the Global New Car Assessment Programme, and the international Road Assessment Programme. On 15 April 2016, the GA adopted resolution A/RES/70/260 on “improving global road safety”.

The Habitat III New Urban Agenda establishes the need to improve road safety and integrate it into sustainable mobility and transport infrastructure planning and design. It also establishes the need to adopt, implement, and enforce policies and measures that actively protect and promote pedestrian safety and cycling mobility, and the development and implementation of comprehensive legislation and policies on

motorcycle safety—given the disproportionately high and increasing numbers of motorcycle deaths and injuries globally, particularly in developing countries. It also establishes the importance of children’s safety, and requests safe school routes, because every day more than 500 children die worldwide on their way to school or home.³

Rail transport

There is no global railway initiative on safety. However, the International Union of Railways works to maintain and further improve safety levels.

Air transport

The agenda for air transport safety is captured in the Global Aviation Safety Plan (GASP) 2017–19.⁴ The International Civil Aviation Organization (ICAO) has a strategic objective dedicated to enhancing global civil aviation safety and focused primarily on the state’s regulatory oversight capabilities. The objective is set in the context of growing passenger and cargo movements and the need to address efficiency and environmental changes. In line with the strategic objective on safety, GASP outlines the key activities for the three years. The GASP objectives call for states to put in place robust and sustainable safety oversight systems and to progressively adapt them into more sophisticated means of managing safety.

Waterborne transport

Although there is not a waterborne transport initiative on safety at the global level, there are some key conventions proposed by the International Maritime Organization as standard:

² The group holds biannual meetings, and developed the UN Global Plan for the Decade of Action on Road Safety.

³ Habitat 3 final statement.

⁴ See ICAO DOC 10004 for details. ICAO has established five comprehensive strategic objectives, which are revised on a triennial basis.



- International Convention for the Safety of Life at Sea (SOLAS) 1974, as amended
- International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 relating thereto, and by the Protocol of 1997 (MARPOL)
- International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) as amended, including the 1995 and 2010 Manila Amendments.

4.1.3 Measuring safety

One of the main challenges in transport safety is to make the populations and governments aware of the risks of transport and that injuries are avoidable. To achieve this measurement is key. Three terms can be used to measure risk in transport—crashes, exposure, and risk.⁵

The most widely used measure of exposure in transport is the number of kilometers traveled for each travel mode. In some cases, useful additional insight is provided by taking into account the speed of travel, in which case exposure is expressed as the amount of time spent in the traffic system. Many developments in recent years, including the installation of electronic and telecommunication equipment inside vehicles and infrastructure and the widespread use of mobile phones, have made it easier to collect up-to-date and reliable information on a variety of parameters that could be of importance in the calculation of vehicle exposure and risk.

The term risk is used in many contexts, including comparing risks between different parts of the transport system, different transport modes, or even different activities outside the field of transport. While theoretically, it is optimal to have various activities exposed to equal risks (to establish a fair distribution of risks), an equal distribution of risk is not practical. It is more

useful to search for ways to make each segment of the transport system as safe as possible, keeping cost-effectiveness considerations into account. Measuring risk between modes of transport helps keep track of the relative safety of the various modes. Risk is typically measured as deaths or injuries per mode of transport at a country or city levels. This can be by trip, or by passenger kilometers, or by time spent during travel, as well as injuries per mode of transport. However, this information is very difficult to obtain in many countries.

Road transport safety

Obtaining accurate data on fatal and non-fatal injuries at national, local, and city levels is a major challenge to road safety measurement. While a number of relevant data sources exist, including health system data, police data, and insurance data, most low-and moderate-income countries do not have sound death and injury data. Gaps in data on deaths include crashes not being reported to police, patients dying later in hospital with no follow-up of status, patients not brought to hospital, hospitals not reporting data centrally for collation, and errors in recording the cause of death. Despite these data limitations, estimates of deaths and injuries exist. Globally, the World Health Organization (WHO) estimates that 1.3 million people died on roads in 2015. The WHO has been producing the *Global Status Report on Road Safety* (2013 and 2015), which contains country level data covering the three areas identified below, and is currently defining the indicators for better tracking of the goals of the UN Decade of Action Global Plan for Road Safety 2011–20.⁶

The Decade of Action identifies the following key areas of action and hence measurement:

- Magnitude of road traffic fatalities, including data issues, emergency care, and multi-sectoral action
- Legislation and road user behavior
- Safer vehicles and roads.

⁵ Based on A.S. Hakkert and L. Braimaister 2002.

⁶ Global road safety is managed by many organizations including UN Road Safety Collaboration, the Multilateral Development Bank Road Safety Working Group, and the Global Alliance of Road Safety Non-Governmental Organizations.



Now, data estimates by the WHO and the Global Burden of Disease are used for global tracking of road safety, especially fatalities.

