ROAD SAFETY

IN LATIN AMERICA AND THE CARIBBEAN

AFTER A DECADE OF ACTION

PROSPECTS FOR SAFER MOBILITY

Ana María Pinto / Claudia Díaz / Edgar Zamora / Eduardo Café
Marisela Ponce de León / Martín Sosa / René Cortés

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Acronyms and abbreviations

UNGA	United Nations General Assembly
LAC	Latin America and the Caribbean
RSV	Road Safety Audit
BIGRS	Bloomberg Initiative for Global Road Safety
FGR	Gonzalo Rodriguez Foundation
FIA	International Automobile Federation
FICVI	Ibero-American Association of Victims against Road Violence
FISEVI	International Child Road Safety Forum
RSI	Road Safety Inspection
iRAP	International Road Assessment Programme
GDCI	Global Designing Cities Initiative
NCAP	New Car Assessment Program
ODS	Sustainable Development Goals
CSO	Civil Society Organization
WHO	World Health Organization
PAHO	Pan American Health Organization
CRS	Child Restraint System
RS	Road Safety
WRI	World Resources Institute

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Foreword

One of the main challenges affecting the economic development and well-being of the region is the unsafe roads. Around 110,000 people die and more than 5 million people are injured in Latin America and the Caribbean (LAC) due to road crashes. These are the leading cause of death for children between the ages of 5 and 14 and the second for young adults. Although the countries of the region have invested in transport infrastructure and services in recent years to provide access to essential services and increase the productivity of the rural and urban population, it should not be overlooked that transport systems must protect life and provide safe conditions for all users.

Annually, road crashes cost between 3% and 5% equivalent to LAC's GDP. This is even more worrisome if we take into account that the people affected are mostly those in their most productive age, between 15 and 49 years, which has an impact on the loss of productive capacity in our countries. Road crashes also have a disproportionate impact on the poorest people, as they often have fewer resources to protect themselves and recover from injuries and economic damages. In addition, these people may have less access to justice, high-quality health care and adequate compensation after the loss. This can further aggravate their economic and social situation, making it difficult for them to recover and perpetuating their vulnerability in the future.

In terms of gender, road crashes affect women differently than men: although 80% of all road crashes victims are men - compared to 20% of women - the women are generally the ones who assume the new caregiving activities in the victims' families, which generates a double burden of work and mental workload, exacerbating inequalities of opportunity and income.

Consequently, the Inter-American Development Bank has joined the efforts of the United Nations Decade of Action for Road Safety 2021-2030, with the commitment to continue investing in actions aimed at reducing road crashes in the region. This report not only compiles the experiences of the region in the first decade of action (2011-2020) but also outlines a roadmap for work between the IDB, the entities, and countries of LAC for a safer and more inclusive transport system, in the service of the economic growth so needed in the next decade.

Rigoberto Ariel Yepez-Garcia

Infrastructure Manager, the Inter-American Development Bank

Introduction

The first **Decade of Action for Road Safety** has ended, but not without demonstrating the importance that systemic work on road safety offers towards protecting life. At the same time, it is clear that real progress in road safety requires a significant commitment of time, resources and political effort.

In the Latin American and Caribbean region (LAC), over the past ten years, the growth in the rate of vehicle deaths has slowed. Unfortunately, in the last two years this trend has reversed due to the expansion of the motorcycle fleet in the region. Although it has been possible to raise awareness, create institutions, plan and implement important actions to reduce fatalities, LAC has not obtained the same results as high-income countries, which have entirely reversed the trend in road deaths. In accordance with the above, it is possible to conceive of a second decade of action as an opportunity for LAC countries to finalize the processes initiated over the past decade and to introduce successful lessons experiences from other countries in the region.

With this study, the IDB intends to guide this process of continuous improvement, highlighting the best practices and offering an overview of how tp move from theory to practice, following the principles that mobility must be safe, sustainable and inclusive, while reducing the risk to all road users, especially the most vulnerable, and maintain the focus on users with special needs (people with disabilities, children and the elderly).

The results of the study presented below are divided into three parts as follows: **Part 1** introduces the context of the first decade of road safety action and analyzes the immediate impact on fatalities during these years; this first section also analyzes the collateral effects of road crashes in economic terms, on gender and even effects related to COVID-19. **Part 2** includes the key components of the five road safety pillars (road safety management, safe transit and mobility infrastructure, safer vehicles, safe road users, and post-crash care) for the development of a logical and comprehensive effort towards greater road safety. Through the collection of experiences at the country and city levels in LAC, the chapter describes the strategies, actions and measures that have shown promising results that can act as fundamental axes of a road safety culture. Likewise, a brief analysis is made of those actions to be improved during the implementation process in LAC countries and how they impact the final performance of the desired road safety system.

Part 3 of this report reflects on the achievements of the first decade of action and how road safety, regardless of the scope of the objectives set, is positioned as a cross-cutting axis in the global agenda in terms of the protection of road users' lives. Based on the analysis of what is stated in the first two parts and interviews with leaders of successful public policy on road safety in the LAC, the IDB introduces its safe mobility strategy, which focuses on three priorities: safe infrastructure, urban mobility, and public policies & institutions and presents a list of recommendations applicable to the countries of the Region.

Part 1

THE STATUS OF ROAD SAFETY IN LATIN AMERICA AND THE CARIBBEAN AFTER A DECADE OF ACTION

1.1. A decade of action for road safety

Since the 1950s, developed countries have been experiencing rapid growth in motorization. A secondary result of this growth was an attendant rise in road traffic crashes, deaths and injuries associated with them. Developed countries responded to this secondary effect to address its negative outcomes, focusing on improving traffic management and improving safety systems. The resulting policies were quite successful in lowering traffic fatalities and injuries.

Middle- and low-income countries have followed a trend toward motorization similar to that of high-income countries, only four decades later. However, these countries did not pursue similar policies to mitigate death and injury. As a result,

road traffic crashes became a growing cause of premature death, especially for the young and low-income population.

In response to this issue, United Nations General Assembly (UNGA) resolution 58/289 of April 2004 recognized the need for the UN system to support efforts to address the global road safety crisis by recognizing it as a public health problem. The resolution assigned the World Health Organization (WHO) to coordinate road safety issues within the UN system, working in close cooperation with its regional commissions. A United Nations Road Safety Collaboration was established to bring together international organizations, governments, non-governmental organizations, foundations, and private sector entities to coordinate effective road safety responses.

In 2006, the Commission for Global Road Safety, formed by the International Automobile Federation (FIA) Foundation, called on the international community to launch a Decade of Action for Road Safety (DARS), which was widely supported by UN member states and international organizations. The UN Secretary General, in his 2009 report to the UNGA, called on member states to support the establishment of the DARS as a strategy that would seek to: a) coordinate global, national, and local road safety support activities; b) accelerate investment in low-and middle-income countries; and c) rethink the relationship between roads and people.

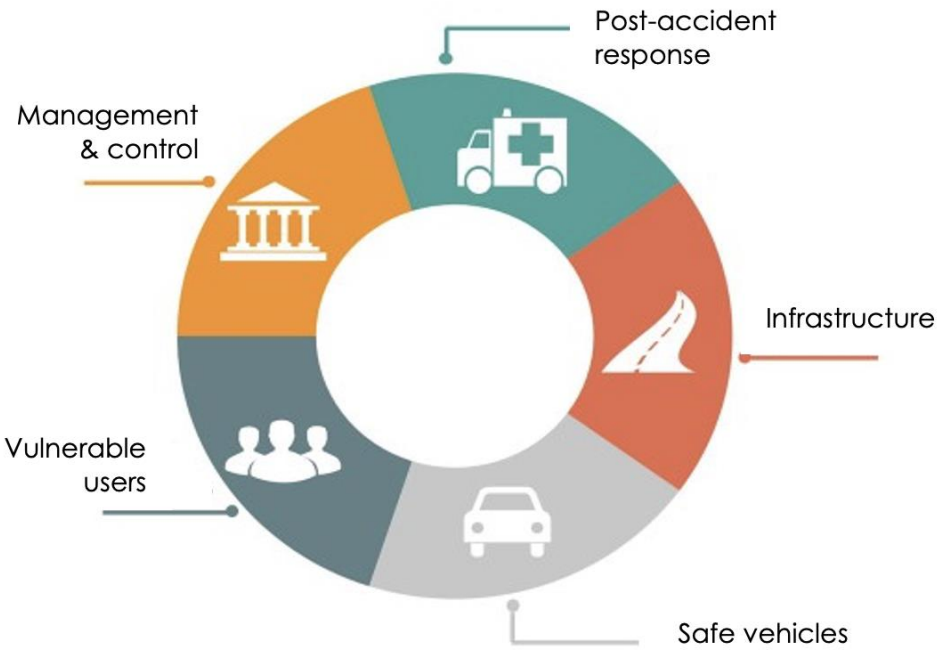
In March 2010, the UNGA proclaimed the Decade of Action for Road Safety 2011-2020, with the goal of stabilizing and then reducing the expected level of road deaths and injuries worldwide. The resolution called for WHO and the United Nations regional commissions, in cooperation with partners in the United Nations Road Safety Collaboration and other stakeholders, to prepare a global plan for the decade as a guiding document to support the achievement of its objectives. This plan had five main objectives: (a) reducing the number of road traffic fatalities by 2020; (b) strengthening infrastructure and management capacity in the technical implementation of road safety activities at national, regional and global levels; (c) improving the quality of data collection at national, regional and global levels; (d) monitoring progress and performance through a set of pre-defined indicators at national, regional and global levels; and (e) encouraging increased funding for road safety as well as the better use of existing resources.

The *Global Plan for the Decade of Action for Road Safety 2011-2020* is the basis of the framework plan for activities at both local and global levels, and uses five pillars as essential building blocks for creating national road safety systems. These pillars are integrated into a comprehensive and sustainable system over time, complemented and assisted by international coordination.

This pillar structure illustrates the scope of activities needed to achieve long-lasting progress in road safety and has proven useful in identifying gaps in national programs and allocating local resources to the most critical areas. The specific interventions included in each of the five pillars

have been tested and evaluated and offer a range of evidence-based actions aimed at achieving safe and sustainable mobility.

Figure 1. 1 Pillars for the Decade of Action for Road Safety



Specifically, in the pillars of road safety management and control, action focuses on the creation of multisectoral partnerships and the designation of coordinating bodies that have the capacity to develop national road safety strategies, plans and targets and manage their implementation. These bodies develop these strategies using data collection and evidentiary research that evaluate the design of countermeasures and monitor their implementation and effectiveness.

In the other pillars, action is focused on the following areas:

a. Legislation: having a clear basis for improving road safety, as well as designating agencies

responsible for enforcement, education, and control.

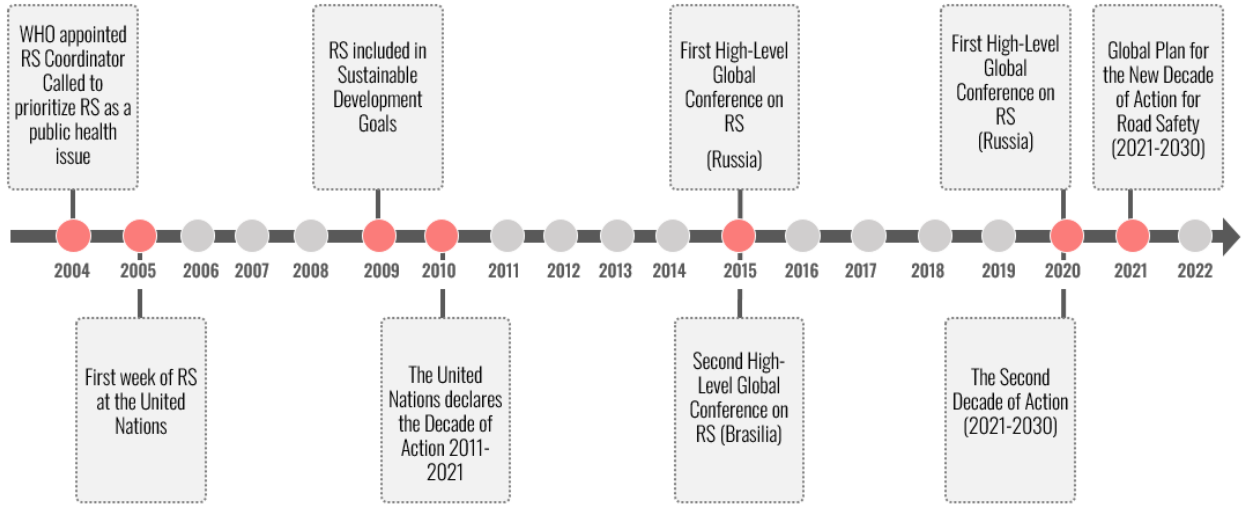
b. Enforcement (including inspection and audits, as appropriate): to ensure that rules and regulations are followed.

c. Education: to ensure that rules and regulations are widely known and can be implemented.

d. Technology: to complement and reinforce other areas, thus increasing the efficiency of the system.

e. International policy support: providing an international legal framework and offering institutional platforms to support work in other areas related to road safety.