While progress has been made in allowing international comparisons of fatality data using comparable estimation methods for deaths, it is more difficult to make cross-country comparisons of non-fatal injuries. Data on non-fatal injuries are inaccurate, or are under-reported in many countries, because of the lack of a standardized definition for these types of injuries. Furthermore, an accurate assessment of injury severity requires specialized training or the use of algorithms to bring hospital discharge data into the severity measures. However, severity indicators are not standardized across countries—a situation further complicated by issues related to access to healthcare (WHO 2015 *Global Status Report*). The first effort to standardize severity indicators has been developed in the European Union with the recent adoption of the definition of seriously injured as someone sustaining injuries of level MAIS3+, *i.e.*, seriously injured⁷.

Rail transport safety

Data on railway safety come from the International Union of Railways (UIC). It is available for the European Union, but does not have global coverage. UIC produces two reports annually, the UIC Safety Report and International Railway Statistics, which contain data on the safety performance of some UIC member railways. Examples of the indicators measured include crashes and casualties, crash and crash rate trends, causes of crashes, crashes by type, fatalities and injuries, passenger safety, railway staff safety, and the UIC global safety index. More aggregated levels of safety data are also available; examples of these aggregates include the number of crashes caused by collisions, derailments, rolling stock, level crossings, and so on.

While these data are generally reliable, they are mostly collected by the railways and the national government regulators. The collection requirements vary on a regional basis, but for the most part are similar within neighboring countries.

In addition, the member states of the EU collect what are known as Common Safety Indicators (CSIs). The European Railway Agency is the European agency publishing these indicators. CSIs contain information about crashes based on a set of common definitions and statistical methods.

Air transport safety

The International Civil Aviation Organization (ICAO)⁸, a specialized agency of the United Nations, was created in 1944 to promote the safe and orderly development of international civil aviation throughout the world. ICAO produces annual safety reports and sets the standards and recommended practices (SARPs) necessary for aviation safety, security, efficiency, and environmental protection on a global basis. Within the context of aviation, safety is “the state in which the possibility of harm to persons or of property damage, is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and safety risk management.”⁹

Waterborne transport safety

Data on waterborne safety come from the International Maritime Organization (IMO), a specialized agency for maritime transport created by the United Nations. IMO functions as a global standard-setting authority for the safety, security, and environmental performance of international shipping. Its main role is to create a regulatory framework for the shipping industry that is fair and effective, universally adopted, and universally implemented (IMO 2017).

⁷ European Commission. Serious Injuries 2015. European Road Safety Observatory www.erso.eu accessed July 25, 2017

⁸ ICAO is the primary forum for cooperation in all fields of civil aviation among its 191 member states.

⁹ Extract of ICAO DOC9859 *Safety Management Manual*.



The IMO uses the Global Integrated Shipping Information System (GISIS) which contains information related to marine casualties and incidents, and the full marine safety investigation reports submitted to the IMO by reporting administrations.

For collecting information on ship casualties, the organization identifies ship casualties at four levels: very serious casualties, serious casualties, less serious casualties, and marine incidents.

A marine casualty¹⁰ can be understood as any event directly connected with the operation of a ship that has resulted in the death of, loss of, or serious injury to a person; the loss, presumed loss, or abandonment of a ship; material damage to a ship or to marine infrastructure external to a ship; the stranding or disabling of a ship or the involvement of a ship in a collision; or severe or potential for severe damage to the environment, brought about by the damage of the ship.

A marine incident can be understood as any event, or sequence of events, other than a marine casualty, which has occurred directly in connection with the operation of a ship that endangered, or if not corrected, would endanger the safety of the ship, its occupants, any other person, or the environment.

4.1.4 Indicators to measure safety

The overall target

The Safety objective aims to halve the number deaths and injuries from road traffic accidents by 2020 (SDG target 3.6) and reduce by 5 percent the fatalities and injuries in each other mode of transport (waterborne, air, and rail transport) by 2020.

To track progress towards this proposed target, the following proposed principal indicator will be used: “number of global deaths and injuries from road traffic accidents by 2020 (absolute number) and number of fatalities and injuries in each other mode of transport (waterborne, air, and rail).”

¹⁰ According to the European Marine Casualty Information Platform (EMCIP).

This proposed principal indicator will be supported by several proposed supporting indicators. To identify a long list of possible supporting indicators, below is a stocktaking of existing indicators for measuring safety by mode of transport.

Road transport

The WHO keeps track of several indicators that are included in the Global Status Report on Road Safety series. The number of fatalities per country is the major outcome indicator, followed by several other indicators that are distributed according to the Global Plan in five pillars, currently in a review process that will end by 2018:

- Safety management
- Safe roads
- Safe vehicles
- Safe road users
- Post-crash care.

Rail transport

The EU requires member countries to measure rail safety based on a set of Common Safety Indicators. These indicators have common definitions and statistical collection methods and could be extended to cover non-EU countries.

Two of the main safety issues in railways around the world relate to pedestrians entering the railways' right of way, and to automobiles being hit by trains at level crossings. The Common Safety Indicators allow for measuring the scale of both these challenges by measuring safety both in terms of crashes happening within the railways and crashes at a level crossing or with pedestrians.



The Common Safety Indicators cover the following:

- Significant crashes
- Deaths and serious injuries
- Suicides
- Precursors of crashes
- Economic impact of crashes
- Technical aspects (level crossings by type and automatic train protection systems)
- Management of safety.

Air transport

Air transport is entering slowly but surely into an era where it will be faced with rare events similar to those of the nuclear industry. The air transport community is therefore focusing on implementing and measuring the strength of preventive risk controls for enhancing safety oversight and managing operational safety risk. Starting in 2013, ICAO and IATA have increasingly harmonized the crash analysis processes and have developed a common list of crash categories to facilitate the sharing and integration of safety data between the two organizations. The following categories resulted from the harmonization:

- Controlled Flight into Terrain (CFIT)
- Loss of Control in-Flight (LOC-I)
- Runway Safety (RS)
- Ground Safety (GS)
- Operational Damage (OD)
- Injuries to or Incapacitation of Persons (MED)
- Other (OTH)
- Unknown (UNK).

4.2 TRENDS IN SAFETY

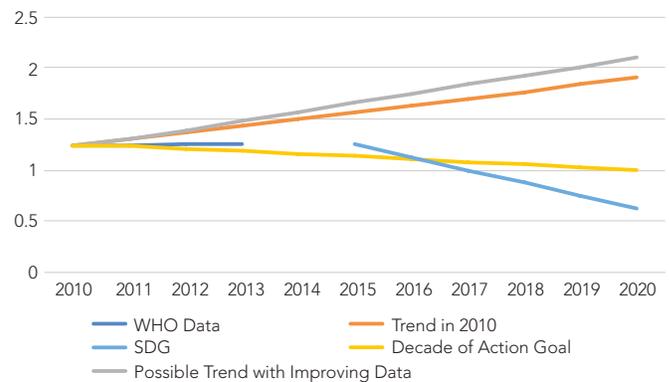
Road transport

The number of road traffic deaths—1.3 million in 2015—has remained constant since 2007, despite the growth in global population and motorization from 2007 to 2013. In 2015, WHO reported there was a 4

percent increase in global population and 16 percent increase in motorization from 2010 to 2013. Geographically, in order of frequency of deaths—the highest to lowest number of fatalities per 100,000 people—the regions were classified as follows: (i) Africa (26.6); (ii) Eastern Mediterranean (19.9); (iii) Western Pacific (17.3); (iv) South East Asia (17.0); (v) Americas (15.9); and (vi) Europe (9.3). Since 2007, the total number of road deaths has remained stable, even though the vehicle fleet has grown 15 percent. WHO estimates that from 2007 to 2013, traffic deaths decreased in 88 countries, and grew in 107 countries.

Figure 4.1 shows the evolution of the fatalities on roads (in millions) since 2010, the trends in 2010 according to WHO, the Decade of Action goal, and the Sustainable Development Goal.

FIGURE 4.1: Fatalities on Roads, Decade of Action Goals, and SDG Objectives (millions of fatalities)

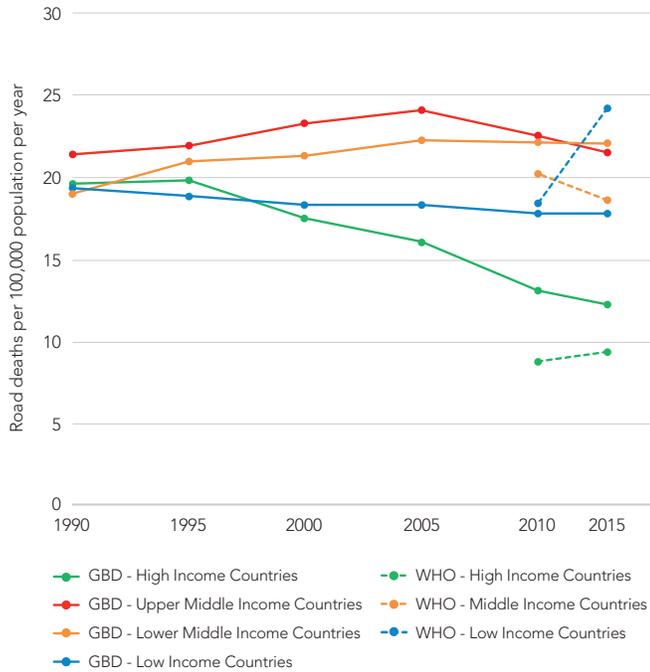


Source: Based on International Transport Forum's calculation

Figure 4.2 shows the trend in deaths per 100,000 people in low-, middle-, and high-income countries, contrasting the improvement in high-income countries with the lack of improvement or worsening in middle and low-income countries. It also shows the variation in estimates from WHO and the Global Burden of Disease Study. The figure shows stark differences across country income, and differences in estimation methods.