Figure 1. 2 Global milestones in road safety



Concern about traffic fatalities and serious injuries was apparent in the Sustainable Development Goals (SDGs), declared in 2015. Under *Goal 3: Health and well-being*, target 3.6: "By 2020, half the number of deaths and injuries from road traffic crashes globally" was included. This target went beyond what was established in the first decade of action, increasing the pressure on UN member countries to adapt the Plan of Action to their local realities.

To date, three ministerial-level conferences on road safety have been held, reaffirming the importance of intensifying international cooperation and multilateralism in achieving the

health-related SDGs, with particular emphasis on achieving the global road safety targets. The first Ministerial Conference was held in Moscow in 2009 and resulted in the *Moscow Declaration.* The second Ministerial Conference was held in Brasilia in 2015 and established the *Brasilia Declaration.* The third and final Ministerial Conference was held in Stockholm in February 2020 and resulted in the *Stockholm Declaration.* This final declaration recognizes, among other things, the lessons learned from the Decade of Action for Road Safety 2011-2020. These include the need to promote an integrated approach to road safety (e.g., the Safe System approach and Vision Zero), to seek safety solutions that are sustainable and long-term, and to strengthen national cross-sectoral collaboration, including engagement with NGOs and civil society, as well as with businesses and industries that contribute to and influence the social and economic development of countries.

The Stockholm Conference recommended a target of a 50% reduction in traffic fatalities and serious injuries by 2030, on the way to Vision Zero by 2050. To achieve this, 18 points were established, and the first meeting of heads of state and government was called to motivate adequate national leadership and promote international and multi-sectoral collaboration. The recommendations of the Stockholm Declaration were taken up by the UNGA in *resolution A/RES/74/299* on September 2, 2020. The UNGA then declared the Second Decade of Action for Road Safety 2021-2030, adjusting the SDG target. This resolution includes 40 articles that form the basis of a new action plan with stronger measures that implement other lessons learned during the first decade of action.

1.2. Latin America and the Caribbean in figures, after a decade of action

1.2.1. EVOLUTION OF MORTALITY DUE TO ROAD TRAFFIC CRASHES

Based on road fatality projections and the target set by the Decade of Action in 2011, casualties were expected to reach 1.9 million by 2020 if no action was taken. The initial Decade of Action target 2011-2020 proposed to "stabilize and then begin to reduce road traffic fatalities," which was adjusted in the SDGs to target a 50% reduction in deaths and serious injuries by 2020, relative to 2011. Meeting the SDGs translated into approximately 900,000 road deaths by 2020 in LAC. After a decade of action on road safety, it is possible to state that, in global terms, the ambitious target set in the Decade's Plan of Action on reducing road traffic deaths was not achieved. This failure occurred despite the countries declaration that they would devote all the efforts necessary to halve the number of victims do address the road safety pandemic.

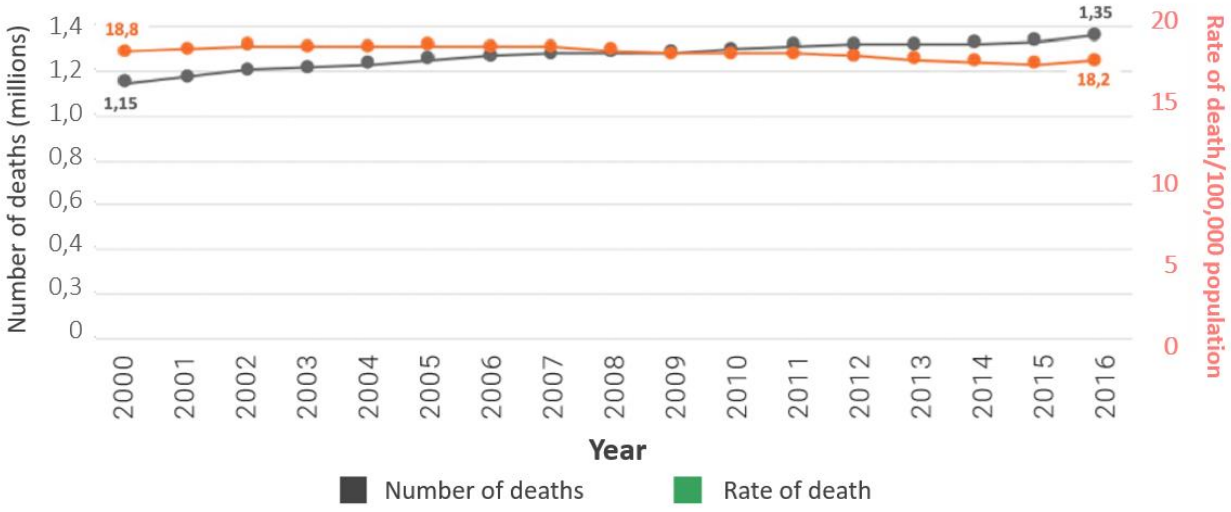
According to WHO (2018a), the number of road traffic fatalities worldwide remains unacceptably high. In 2016, about 1.35 million people[1] died worldwide in road traffic crashes; this figure is higher than the 1.15 million victims reported for the year 2000 (WHO, 2018) and very similar to the number of deaths recorded globally in 2010, when the Decade of Action began (WHO, 2011).

Unfortunately, the figures and trends known to date suggest that, at the end of the decade, the expected goals will not have been achieved.

Globally, however, the results are not entirely discouraging when considering fatality figures relative to population size. The global road traffic casualty rate (measured in deaths per 100,000 population) has declined slightly, from 18.8 in 2000 to 18.2 in 2016 (Figure 1.1)

1 Latest available data to date, World Health Organization report (WHO, 2018).

Graph 1. 1 Number and rate of road traffic fatalities worldwide, 2000-2016.



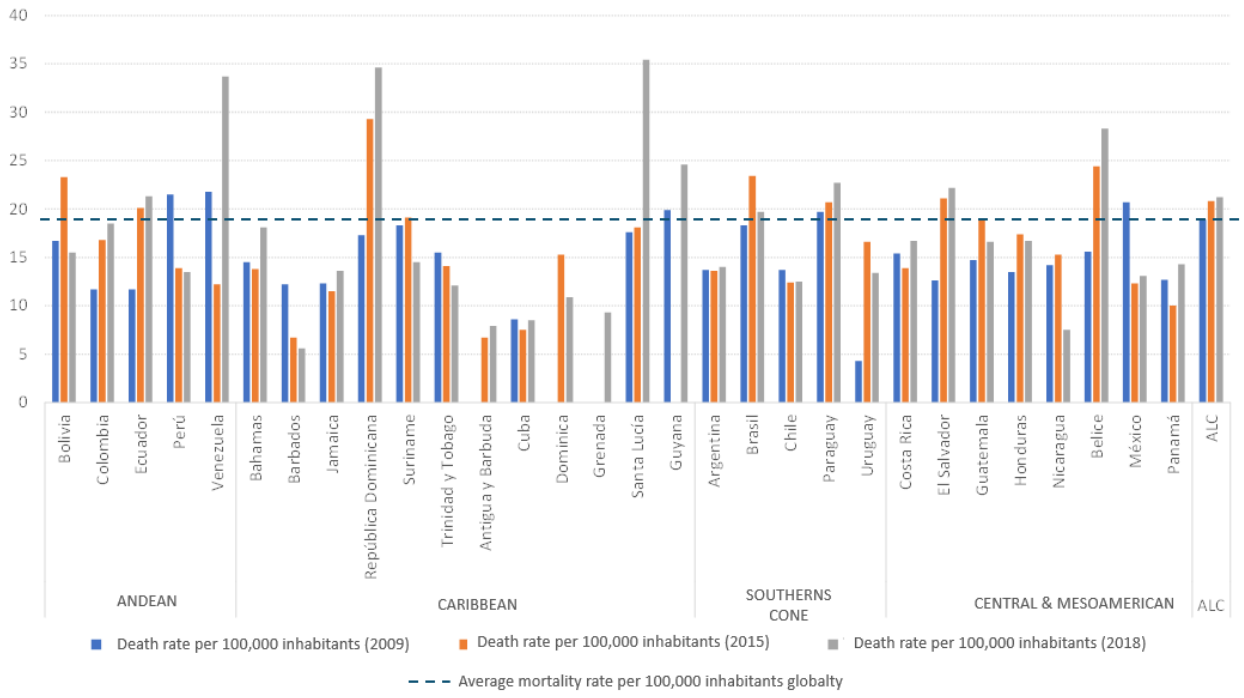
Source: WHO (2018).

Unfortunately, for Latin America and the Caribbean (LAC) the results were less favorable. According to the most recent data (PAHO, 2019), some 109,000 people lost their lives in road traffic crashes in the region in 2018. Road traffic deaths and injuries remain a major public health problem in LAC, and this region, like the rest of the world, failed to achieve the goals established in the international declarations. That said, the Decade of Action did manage to stabilize the number of deaths in many countries, and this is encouraging news.

According to WHO and PAHO data, mortality rates in the region increased from around 18 victims per 100,000 population, in 2008, to more than 20, in 2018 (Graph 1.2). Although these figures are still higher than the global average (18.2 deaths per 100,000 inhabitants), throughout the decade they have remained below the rates of countries in the world classified as low-income (27.5, in 2018), where those with the highest mortality rates are located and which show the highest relative growth in mortality from road traffic crashes.

It is clear that despite the great efforts made by countries of the LAC region, they were not enough to slow down the growth of traffic fatalities, especially in the second half of the decade of action.

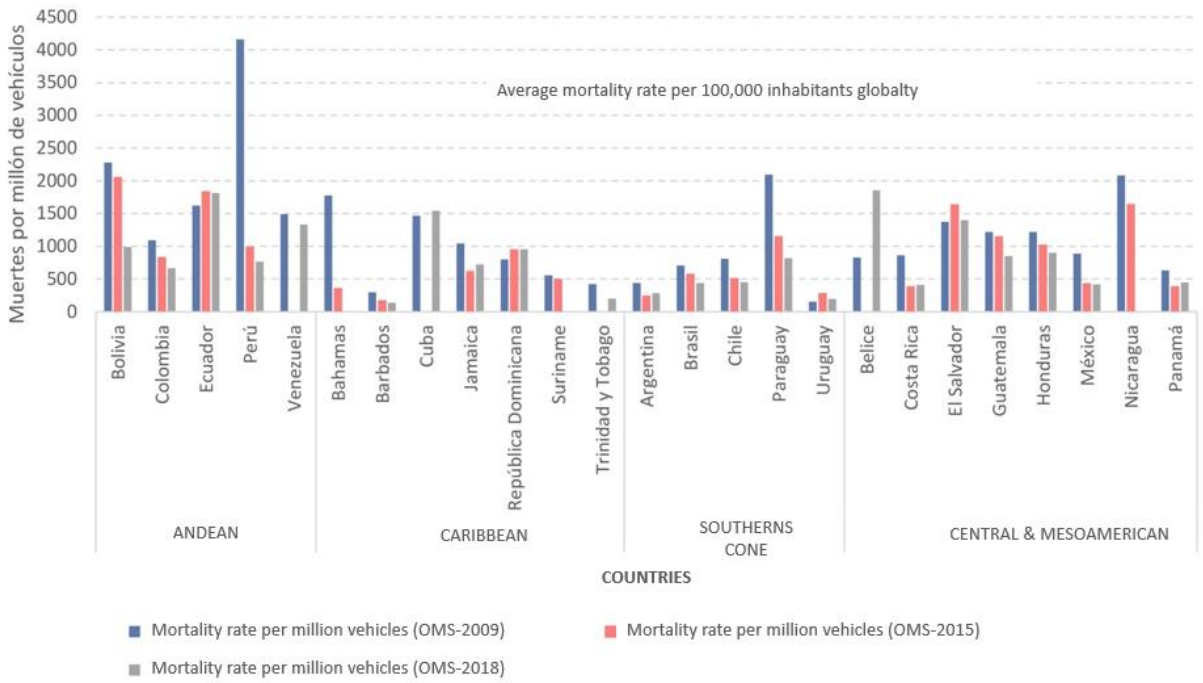
Graph 1. 2 Road traffic fatalities in LAC countries



Source: Own elaboration with data from WHO (2018).