FIGURE 4.2: Trends in Road Crash Deaths per 100,000 People, for Low-, Middle-, and High-Income countries



Source: Based on International Transport Forum’s calculation

In low-income regions, fatality rates on roads per 100,000 inhabitants are almost three times those of high-income regions (Figure 4.2). Half of the traffic deaths occur among motorcyclists (23 percent), pedestrians (22 percent), and cyclists (5 percent); 32 percent occur among car occupants; and the remaining 19 percent occur among unspecified road users. Key reasons for this difference include the lack of effective regulation and enforcement of unsafe behavior such as speed, the safety levels of road infrastructure, and the safety of vehicle fleets.

Many countries have adopted a safe system approach, embracing the vision of zero deaths and serious injuries—accepting that human error is inevitable, but should not result in death or serious injury. These countries have been more successful in managing road

safety than other countries.¹¹ The safe system approach demands improvement of roads, speed limits, vehicles, post-crash care, and human behavior, to protect people in the event of crashes.

Motorcycles are not effectively managed in safe system advocacy, especially safe system promoted speed limits which ignore the failure of the proposed limits to protect motorcycles. The limits proposed by safe system are for occupants in cars with seat belts on only. From a young age, males are more likely to be involved in road traffic crashes than females. About three-quarters—73 percent—of all road traffic deaths occur among men. Among young drivers, young males under the age of 25 years are almost 3 times as likely to be killed in a car crash as young females.¹²

In many low- and middle-income countries, females represent a quarter to half of all fatalities. As motorization increases, it is possible that the proportion of females represented in the statistics may increase. Despite the imperative for improved road safety, as of the end of 2015, 32 percent of countries had not acceded to any of the 10 conventions on road safety under the purview of the UNECE’s Inland Technical Committee on Land Transport.^{13, 14} Most of these countries are in Central America and Africa, with some in Latin America and Asia. WHO assessed that basic

¹¹ Mooren, L, Grzebieta, R., Job, R.F.S. Williamson, A. 2011. “Safe System—International Comparisons of this Approach,” in *A Safe System—Making it Happen: Proceedings of the Australasian College of Road Safety Conference September 2011*. Melbourne; and International Transport Forum. 2016. Zero Road Deaths and Serious Injuries Leading a Paradigm Shift to a Safe System.

¹² <http://www.who.int/mediacentre/factsheets/fs358/en/> (accessed June 22, 2017)

¹³ UNECE conventions on road safety: a) 1968 Convention on Road Traffic, b) 1949 Convention on Road Traffic, c) 1949 Protocol on Road Signs and Signals, d) 1968 Convention on Road Signs and Signals, e) 1958 Agreement concerning the Adoption of Uniform Technical Prescriptions 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 Prescriptions, f) 1997 Agreement concerning the Adoption of Uniform Conditions for Periodical Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of Such Inspections, g) 1998 Agreement concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be fitted and/or be used on Wheeled Vehicles, h) 1957 European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), i) 1970 European Agreement concerning the Work of Crews of Vehicles Engaged in International Road Transport (AETR), j) 1975 European Agreement on Main International Traffic Arteries (AGR).

¹⁴ UNECE “SDGs and the UN Transport Conventions--Under the purview of the UNECE Inland Transport Committee”



safety regulations in only 28 percent of countries—representing 7 percent of the world’s population—have comprehensive road safety laws on five key risk factors: drinking and driving, speeding, and failing to use motorcycle helmets, seat-belts, and child restraints. Significant progress can be made by implementing and enforcing basic legislation that addresses these important risk factors.

Road traffic injuries are the leading cause of death for young people ages 15 to 29. Male and young drivers are more likely to speed. Other factors that may influence speed include alcohol. Younger and novice drivers are also at a much higher risk of road traffic crashes compared to older and more experienced drivers when under the influence of alcohol.

In terms of distracted driving, younger drivers are also more likely to text and drive, which can increase their chances of being in a traffic crash.