In the absence of information about the total distances traveled by motor vehicles in each country, the casualty rate in relation to the number of registered vehicles is often considered as a way of assessing the relative risk of traveling on its road network, resulting in a good approximation of risk levels.

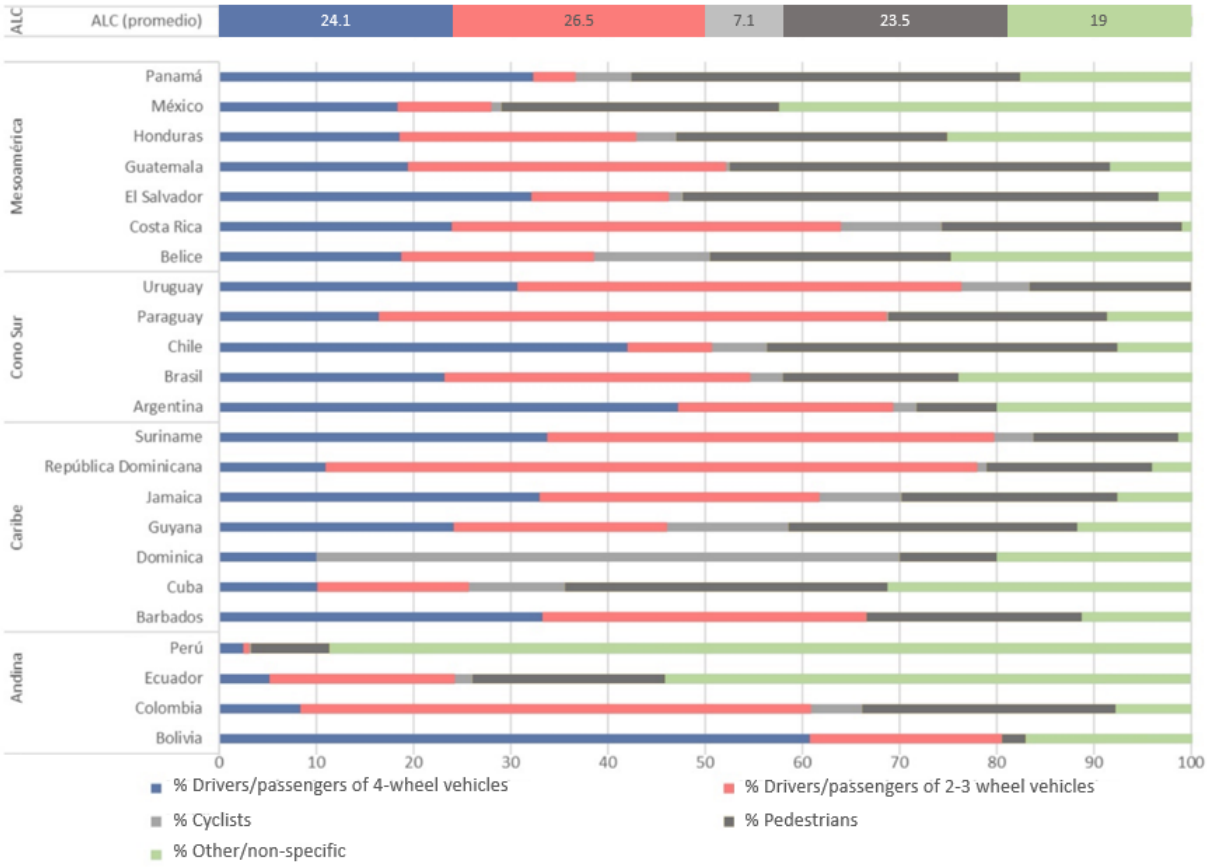
Graph 1. 3 Road traffic fatalities in LAC countries



Source: Own elaboration with data from WHO (2018).

As shown in Graph Figure 1.4, the most vulnerable users (motorcyclists, pedestrians, and cyclists) make up the majority of traffic fatalities, representing more than half of the total. Motorcyclists are the most affected (26.5%), and pedestrians account for 23.5%. In countries such as the Dominican Republic, Suriname, Colombia, Jamaica and Barbados, motorcyclists are disproportionately affected, while in Panama, Guatemala and El Salvador, pedestrians make up the main group of fatalities. In countries such as Argentina, Bolivia and Chile, fatalities continue to be concentrated in the group of drivers and passengers of motorized four-wheeled vehicles. In addition, Graph 1.4 shows the rate of deaths per 100,000 inhabitants in contrast to the rate of motorization per million vehicles. Although this is a common indicator in road safety studies, the reduction in the rate may not be a favorable indicator if there is a very rapid growth of motorized vehicles, as is the case in LAC.

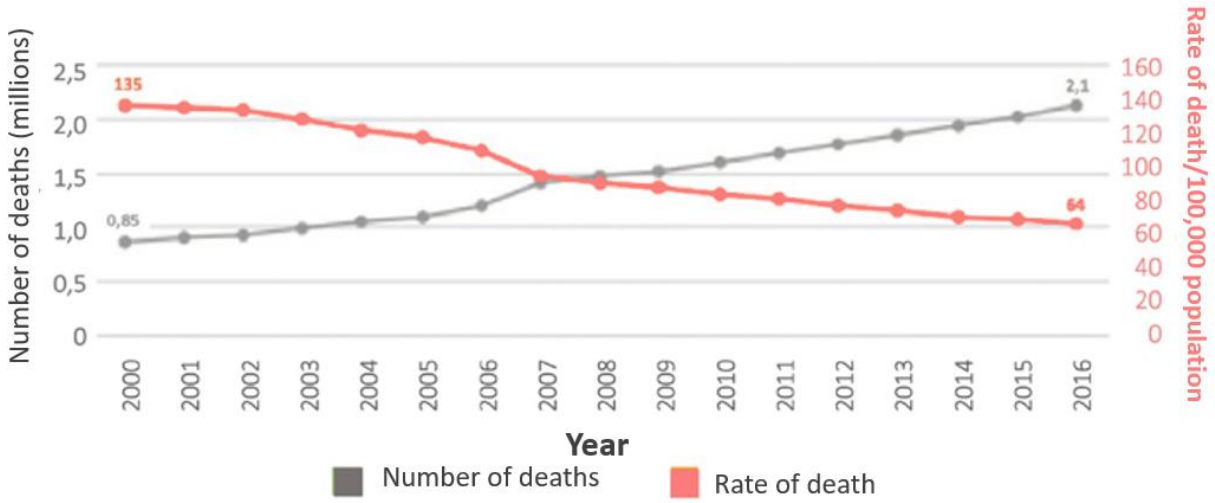
Graph 1. 4 Proportion of traffic fatalities by type of user



Source: Own elaboration based on WHO data (2018).

Note: LAC data were calculated by the IDB as the average of the data for the countries shown in the graph.

Graph 1. 5 Number of vehicles and fatality rate per 100,000 vehicles.



Source: WHO (2018a)

1.2.2. A public health problem

The WHO has established that road traffic injuries and fatalities constitute a major public health problem, both because of the number of lives they claim and because of the enormous number of people who are disabled or suffer other consequences.

Road traffic injuries are the leading cause of death among young people aged 15-29 (WHO, 2018). Furthermore, approximately 46% of people who die because of road traffic crashes worldwide are vulnerable road users.

Both phenomena are particularly serious in low- and middle-income countries, such as those in LAC, where significant economic resources are allocated to the care and rehabilitation of people injured in traffic crashes, care that is largely covered by the State through public health services, and constitutes a significant cost for the society as a whole.

The economic impact of trauma on individuals, families, communities, and countries is enormous, costing the latter 1% to 2% of their gross domestic product (GDP) (WHO, 2004). In addition, a heavy and tragic burden - both physical and psychological - falls on those directly affected, as well as on their families, friends, and communities.

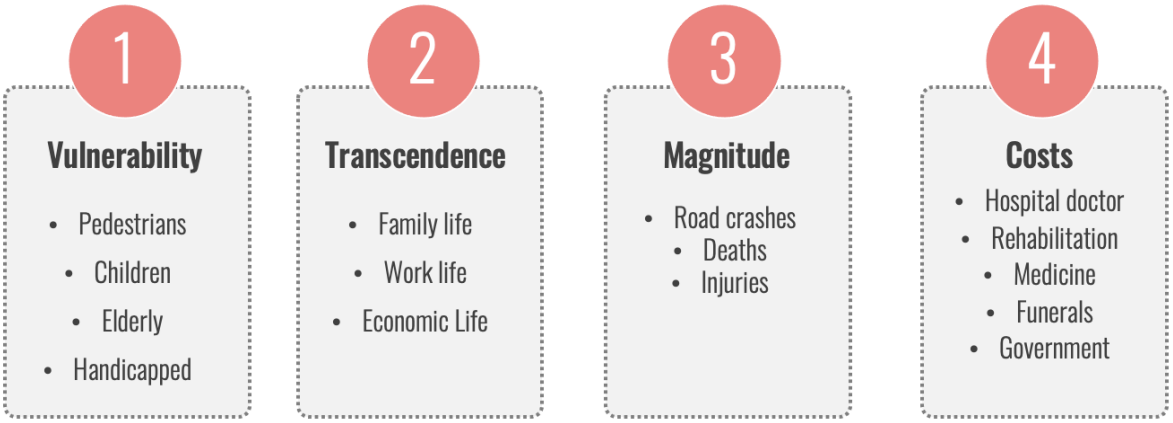
At the same time, it is important to question how vehicular chaos impacts psychological states.

Particularly during rush hour, traffic can cause temperamental and character disorders, which lead to an increase in road crashes and can be identified as epidemiological factors, because of their frequency and repetitiveness, as well as their consequences in the modification of an individual's personality traits.

Among the reasons why road crashes are a public health problem is the fact that it is estimated that, for a low-income country, road crashes account for approximately 1% of GDP. On the other hand, it is also estimated that the costs for medical care and lost productivity reach USD 500 billion dollars annually.

A public health problem is determined by four elements: a) vulnerability, b) significance, c) magnitude, and d) costs. Figure 1.3 shows the reality of each element in the public health situation concerning road traffic crashes.

Figure 1. 3 Elements that determine a problem as public health



Source: Own elaboration. Costs refer to direct costs

International experience shows that those countries that have undertaken comprehensive and sustained actions over time, considering interventions in the areas of health, education, legislation, infrastructure, equipment, and control, are the ones that have achieved significant and lasting reductions. This is the case of high-income countries that have achieved significant reductions in mortality while increasing their economic activity.

1.2.3. ECONOMIC EFFECTS OF TRAFFIC CRASHES

Traffic crashes have an impact on the economic growth of countries, either because of the costs incurred after an event of this type (medical expenses, lack of the injured party's productive capacity, human loss, property damage or administrative costs) or because of loss to the victims' future consumption ability and potential production capacity.