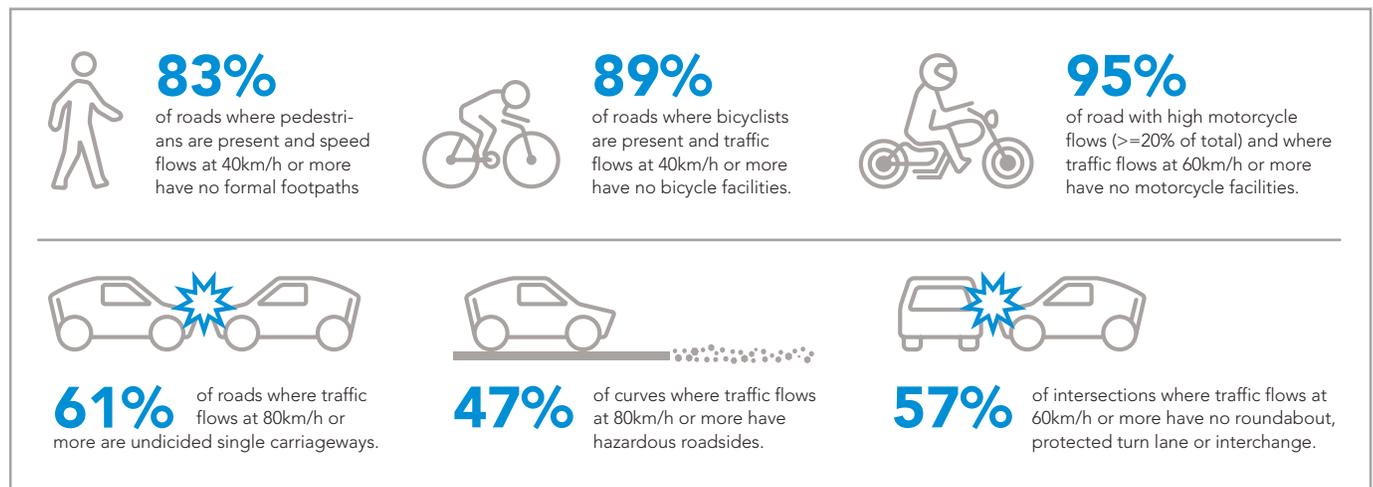
Road infrastructure is mainly constructed with the needs of motorists in mind, although a 2016 report by UNECE indicates that 49 percent of all road traffic deaths occur among pedestrians, cyclists, and motorcyclists. However, the likelihood of dying on the road as a motorcyclist,

cyclist, or pedestrian varies by region. Africa has the highest proportion of pedestrian and cyclist deaths, at 43 percent of all road traffic deaths. These rates are relatively low in Southeast Asia.

This partly reflects the level of safety measures in place to protect different road users—especially the most vulnerable ones—and the predominant forms of mobility in the different regions, considering the increasing number of motorcycles around the world. The active modes, such as biking and walking, are very vulnerable forms of mobility, yet they are the most sustainable and equitable; thus, they need special attention (Figure 4.3).

Improving the safety of pedestrians and bikers will not only directly benefit these users, it is also likely to have a spillover effect over other motorized users, mostly motorcycle ones. Along with the direct impact on crash-related injuries, there are additional health benefits to promoting the active transport use (walking and cycling) of the road network, such as environmentally-related health effects (less air pollution, less noise) and the physical exercise-related health benefits. Improvements on the road network are essential for this transport modal shift.¹⁵

FIGURE 4.3: Statistics on Protection offered by the road network by User Type

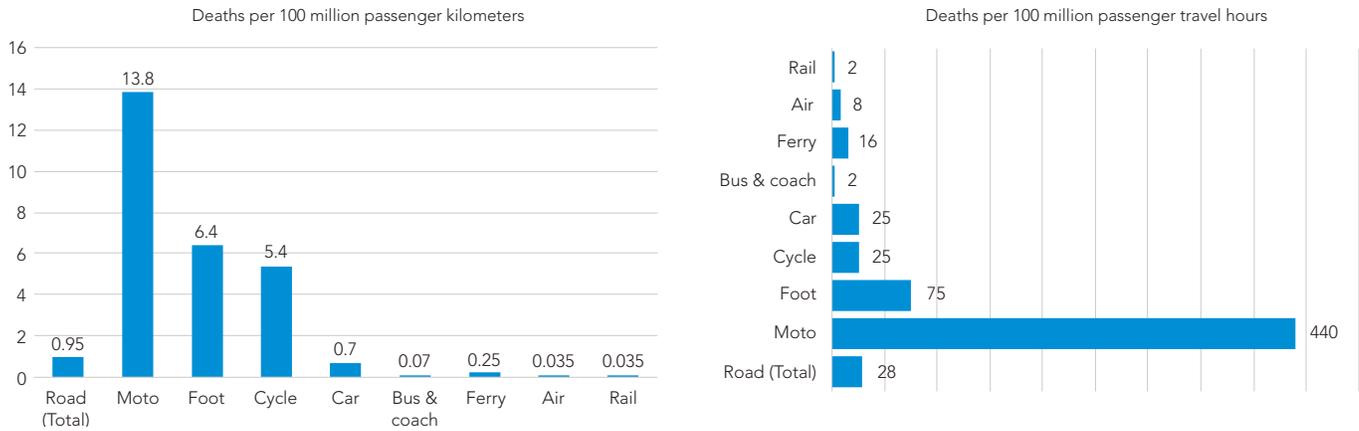


Source: International Road Assessment Programme 2015. “Vaccines for Roads”. 3rd edition.