Chen, Kuhn, Prettner, and Bloom (2019) highlight that road traffic injuries effect the economy through the loss of labor supply due to mortality and morbidity. High fatality rates reduce the population and, consequently, the number of working-age individuals, while non-fatal cases reduce productivity and increase work absenteeism. In addition, family resources, if any, are diverted to medical treatment, thus forfeiting potential savings. In many cases, family members become caregivers to the victims. On the other hand, treatments covered by insurance result in higher premiums and fees, to cover public health costs. Both responses imply the loss of productive investments on the part of the population and the government, thus impairing the accumulation of physical capital.

There is extensive literature that measures the economic costs of road crashes, to measure the problem and to have tools to persuade authorities of the relevance of designing public policies to reduce these incidents. The most common methodologies adopted for these studies are the cost-of-illness approach (which aggregates the direct and indirect costs of traffic incidents) and the statistical value of life approach (which multiplies the cases by the willingness to pay in exchange for reducing road risks). Some countries have now developed guidelines for estimating the costs of road crashes as a tool for decision making, raising awareness and evaluation of public policies (see Table 1).

Table 1. Guidelines for economic costs of road crashes in LAC

Some countries in the region have developed their own guides to the economic costs of road crashes, as is the case of *Argentina.* This case highlights several reasons why it is important to have estimates of the costs associated with road crashes in Argentina:

- Enables investments in road safety to be properly prioritized in relation to other lines of public policy.
- Is useful to highlight the significant economic benefits of investing in prevention.
- Allows the construction of cost-benefit analyses that estimate the social return on investment in infrastructure and road safety.
- Is a valuable element of discussion to highlight the importance of road safety policies for society as a whole, in order to achieve a higher level of social awareness on the subject.

This methodology was applied to the 2017 statistics, finding road accident costs to be 175,665 million Argentine pesos (about US$10 billion), equivalent to 1.7% of Argentina's GDP.

Source: National Road Safety Observatory (2019).

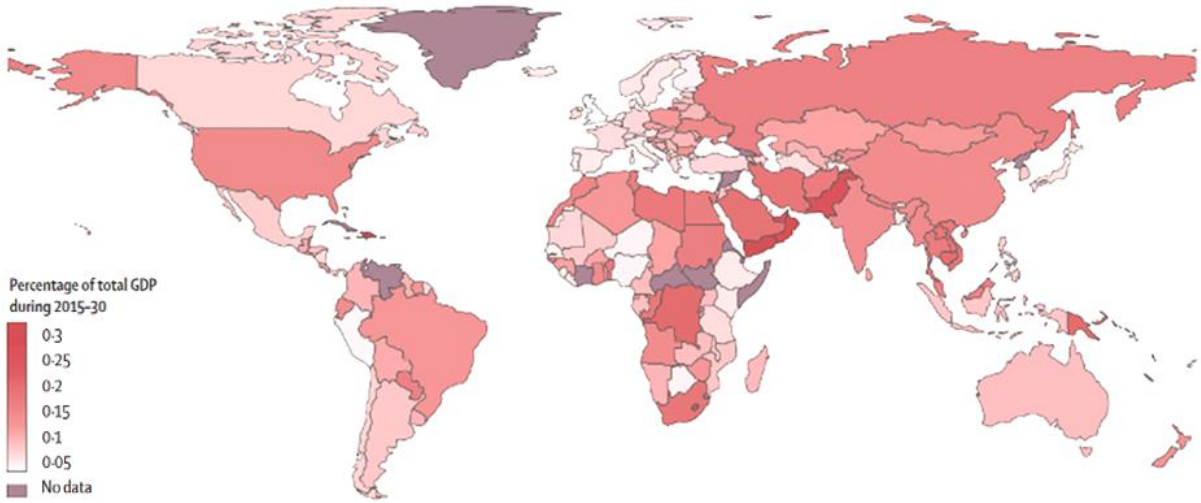
A study by the Inter-American Development Bank (2013) has estimated that road incidents in 2010 caused economic losses equivalent to 1.5% - 2.9% of Argentina's GDP, 1.8% - 3.5% of Mexico's, 2% - 4.9% of Paraguay's and 1.6 % - 3.1 % of Colombia's GDP. More current data from the region shows a GDP loss of 1.7% in Argentina (Observatorio Nacional de Seguridad Vial, 2019) and 3.04% in Brazil. Comparatively, a study by the Colombian Insurance Federation highlighted that road incidents in 2016 cost approximately 2.3 billion Colombian pesos (USD 770,000) to the Social Insurance System for Road Accidents and an additional 1.6 billion (USD 535,000) to the country's pension system (Fasecolda, 2019).

Recent studies have adopted a different methodology than the traditional ones used in the studies mentioned above, and although more conservative[2], still found significant costs of traffic incidents for the GDP of countries around the world. Chen et al. (2019) estimated the economic burden of road traffic incidents in 166 countries by means of a macroeconomic model that considers the effects of these incidents on labor

2 The study stresses that the models that had been used previously were static since they did not consider the possibility of rapid substitution of labor and machines in the labor market (physical capital). In addition, past models did not consider that health expenditures also express positive impacts to the economy, as they constitute a relocation of expenditures to another sector in an economy at full employment, i.e., these expenditures pay for the salaries of doctors, nurses, construction of hospital infrastructure, equipment and medicine (Chen et al., 2019).

supply and on the diversion of potential savings to health treatments, resulting in less productive investments. This study estimated that road insecurity will cost the global economy USD 1.8 trillion (at 2010 prices held constant) between 2015 and 2030, which is equivalent to 0.12% of global GDP. In LAC, the losses would be USD 114 billion. Figure 1.4 shows that in countries such as the Dominican Republic, Belize and Paraguay, the rate exceeds the global average, reaching 0.2%, 0.19% and 0.17% of GDP, respectively.

Figure 1. 4 Macroeconomic burden of traffic incidents, 2015-2030 Figure



Source: Chen et al. (2019).

Given the conclusions of the studies mentioned above, road traffic crash prevention, as well as disease prevention and treatment, are important elements of a country's economic health and growth. The World Bank (World Bank, 2017) estimated that a 50% reduction in road fatalities and injuries (Tanzania, Philippines, India and China) could result in 7% to 22% growth in GDP per capita over 24 years, and 6% to 32% growth in overall GDP during the same period.

Table 2. Effects of the covid-19 pandemic on road safety.

In 2020, because of reduced activity during the COVID-19 pandemic, many countries and cities around the world experienced reductions in accident rates, although the net effect is still considered uncertain. Other factors involved, such as greater stress and anxiety, greater consumption of alcohol and other drugs, and more opportunities to reach high speeds, can generate greater risks (Vingilis et al., 2020). The authors refer to literature showing that past recessions have caused a reduction in activity and that, as a result, a reduction in deaths has been observed, although there are variations between different countries and effects of conditions pre-existing to the recession.

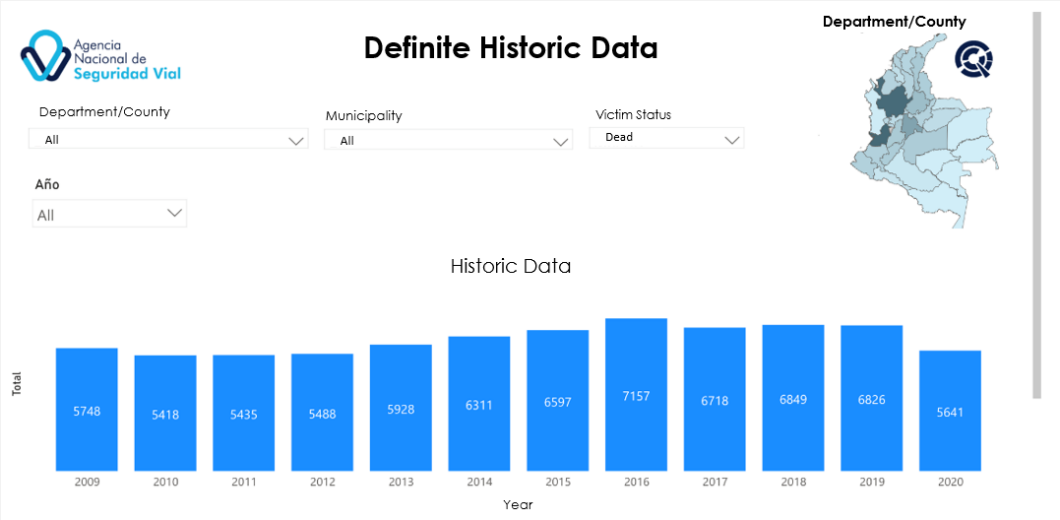
Although the analyses for 2020 are still preliminary, early results during the COVID-19 pandemic are striking. For example, in California, from March 1 to April 30, 2020, there was a 50% reduction in collisions with victims on state roads, compared to the same period of the previous year, although some areas had no reduction (Shilling and Waetjen, 2020). The decrease in road death data was also reported in the first three months of 2020 in Arizona (-4%), Hawaii (-32%), Idaho (-28%), Iowa (-13%), Maryland (-13%), Michigan (-12%), Oregon (-24%) and South Carolina (-12%).

In Latin America there is some evidence showing road death reduction caused by the COVID-19 pandemic. A study in Peru shows a general decline in mortality from external causes, with greater reduction in deaths related to road accidents, in which a decrease of 12.66 deaths per million people (95% CI between -15.56 and -9.76) and 3.64 deaths per million women per month (95% CI between -5.25 and -2.03) is observed (Calderon-Anyosa and Kaufman, 2020).

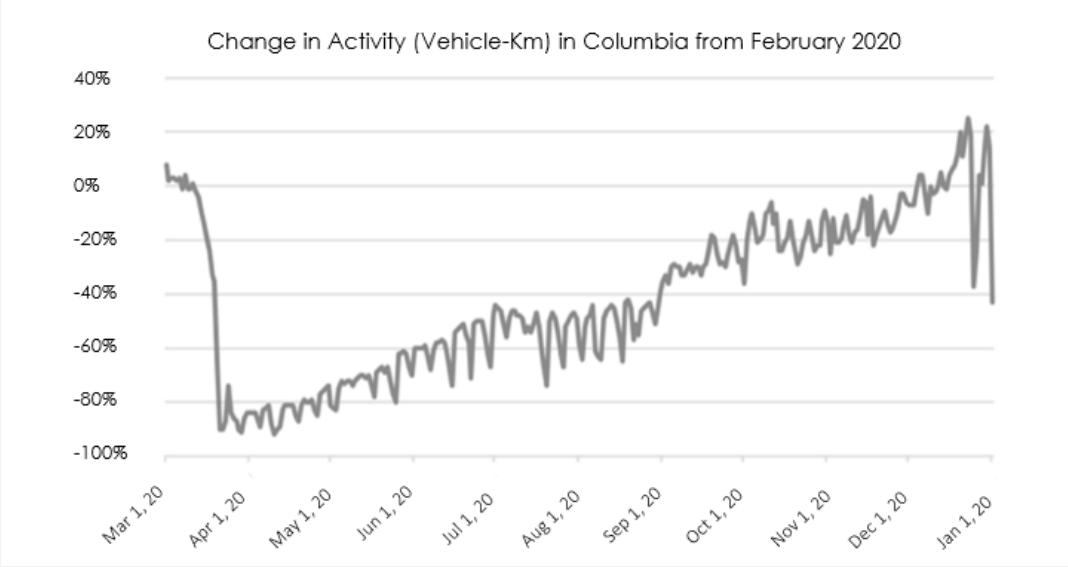
In the case of Colombia, data from the National Road Safety Observatory show a 17.4% reduction in total deaths in road accidents in 2020 compared to 2019.However, there are notable regional differences that indicate that, although some departments, municipalities and cities have shown reductions of more than 30%, a few have experienced increases of between 5% and 12%. There is also a reduction in accidents related to travel distance (less KTV), however, this does not exceed the decrease in activity, and the effect is distinctive in different regions and cities.