¹⁵ ITF Research Reports (2013) Cycling, Health and Safety. ISBN: 9789282105955 (PDF);



Figure 4.4: Distribution of Deaths by User Type due to Road Crashes



Source: European Transport Safety Council 2003. "Transport Safety Performance in the EU: A Statistical Overview."

A study by the European Transport Safety Council (ETSC) in 2003 shows that overall road traffic has the highest fatality risk in all modes of transport: it accounts for more than 97 percent of the deaths and 93 percent of the costs. However, it is important to note that within road transport not all modes are equal. It is important to distinguish between fatality risks for motorcycles, foot, cycle, car, and bus, because the risks differ significantly among the types of road users (Figure 4.4). The death rate by passenger-kilometers is the highest for motorcyclists (13.8 deaths per million passenger-kilometers), followed by the two active modes of mobility (the death rate for those on foot is 6.4 per million passenger-kilometers, and for those on cycles is 5.4 per million passenger-kilometers). To put things in perspective, the fatality risk for motorcyclists is 20 times higher than for car occupants, followed by cycling and walking, with 7 and 9 times higher risk than car travel. In comparison, rail and air are the safest modes, and bus occupants are 10 times safer than car occupants.

A similar picture emerges when we consider passenger-hours travelled instead of passenger-kilometers. The star rating of a road provides an objective, evidence-based measure of the safety performance of road infrastructure. According to the International Road Assessment Programme (iRAP), a 5-star rating is the safest, and a 1-star rating is the least safe. The iRAP star ratings are available for pedestrians, cyclists, motorcy-

clists, and vehicle occupants, and more than 800,000 km of roads have been assessed by governments, civil society, and development partners worldwide. More than half of all roads assessed are only 1 or 2-star standard for each road user, according to iRAP's 2015 report, with crash risk per kilometer travelled typically halved for each incremental improvement in star rating.¹⁶

The star rating is made up of the impact key road features have on the primary crash types that kill and injure, including head-on, run-off-road, and intersection crashes, as well as pedestrians and cyclists moving along or crossing a road. Simple deficiencies, including the lack of footpaths, lack of cycle lanes, no motorcycle facilities, undivided roads, dangerous roadsides, and unsafe high-speed intersections help explain the high-risk environment facing road users across the world (OECD, 2016).

Globally, 40 to 50 percent of traffic fatalities occur in urban areas. The World Resources Institute provided the reported fatality rate per 100,000 inhabitants for about 60 cities in different regions of the world.¹⁷ The highest fatality rates occur in cities in the developing world. The proportion of fatalities in urban areas is high

¹⁶ iRAP (2015) Vaccines for Roads III, London, UK

¹⁷ World Resources Institute 2015. "Cities Safer by Design: Guidance and Examples to Promote Traffic Safety Through Urban and Street Design." Version 1.0, Figure 1.1. Washington, DC: World Resources Institute.



and rising in low- and middle- income countries. And it is expected that by 2050, 70 percent of the world's population will be living in cities.

Therefore it is important to prepare cities with an urban form and design that enables and promotes sustainable and safe forms of transport, such as rail and mass transport; makes safer the sustainable but unsafe modes of walking and cycling; and finds ways to make cars and motorized two-wheelers safer. Improving safety on urban roads will provide adequate access to jobs, services, and goods for all.

Environments that are friendly to active transport modes contribute to reducing road injuries and to increasing public transport use, particularly for more vulnerable users, including women, children, persons with disabilities and older persons.

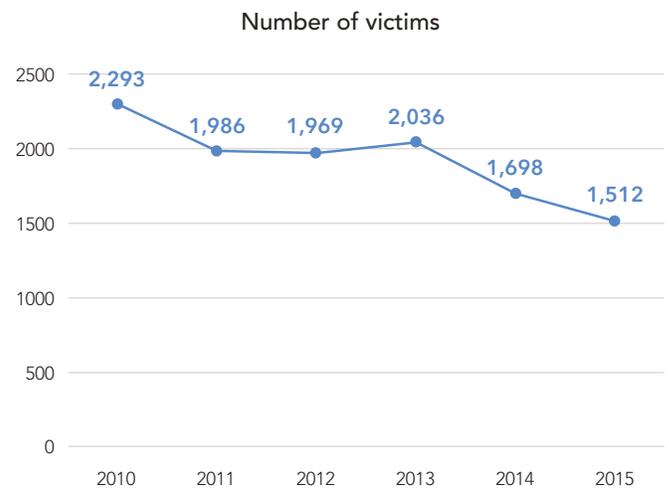
Much more progress needs to be made on the five pillars of road safety identified by the WHO. WHO's Global Status reports measure progress on implementation of the five pillars for advancing road safety: (i) road safety management; (ii) safer roads and mobility; (iii) safer vehicles; (iv) safer road users; and (v) improved post-crash response and hospital care. For example, WHO, in relation to road safety management, reported in 2015 that from 2010–2013 "...17 countries have amended their laws on one or more key risk factors for road traffic injuries to bring them into line with best practice." In relation to safer vehicles, WHO reported that "...just over half of all countries have enacted good seat-belt laws."¹⁸