Department	Cases 2018	% 2018	Cases 2019	% 2019	Cases 20	% 2020	Change	Change %
Antioquia	623	11,7	712	13,3	509	12,2	-203	-28,51
Valle Del Cauca	734	13,8	733	13,7	582	14,0	-151	-20,6
Cundinamarca	378	7,1	421	7,9	296	7,1	-125	-29,69
Bogotá DC	441	8,3	435	8,1	310	7,5	-125	-28,74
Narino	168	3,2	183	3,4	108	2,6	-75	-40,98
Magdalena	161	3,0	168	3,1	102	2,5	-66	-39,29
Norte Santander	160	3,0	188	3,5	125	3,0	-63	-33,51
Huila	188	3,5	190	3,5	138	3,3	-52	-27,37
Santander	244	4,6	245	4,6	198	4,8	-47	-19,18
Atlantico	197	3,7	171	3,2	128	3,1	-43	-25,15
La Guajira	122	2,3	91	1,7	49	1,2	-42	-46,15
Tolima	228	4,3	197	3,7	159	3,8	-38	-19,29
Cauca	176	3,3	203	3,8	171	4,1	-32	-15,76
Boyaca	153	2,9	163	3,0	137	3,3	-26	-15,95
Risaralda	115	2,2	104	1,9	87	2,1	-17	-16,35
Putumayo	76	1,4	53	1,0	37	0,9	-16	-30,19
Meta	169	3,2	164	3,1	151	3,6	-13	-7,93
Caqueta	39	0,7	48	0,9	37	0,9	-11	-22,92
Arauca	44	0,8	68	1,3	57	1,4	-11	-16,18
Casanare	89	1,7	101	1,9	91	2,2	-10	-9,9
Cordoba	153	2,9	145	2,7	135	3,2	-10	-6,9
Cesar	216	4,1	172	3,2	162	3,9	-10	-5,81
Caldas	123	2,3	89	1,7	83	2,0	-6	-6,74
San Andrés	8	0,2	14	0,3	9	0,2	-5	-35,71
Choco	18	0,3	19	0,4	14	0,3	-5	-26,32
Guainia	1	0,0	4	0,1	0	0,0	-4	-100
Sucre	77	1,4	61	1,1	58	1,4	-3	-4,92
Quindio	77	1,4	71	1,3	68	1,6	-3	-4,23
Amazonas	5	0,1	5	0,1	4	0,1	-1	-20
Department not asigned	2	0,0	0	0,0	0	0,0	0	—
Guaviare	7	0,1	7	0,1	8	0,2	1	14,29
Vaupes	1	0,0	1	0,0	2	0,0	1	100
Vichada	2	0,0	1	0,0	6	0,1	5	500
Bolivar	137	2,6	129	2,4	135	3,2	6	4,65
Total	5332	100,0	5356	100,0	4156	100,0	-1200	—

Source: Regional and municipal changes in Colombia; deaths January-October 2020 with respect to 2019, preliminary data (ANSV, 2020).



Source: Final data 2020, National Road Safety Observatory, Colombia.



CI: Confidence interval
KTV: Kilometers Traveled per Vehicle.

Source: Waze data

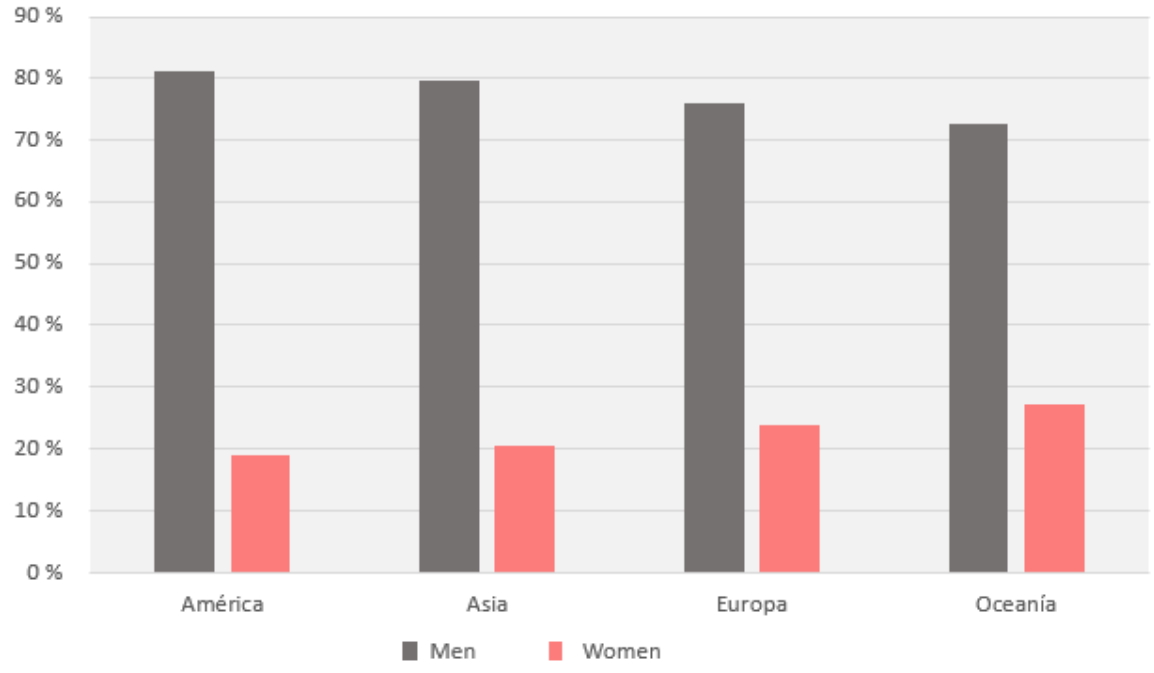
Note: Decreased mobility and economic activity in Latin America has resulted in substantial reductions in air pollution and urban traffic, with possible positive consequences for health and injury reduction, although some increases in traffic speeds associated with reduced congestion may offset reductions in casualty crashes (Diez Roux et al., 2020).

1.3. Road Safety from a Gender Perspective

1.3.1. NUMBERS OF ROAD CRASHES AND GENDER

Men are the world's largest victim group in road traffic incidents (Graph 1.6). Globally, by the early 2000s, studies showed that the number of men who died in road traffic crashes was almost three times the number of women (WHO, 2002), a trend that continues today. According to WHO figures, by 2018, 73% of all deaths caused by road crashes involved men under 25 years of age versus 27% of women in the same age group (WHO, 2018). Analysis of these data by subcontinent indicates that, in LAC, men have a road crash fatality rate 4.5 times higher than women. Similarly, an analysis of mobility surveys in Bogota, between 2011 and 2015, showed that a man's risk of dying from a road crash per trip made is five times higher than that of a woman (Moscoso et al., 2020). Likewise, studies conducted in Catalonia showed that for all age groups, men had a higher risk of fatal injuries than women (Santamariña-Rubio, Pérez, Olabarria and Novoa, 2014).

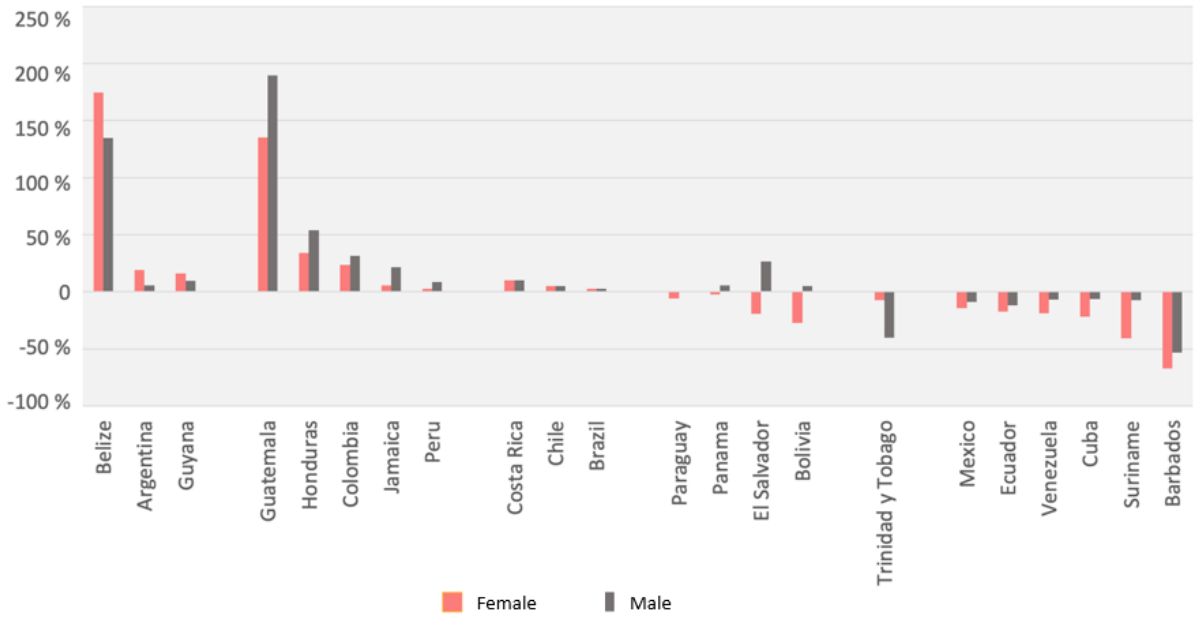
Graph 1. 6 Persons killed in road crashes, disaggregated by gender, 2016.



Source: Own elaboration with data from WHO (2018)

The total number of women killed in road crashes decreased by 1% between 2010 and 2016, while the number of men killed increased by 3.7%. Available data show that in countries such as Guatemala, Jamaica and Colombia the number of female fatalities grew at a lower rate than the number of male fatalities (Graph 1.7). Studies conducted in Bogotá provide evidence in this regard (Table 3), showing that women have a lower risk of dying on the road than men. In 2019, 76% of fatalities from road traffic crashes were men, and 24% were women (SDM, 2020). However, it is important to note that in other countries, such as Belize, Argentina and Guyana, the number of female fatalities increased at a higher rate than the number of male fatalities. The absence of road safety analysis, and mobility data in general, from a gender perspective limits the identification of cultural, physical and infrastructure factors that explain these variations between countries and by gender.

Graph 1. 7 Rate of growth of deaths in LAC, 2016-2010



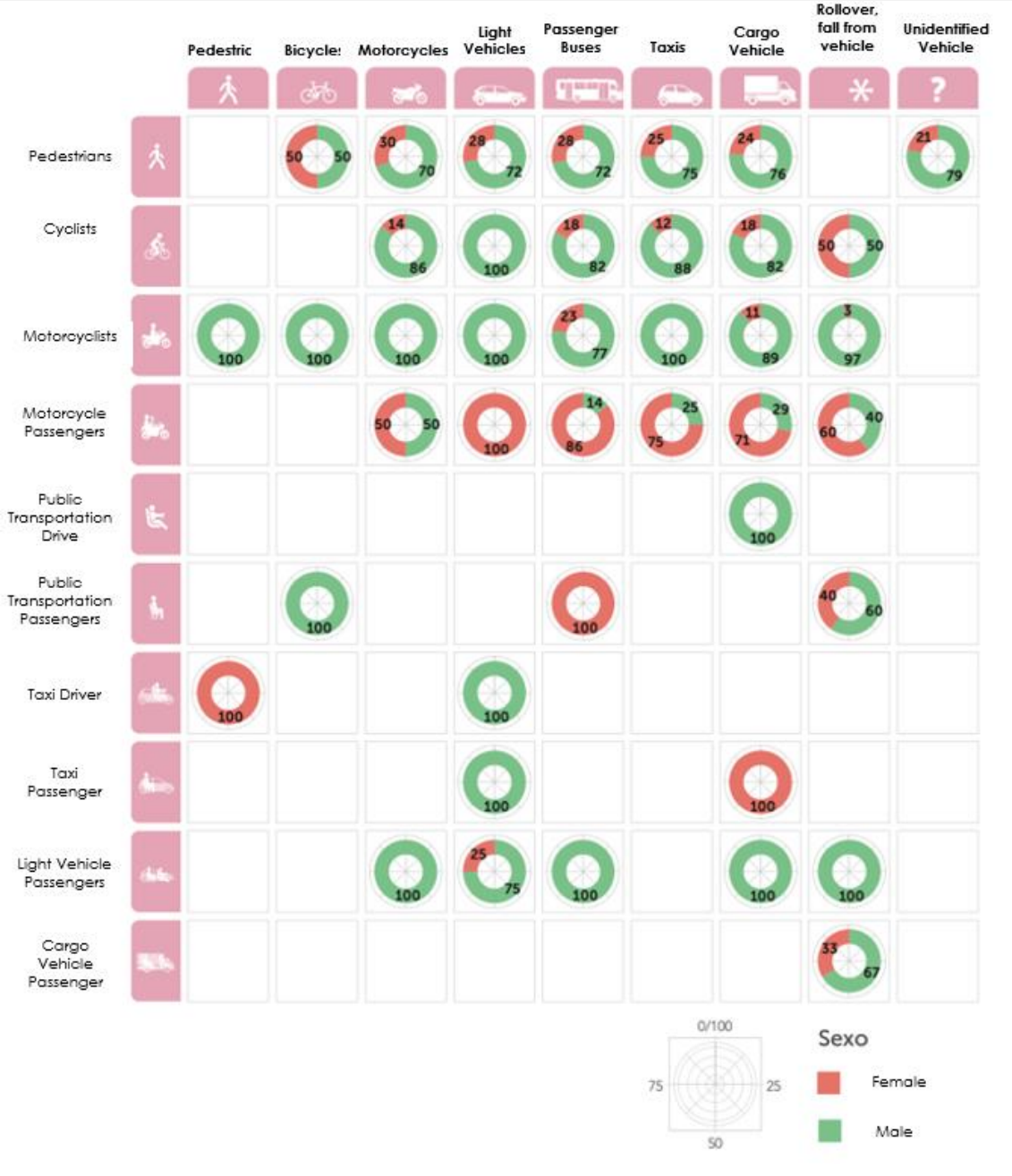
Source: Own elaboration with data from WHO (2018).

Even though women are less frequently involved in road traffic crashes, when they do experience a road incident, they are 47% more likely to be injured. Literature shows that in the instance of car design, simulated crashes use only male dummies, ignoring morphological differences such as spine structure or muscle composition, resulting in cars designed exclusively for men. (World Bank Blogs, 2021). According to Barry's (2019) analysis for Consumer Reports, in road crashes female drivers or right front seat passengers are 17 % more vulnerable to death than men of the same age in the same situation. In the event of a frontal crash, the probability of serious injury for a woman wearing a seat belt in a vehicle is 73% higher than for a man in the same situation (Barry, 2019).

Road traffic crashes on rural roads tend to have a higher fatality rate than those on urban roads. Some of the factors responsible for this fatality rate in rural areas are "errors of judgment or driver fatigue, alcohol or other drug use, very young drivers or drivers over 60 years of age, speeding, non-use of seat belts and driving on unfamiliar roads" (Tziotis, Roper, Edmonston and Sheehan, 2006) (Tziotis, Roper, Edmonston and Sheehan, 2006). Consistently, the literature illustrates that young male drivers are more likely to be involved in a road crash on rural roads in Australia (Tziotis et al., 2006).

Table 3. Percentage of fatalities by vehicle or actor involved in Bogotá, Colombia, by sex, 2019.

As indicated above, the number of deaths of women in road crashes is lower than that of men. However, the following graph allows us to identify the existence of gender discrepancies in road crashes, which impact women in a different manner. For example, female motorcycle passengers had a higher proportion of fatalities compared to men. It is also observed that all female taxi passengers (100%) died in crashes involving cargo vehicles, and that the proportion of female cyclists who died in crashes involving impact injuries, rollovers or falls of occupants is 50%. Among female road fatalities during 2019, 53% died as pedestrians, 9.5% as motorcycle drivers, 11% as cyclists and 25% as passengers (vehicles with two or more wheels).



Source: Bogota Road Accident Yearbook, 2019 (SDM, 2020)

1.3.2. TRADITIONAL MASCULINITIES AND MEN'S HIGHER RISK OF ROAD CRASHES

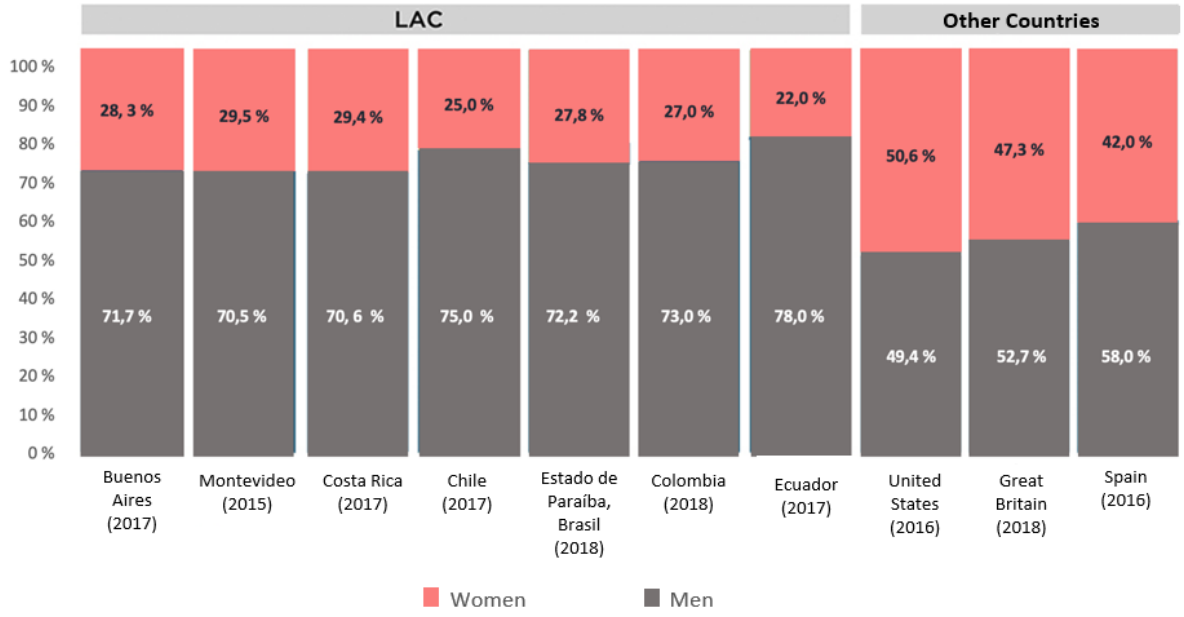
Men and women have different mobility patterns, and this may result in different exposure to road crash risk. That is, while men make longer trips and tend to use roads with more traffic, the opposite is true for women (Cordellieri, Baralla, Ferlazzo, Sgalla, Piccardi, & Giannini, 2016). To this extent, the differentiated use of transport modes influenced by gender may be one of the factors explaining the discrepancies in road crash statistics described above for men and women (Cordellieri et al., 2016).

Thus, literature associates men's higher risk with factors such as greater access to motor vehicles and the exercise of behaviors typical of traditional[3] masculinities. Some examples of these masculinities are linked to greater tolerance of the consequences of road crashes, drunkenness on the road, the belief that men drive better than women, impatience and aggressiveness behind the wheel, and greater risk tolerance.

Indeed, men have greater access to driving motor vehicles in LAC. There are several factors that increase men's chances of driving their own vehicle. First, taken cumulatively, men have more economic resources to acquire a car or motorcycle. In 2019, 28.6 % of women aged 15 years and older did not receive individual monetary income compared to 10.4 % of men in the same age cohort (ECLAC, 2019). Second, men have greater access to driver's licenses and represent the gender more employed in industries related to driving heavy vehicles, such as buses, trucks or other commercial vehicles (Gender and Health, 2002). Graph 1.8 indicates that in several Latin American countries, women do not represent even 30 % of the total number of people with driver's licenses (Rivas, Suárez-Alemán and Serebrisky, 2019). In contrast, some countries like the United States have larger numbers of women with licenses than men, although they only exceed them a small margin (1.2 %) (Rivas et al. , 2019).

[3] Called hegemonic masculinities or toxic masculinities, they refer to the set of masculine, social and regressive characteristics, which promote the domination and devaluation of women, as well as homophobia (Kupers, 2005). These types of masculinities are manifested in dangerous behaviors by men on the road (Montoya-Robledo et al., 2020).

Graph 1. 8 Driver's licenses disaggregated by gender

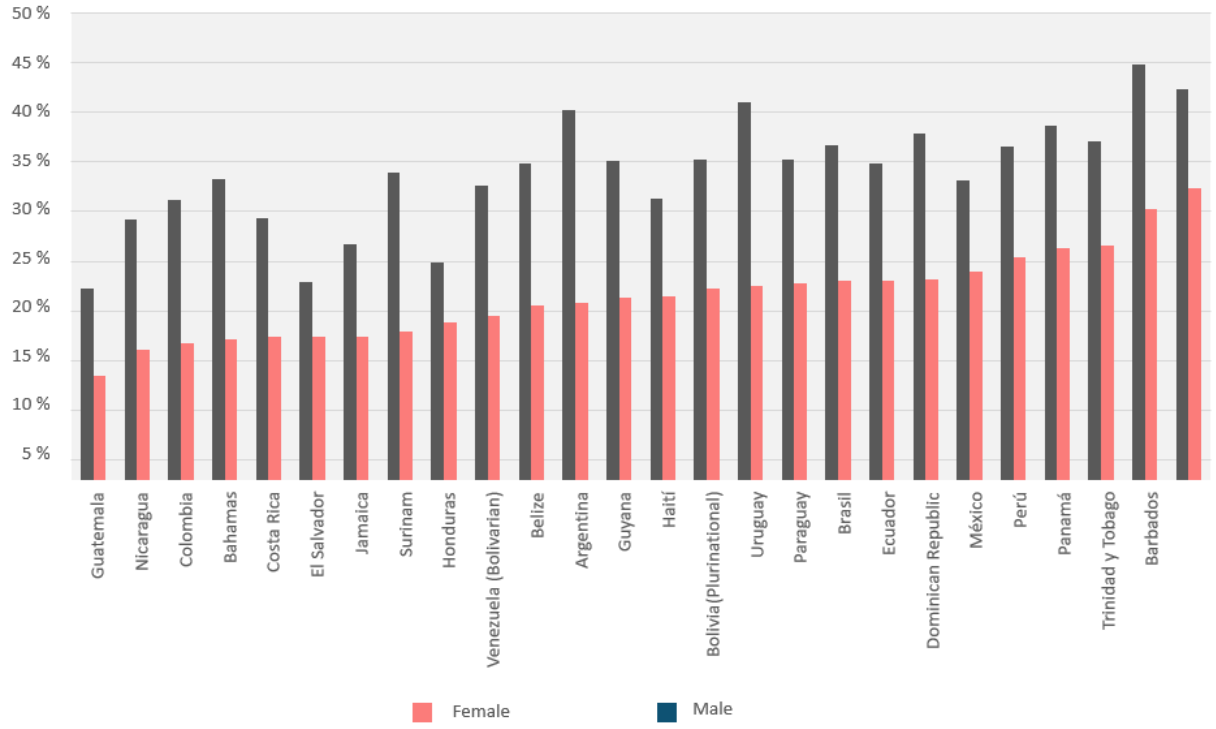


Source: Rivas et al. (2019)

Men, being less risk averse, are more likely to perform dangerous actions behind the wheel. The literature has shown that traditional masculinities, linked to risk-taking behavior and disregard for pain and injury, can lead to dangerous actions on the road, such as alcohol and other drug abuse, aggressive behavior, and dangerous driving (Gender and Health, 2002, p. 3). These correlations with gender roles have been supported by more recent studies, including work by the Organization for Economic Co-operation and Development (OECD) showing that young men are generally more inclined to take risks, seek strong sensations, drive fast, display antisocial behavior, overestimate their driving skills, and submit to the influence of their environment (OECD, 2006, p. 3).