Rail transport

Data on railway safety performance is readily available for systems in the EU and North America. However, these data are difficult to obtain for other regions of the world. Based on readily available data, safety performance on railways has improved over the last 20 years. Figure 4.5 shows safety statistics for the main

European railways; and as can be seen, the number of crashes and fatalities has gone down since 2010. Railways within the EU have evolved toward a more integrated continental railway system, where the EU requires national governments to comply with EU interoperability and safety requirements. This has allowed EU railways to establish safety management systems to improve their safety performance and their ability to operate outside their national boundaries.

FIGURE 4.5: International Union of Railways Safety Statistics for 21 EU Member Countries



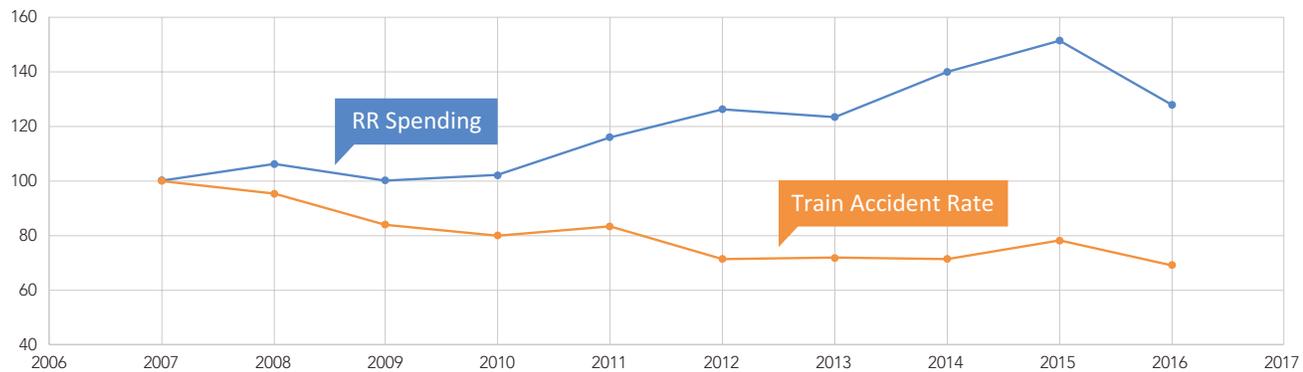
Source: International Union of Railways 2015. "Significant Accidents 2014 Public Report"

In North America (U.S., Canada, and Mexico), the performance has been similar. Figure 4.6 shows U.S. train crashes since 2007. Such performance is likely the result of both a proactive regulatory body and the ability of the North American railways to invest in safety related measures, infrastructure, and equipment. What is important to note is the impressive reduction in train crashes of around 44 percent. Safety improvements have been more modest on road and rail level crossing crashes and trespasser safety.

¹⁸ WHO 2015. Op. cit.



Figure 4.6: U.S. Train Crashes, 2007–2016



With an average of \$26 billion spent annually in recent years on upgrades to and maintenance of the privately-owned freight rail network, the train accident rate on America’s freight railroads has been at an all-time low. In fact, from 1980 through 2016, railroads have spent approximately \$635 billion on infrastructure and equipment, as a result train accidents have decreased 44 percent since 2000.

Source: Association of American Railroads 2017. “Railroads: Moving America Safely Report”.