According to According to WHO data, of the total number of people killed in road crashes over the age of 15, the percentage attributable to alcohol consumption is higher for males than for females in all countries in the region (Figure 1.9) (WHO, 2018). Additionally, an analysis conducted in Jordan based on road crash records found that the highest road crash rate for males was caused by inattentiveness and the impatience of male drivers (Al-Balbissi, 2010). Other studies on road safety and traditional masculinities conclude that men adopt more risky behaviors, use fewer safety elements and report crashes less frequently than women (Jiménez-Mejías, Amezcua Prieto, Martínez-Ruíz, Luna del Castillo, Lardelli-Claret, & Jiménez-Moleón, 2014

Graph 1. 9 Percentage attributable to alcohol* for persons over 15 years of age in traffic fatalities in LAC.



* The alcohol-attributable percentage (AAP) means the proportion of a better outcome caused by alcohol (i.e., the proportion that would disappear if alcohol consumption were eliminated).

Source: Own elaboration with data from WHO (2018a).

In contrast, women and girls often adopt risk-averse behaviors, which limits their exposure to road hazards (Cordellieri et al., 2016). Some research shows that women are less likely to drive dangerously, travel at lower speed limits, and with greater respect for traffic rules (European Transport Safety Council, 2013).

Similarly, a mixed study conducted in Rosario, Argentina, showed that more than 65% of drivers who never wore seat belts were men (De Michele, 2011). This study showed that women repeatedly engage in more self-care than men on the streets. For example, 56% of women reported respecting the pedestrian crossing signal, compared to 44% of men. Regarding the use of cell phones, the study showed that 82.5% of women considered it dangerous to travel with someone who was using a mobile phone while driving, compared to 72.1% of men.

Gender stereotypes have the opposite impact regarding the use of helmets among female bicycle users. Studies conducted in the United States and Japan showed that women often consider helmets to be uncomfortable, ugly, and unflattering to their physical appearance (Garrard et al., 2012). Many of these women prefer not to cycle to work, as they would have to wear a helmet that would affect them aesthetically and make them sweat (Garrard et al., 2012), reflecting how the cultural emphasis on female appearance bears on mobility decisions. Additionally, a study funded by the Transport Gender Lab, based on mixed methods with bicycle users in Bogotá, found that in 95% of the cases women did not use any protective element (Montoya-Robledo et al., 2020). In the focus groups, women reported that they did not use it, arguing that the helmet was not necessary, that it was uncomfortable, that it was not their size, and that it disfigured their appearance and that of their daughters' (Montoya-Robledo et al. 2020). Although literature on this matter has not reached a consensus on the protection offered by helmets, there are some evaluations that suggest significant benefits in terms of road safety (Amoros, 2010; European Cyclists' Federation, 2014; Montoya-Robledo et al., 2020; Quiñones and Pardo, 2017; The Royal Society for the Prevention of Accidents, 2003; Valero-Mora et al., 2018).

The belief that men are better drivers is another reflection of toxic masculinities. A study conducted at the University of Granada in Spain, based on a series of surveys of 1574 students conducted between 2007 and 2010, showed that men drove longer distances than women and considered themselves better drivers than women (Jiménez-Mejías et al., 2014). The results showed that men feel more confident of their abilities to drive motor vehicles than women (Jiménez-Mejías et al., 2014). Similarly, the Transport Gender Lab study mentioned above revealed, along the same lines, that men have the perception that they drive better than women, and this leads them to drive at higher speeds, even when children are onboard, which was analyzed as a manifestation of toxic masculinities (Montoya-Robledo et al., 2020). Additionally, the 2019 Road Risk Perception Survey (EPRV), conducted by the District Secretariat of Mobility of Bogota, which aimed to measure the perception of citizens regarding road safety in the city, revealed that 72 % of the people surveyed consider that women are more careful on the road than men and. Additionally, 60 % of respondents expressed the idea that women are less skilled at driving than men.

Several studies show that female public transport drivers are less likely to be involved in road crashes than male drivers. A recent study in the United States on mobility platforms showed that 45% of female users prefer their driver to be a woman (The National Council for Home Safety and Security, 2020). This is largely because, according to the Insurance Institute for Highway Safety, they are less likely to engage in risky driving (The National Council for Home Safety and Security, 2020). In addition, a study funded by the Transport Gender Lab on the incorporation of women in the public transportation system supply

chain in Santiago, Chile found that women drivers are less at risk in road crashes than men, and, when they are involved in a crash, the incidents are less severe (Granada et al., 2019). Data from Bogotá confirm this trend. Eighteen percent of crashes involving female bus drivers of all types of services in Bogotá between 2013 and 2017 resulted in injuries, which is considerably lower than the percentage (28%) of crashes involving male drivers. Likewise, the proportion of lethal crashes (injured or killed) within the total number of crashes is 0.4 % for women and 1.3 % for men, reflecting that women drivers are involved in less serious crashes than men (Moscoso et al., 2020).

1.3.3. IMPACTS OF ROAD CRASHES: GENDER AND ECONOMIC INCOME

Fatal and non-fatal road crashes have gender-differentiated outcomes, with significant impacts on care work and household income. In terms of care work following a road crash, a qualitative study conducted in the Guadalajara metropolitan area found that victims with non-fatal injuries were left in the care of one person (Pérez-Núñez, Pelcastre-Villafuerte, Híjar, Ávila-Burgos and Celis, 2011), who, in line with what gender roles indicate, is usually a woman (Charmes and International Labour Office, 2019). Caregivers reported changes after a road crash, such as putting the victim's needs above their own and abandoning their own life to care for the other person (Pérez-Núñez et al., 2011).

At the household level, several studies have shown that a road crash resulting in death or serious injury significantly will impact income and spending patterns. This is especially true for households that are not within the social security system, which, in general, are those with fewer economic resources (Aeron-Thomas, Jacobs, Sexton, Gururaj and Rahman, 2004; Domínguez and Karaisl, 2013; Pérez-Núñez et al., 2011). For men, given that in many households they are the primary providers, their injuries negatively impact the family economy (Gender and Health, 2002, p. 4). For women, since many may be unemployed or in unofficial jobs, their social security system may be insufficient to cover the consequences of injuries, or they may not even have any social security at all (Gender and Health, 2002: 4). The study of the Guadalajara metropolitan area showed that, in economic terms, beyond the initial medical expenses or funeral expenses, household income, especially among those with low economic resources, decreased temporarily or permanently after the road crash incident, when one or more of its members had to stop working (Pérez-Núñez et al., 2011).

The lack of social security in households increases the burden of caregiving and contributes to their impoverishment. A study conducted in Mexico showed that 42% of those who die in road crashes in that country do not have health insurance, which implies that many families in difficult economic situations end up suffering significant impoverishment, because medical care must be provided at the family level (Domínguez and Karaisl, 2013). Likewise, the study showed that cases of road crashes that result in the disability of the person involved can lead to greater impoverishment of families. On the one hand, one person, usually a woman, must assume the care of the person with a disability, having to limit other activities that could generate income. Further, when households can pay someone to provide care, it implies an additional expense, in addition to the loss of income of the person who becomes disabled. In addition, nearly 50% of those who die in road crashes are pedestrians, most of whom are women in Latin America and 96% of them belong to the first five income deciles, i.e., the poorest segment of the population.

Part 2

EXPERIENCES AND LESSONS LEARNED DURING THE DECADE

Although the LAC region did not meet SDG 3.6, it did make progress in the goal of stabilizing and reducing road deaths, thus achieving the main objective of the first decade of road safety. Progress is significant, albeit differentiated, and provides the foundation for the second decade on road safety.

Part 2 gathers experiences and best practices implemented by Governments (whether or not financed by institutions such as the IDB) along with some of IDB's strategic partners such as the International Road Assessment Programme (iRAP), New Vehicle Assessment Program for Latin America and the Caribbean (Latin NCAP), FIA Foundation, Ibero-American Association of Victims against Road Violence (FICVI), World Resources Institute (WRI), Fundación Gonzalo Rodríguez (FGR), Bloomberg Philanthropies, multilaterals acting on behalf of the IDB, Asociación Iberoamericana de Víctimas contra la Violencia Vial (FICVI), the multilaterals operating in the region (World Bank and Bank of Latin America-CAF) and the Global Designing Cities Initiative (GDCI).

This section organizes best practices into five sections, structured according to the pillars of the Decade of Action for Road Safety (see figure 1.1 in the first part of this paper). After introducing the topic, these sections present a diagnosis of the current state of the region, mention the experiences that have promoted positive changes and offer a reflection on the possible reasons why LAC has not been able to achieve the desired result for each of the pillars. This section is not intended to be exhaustive in terms of experience, but rather to present a selection of the most widely applicable examples.

2.1. Road safety management

OBJECTIVES OF PILLAR 1 OF THE DECADE OF

ACTION, ROAD SAFETY MANAGEMENT

This pillar focuses on the need to strengthen institutional capacity to promote national road safety initiatives. It includes efforts to be implemented according to the United Nations conventions on road safety: the establishment of a national road safety coordinating body involving partners from a wide range of sectors; the development of a national road safety strategy; and the setting of realistic, long-term targets for actions with sufficient funding for their implementation. Pillar 1 also calls for the establishment of data systems for performance monitoring and evaluation.

Source: WHO (2011)

Road safety management coordinated by a lead agency is indispensable in the creation and maintenance of multisectoral partnerships at the national level, for the implementation of the activities defined in all UN road safety pillars, and for monitoring and evaluating the progress of the country's road safety strategy. This body must also be able to centralize information regarding crashes throughout its country and determine the data collection methods of the entities responsible. This section will cover the main elements of road safety management in Latin America, its evolution, and best practices, in three dimensions: the coordinating body, the national strategy and road safety plans, and data systems.

2.1.1. ROAD SAFETY COORDINATING BODIES

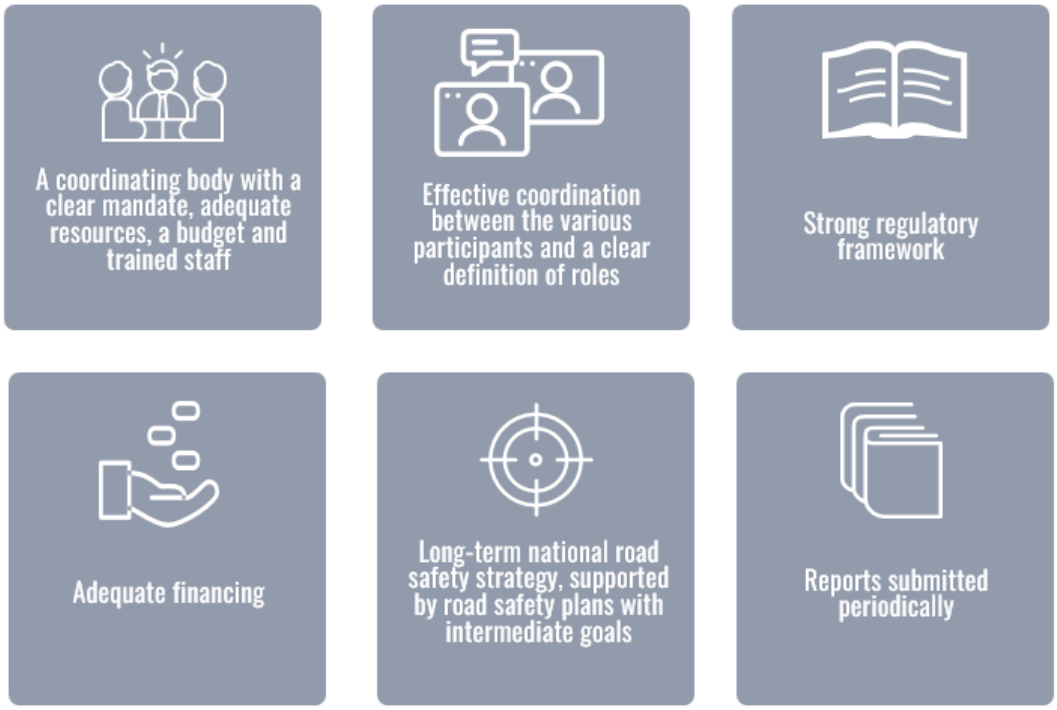
While road safety management is considered a multi-sectoral responsibility, government institutions have the greatest responsibility in this area and should contribute the most. Best practice in road safety management at the country level begins with the designation and funding of a coordinating body that brings together all functions, convening the necessary branches of government, into a cohesive national response to road safety issues (ITF, 2017).