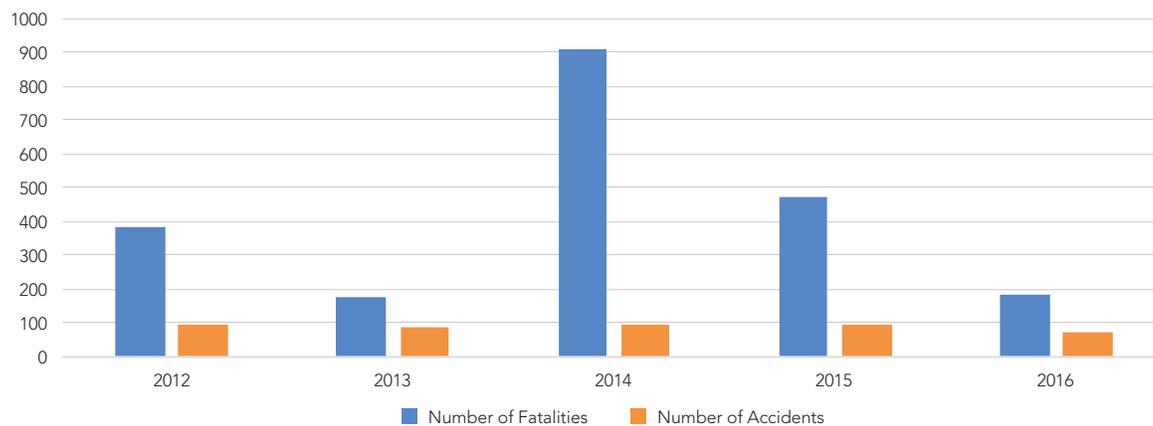
Air transport

Air transport has seen a continuous reduction of the number of fatalities and fatal crashes over recent years. Some regions have begun to experience zero fatalities in commercial scheduled aviation over a one-year period. An aspirational goal for air transport is to achieve zero fatalities worldwide within the next decade. Crashes happen mainly in three categories: runway safety related crashes, like excursions or overruns; controlled flight into terrain, such as hitting a mountain through loss of spatial awareness; or loss of control in flight, where the flight crew loses control over a

functioning aircraft. Operational safety now focuses on those categories by collecting data from normal operations to build early warning systems.

The reduction in the crash rate to 2.8 crashes per million departures—a 7 percent decrease compared to 2014—represents the lowest rate in recent history (Figure 4.7). Extremely notable was that the Africa–Indian Ocean Regional Aviation Safety Group (RASG-AFI) region did not have any fatal crashes in 2015, and three of the five RASG regions each experienced only a single fatal crash in 2015.

FIGURE 4.7: Accident Records for 2012–2016 Scheduled Commercial Flights



Source: Civil Aviation Organization 2016. “Annual Safety Report”.



Waterborne

Based on the Annual Overview of Maritime Casualties and Incidents 2016, in 2015 in Europe there were 3,296 maritime casualties and incidents involving 3,669 ships. During that year, 36 ships were lost.

4.3 SCALE OF THE CHALLENGE

The Safety objective faces several challenges. The first challenge is to shift population behavior to reduce unproductive travel, and to incorporate safety in transport planning, giving priority to the safest transport modes and incorporating safety in people's decision-making processes. The second challenge is for all countries to implement the roster of interventions with known effectiveness to reduce risks, to carry out very good cost-efficient and cost-saving measures, with a focus on making cycling and walking—the most sustainable modes—safe, and reducing the risks of motorized two-wheelers. The WHO- developed Save LIVES package captures the priority and proven interventions for large-scale action globally¹⁹.

The third challenge is to ensure that the integration of transport-aid related technologies—ranging from autonomous passenger cars to automated traffic control systems—prioritizes safety in all decision-making algorithms and in determining how the transition between non-automated and automated fleets gets done.

A fourth challenge is to measure safety with good, timely, and quality data on fatalities and injuries in each mode of transport, and with sufficient information to identify the principal causes of crashes or incidents. This is more critical when related to injuries. The level of information is very poor in many countries, and it is not consistent enough for comparisons between countries. It is also important to have accurate information on risk, measured as passenger-kilometers, ton-kilometers and travel times.

The main challenges measuring road safety can be identified as: (i) how to measure the performance and implementation of national and local road safety plans; (ii) how to measure the safety of motorized two-wheelers; (iii) how to measure the safety of existing vehicle fleets; (iv) how to measure the safety in design and operation on roads in urban and rural areas; (v) an adequate way to measure post-crash assistance such as medical assistance and attention to victims; (vi) how to measure the effectiveness of systems that protect the most vulnerable and yet the most sustainable forms of transport, walking and cycling; and (vii) how to incorporate the real cost of road crashes in road transport planning, as well as including the benefits of preventing them.

The challenges faced by rail transport are twofold. The first challenge is to collect and analyze worldwide information on rail transport, including the number of incidents, victims, and localization of the crashes. Today this information is only available for Europe, collected by the UIC, and partially available for the United States. The second challenge is to improve safety measures for car and pedestrian crossings, anticipating urban expansion and conflicts that might happen between trains and trespassers, including cars and pedestrians.

One of the biggest challenges in air transport is how to maintain an extremely safe system, knowing the traffic is constantly increasing and new actors are entering the aviation system. These new actors include integration of regular commercial space transport operations into controlled airspace and remotely piloted aircraft systems, which change the way air operations are controlled. In addition, climate change may increase environmental hazards and therefore the risk of crashes in all categories.

The Global Integrated Shipping Information System, called GISIS, which contains information related to marine casualties and incidents, and the full marine safety investigation reports submitted to the International Maritime Organization by reporting administrations, is not corroborating the data.

¹⁹ http://www.who.int/violence_injury_prevention/publications/road_traffic/save-lives-package/en/