The role of the coordinating body is as follows (ITF, 2017):

- Vigorously promote road safety within the framework of the government and society in general.
- Ensure that there is sufficient public investment and effective allocation.
- Coordinate activity between government agencies.
- Prepare national strategies and lead the achievement of associated goals.

The most important criteria for a successful and, in turn, efficient road safety agency is considered to be the following (ITF, 2017):

Figure 2. 1 Success factors of a road safety coordinating agency



2.1.2. Road Safety Strategies and Plans

Road safety strategies integrate the actions of the administration and align them from a multidisciplinary perspective, in addition to promoting and encouraging the actions of the rest of the public administrations that have proficiencies in this area.

A comprehensive road safety strategy including ambitious but achievable targets will help set the policy course toward fewer road fatalities and fewer serious injuries. A national road safety

strategy should be complemented with short-term action plans and intermediate targets for key safety performance indicators. The strategy should build and sustain capacity and generate investment in road safety data systems and research.

For road safety strategies to achieve greater success, the following conditions must be taken into account (Peña, Millares, Díaz, Taddia, & Bustamante, 2016):

- Elaborated in consensus with all public and private institutions working in road safety.
- Incorporation of civil society.
- Participation of the media
- Realistic but ambitious, quantified and time-bound objectives
- Definition of actions in accordance with the objectives to be achieved, establishing the entity responsible for carrying them out and the measures to be implemented to obtain the expected results; the timetable for each action and the budget allocated must also be established
- Programming of follow-up actions, including the design of performance and development indicators
- Time frame preferably longer than four years, to allow for the development of long-range actions.
- Political accountability at the highest possible level

2.1.3. A DIAGNOSIS OF THE INSTITUTIONAL FRAMEWORK FOR ROAD SAFETY IN LAC

The creation of agencies responsible for road safety has shown positive results. In the LAC region these agencies have been formed, with road safety councils and leading agencies, and have made progress on an agenda by country, despite limited capability for action, insufficient human and economic resources, and a low degree of commitment on the part of other entities involved.

Of the 25 LAC countries, most (23) have established coordinating bodies or agencies with leadership in road safety. However, in two countries the existence of such bodies is merely formal, as the agency is not operational. Some of the agencies have been in existence for several decades, such as, in the case of Brazil, the National Traffic Secretariat (formerly the National Traffic Department - Denatran) and the National Traffic Council (CONTRAN), established in 1967, and Costa Rica's National Road Safety Council (Cosevi), created in 1979.

Institutional arrangements are not the same in all cases and depend on the governmental structure of each country. Some countries have their own national road safety agency (e.g., Paraguay (ANTSV); Argentina (ANSV) or Colombia (ANSV)), while in other countries, road safety actions are

coordinated by pre-existing ministries (in Bolivia, Vice-Ministry of Citizen Safety; Peru, Ministry of Transport and Communications; and the Bahamas, Road Traffic Department).

Some countries have centralized institutions that can carry out actions at the local level, such as Argentina (ANSV), Mexico (Conapra) and Uruguay (Unasev), while others depend on municipalities for specific actions, as in the case of Chile (Conaset), Colombia (ANSV) and Paraguay (ANTSV). Municipalities in Argentina are also responsible for road safety interventions in accordance with provincial and local constitutions. In parallel, Brazil and Ecuador have high-level institutions that coordinate road safety at the local level (ITF, 2017). However, in federated countries, actions depend on the political will of specific municipalities, provinces, or states, which limit the actions of leading national road safety agencies.

As shown in the figure 2.2, there are 21 countries that have a road safety strategy as a planning tool to reach their objectives. However, most have reported a lack of funds to finance part or all their strategy. The exception is Costa Rica, which until 2020 received guaranteed resources from the Road Safety Fund to implement its strategic plan. Decentralized countries, such as Argentina, Colombia, Brazil, and Mexico, depend on municipalities, departments, provinces, or states to implement road safety actions at the local level, although they do have some funds to support actions locally. On the other hand, after a decade of action, there are still at least five countries that have not updated nor are they expecting to be able to update road safety strategies. The experiences of Colombia (experience 1), Haiti (experience 5), the Dominican Republic (experience 2) and Paraguay (experience 3) show how these countries have been successful, despite still facing some challenges as they create and maintain their road safety institutions.

Figure 2. 2 Status of road safety institutions in LAC

	NATIONAL ROAD SAFETY STRATEGY FUNDED	NATIONAL ROAD SAFETY STRATEGY PARTIALLY FUNDED	UNFUNDED NATIONAL ROAD SAFETY STRATEGY	NO NATIONAL ROAD SAFETY STRATEGY
THERE IS A LEAD AGENCY WITH FUNDING IN THE NATIONAL BUDGET	Costa Rica (2015-2020)a	Argentina (2016-2020)b Belice (Road Safety Master Plan 2030) Bolivia (2021-2026)c Brasil (2018-2028)b Colombia (2013-2021)b Ecuador (2022-2030) El Salvador (2015-2020)d Guatemala (2017-2020) Guyana (2013-2020) Honduras (2011-2020) Jamaica (2016-2020) México (2011-2020)b Nicaragua (2013-2018)e Panamá (2021-2030) Paraguay (2021-2030) Perú (2017-2021)f Dominican Republic (2021-2030)	Chile (2021-2030)	Bahamas[h] Uruguay (2008-2012)[i]
THERE IS AN UNFUNDED LEAD AGENCY IN THE NATIONAL BUDGET	-	-	Haití (2015-2020)	Trinidad and Tobago[j]
THERE IS NO LEAD AGENCY	-	-	Surinam (2018-2021)[g]	Barbados (2006-2012)

[a] In Costa Rica, the Road Safety Council (Cosevi) will receive funds from the national budget for its activities. Until last year, they received resources from the Road Safety Fund, which financed the activities of the 2015-2020 Plan. In terms of strategy, they are evaluating the results of the last plan to launch the Institutional Strategic Plan for Mobility and Road Safety 2022-2030.
[b] the strategies of Argentina, Brazil and Mexico have funding for activities at the federal government level. Actions at the state and municipal levels must be financed by these entities and are not provided for in the federal budget.
[c] Bolivia is about to launch its National Road Safety Plan (2021-2026), which is ready but not yet published. Due to the political scenario and the evaluation of the 2014-2018 plan (which served as input for the new plan), Bolivia was left without a strategy during 2019 and 2020.
[d] El Salvador is finalizing the 2021-2030 strategy. The lead agency, the Vice Ministry of Transportation and Conasevi have their own funds that partially finance the activities of the plans.
[e] the strategy, although planned for the years 2013-2018, was extended and is still in place, but has only partially fulfilled its functions.
[f] the lead agency is attached to the Ministry of Transportation and Communications (MTC).
[g] Suriname has a Road Safety Commission, a multi-sectoral body coordinated by the Ministry of Justice and Police, which has no executive power or budget to carry out road safety activities.
[h] the last strategy identified is for the 2006-2012 period.
[i] the last national strategy identified is from 2008-2012. However, the city of Montevideo, the capital and largest city in the country, has a Road Safety Plan (2019-2020).
[j] The National Road Safety Council was created in 2011, but it is currently inactive. The country does not have a strategy, although several road safety improvement accomplishments have been conducted over the last ten years. Currently, Trinidad and Tobago is working on a strategy with a vision for 2030, which is being developed by the Ministry of Transport and Public Works.

Source: Own elaboration, based on information collected in the countries.

Note: The date of the country's last plan/strategy is shown in parentheses. Countries that have at least one strategy covering the period up to 2020 have been classified as countries with a current strategy, as many of these countries are working on their new 2021-2030 strategy with the end of the decade.

2.1.4. DATA COLLECTION SYSTEMS AND ROAD SAFETY OBSERVATORIES

Road safety agencies or similar bodies are responsible for consolidating road safety data produced by different institutions (traffic police at all levels, health departments or hospitals, insurers, etc.). In general, data collection systems in relation to road incidents have improved. A good number of countries follow international criteria for collecting information on deaths up to thirty days after the incident occurs, some of them using correction factors and without full follow-up regarding the status of the injured. There are other countries that only collect casualty data at the casualty site or hospital. Coordinated methodology for data collection helps carrying out international and intra-regional comparisons. Detailed analysis of the road crash incident rate (to draw conclusions about victims, vulnerable users, most frequent causes, concurrent factors, etc.) is still deficient in the region and few countries carry it out with consistent accuracy. An important element is that the information should be transparent and accessible to all, so that the different road safety stakeholders can monitor developments over time.

Road safety observatories, in charge of monitoring performance and reporting results, have been a very useful tool for road safety agencies. Observatories are highly efficient and technical policy institutions whose objective is to produce information for understanding the existing road safety status. Consequently, observatories establish relevant priorities to guide management efforts. The information generated by road safety observatories should facilitate the design, implementation and evaluation of road policies and interventions that favor the reduction of road crash incidents.

Table 4. Road Safety Observatory of Fortaleza, Brazil

The city of Fortaleza, capital of the state of Ceará in Brazil, has implemented a range of road safety activities, from planning to major changes in road infrastructure. Its Traffic Accident System (SIAT), which has existed for more than 20 years, underwent a process to improve data integration and communication from 11 different sources (e.g., general hospital, emergency service, federal and state highway police, municipal traffic police, and others). In addition, the city signed an agreement with the Federal University of Fortaleza (Unifor) to reactivate *the Road Safety Observatory*, which has been issuing detailed reports since 2015. The optimization and geotagging of data were essential for prioritizing roads that needed to be reconstructed to reduce traffic incidents.

At the regional level, there are institutions that seek to support agencies or observatories in improving data collection, such as the Ibero-American Road Safety Observatory (see Table 5).

Table 5. Ibero-American Road Safety Observatory

The Ibero-American Road Safety Observatory (OISEVI) is a cooperation body established in May 2010, with the participation of 21 Ibero-American and Caribbean countries.

OISEVI's actions are aimed at strengthening the technical capacities of each of its member countries, in accordance with the principles of autonomy and democracy. Its main objective is to coordinate road safety strategies and initiatives at the regional level, based on the generation of timely, objective, and reliable information that effectively contributes to achieving a reduction in road accidents in Ibero-America.

These strategies are meant to promote awareness of the problems so that national authorities and non-governmental organizations specializing in road safety make informed decisions. These initiatives also aim to understand the causes and implement intervention alternatives for road safety issues, which would favor the development of policies and objectives aimed at overcoming the problems within the framework of the Decade of Action.

The data collection process promoted by OISEVI is based mainly on the methodological recommendations of the World Health Organization with parameters and indicators of the International Traffic Safety Data and Analysis Group (IRTAD) of the International Transport Forum (ITF).

The OISEVI's process to produce road safety information is structured in three stages:

- Data is collected from each member country, using standardized tools and, in turn, adapted to the context of each country, using police and health center records as primary sources. Data are cross-referenced with records of persons, insurance, vehicles, driver's licenses, etc.

- Once each country has collected the information, it is analyzed in coordination between the OISEVI's Technical Secretariat team and each country's statistical leader.

- The annual report is prepared by consensus among the data coordinators in each country.

OISEVI's publications make a comparative analysis between countries over time, trying to identify trends or changes in the behavior of the main indicators. Thanks to this, OISEVI can produce information on road safety within the region at the regional or national level. This allows the institution to take into consideration, among other factors, victims, vehicle fleet, population, and socio-demographic variables, in addition to following up on the policies and measures taken by each country.

For data collection strategies to be successful, they must obtain information from various sources and participants, i.e., they must be multisectoral. These strategies must also monitor the context of each country, compare indicators periodically and establish a process of continuous improvement. In the case of the countries of the region, this improvement involves the incorporation and optimization of data collection methodologies aligned with global road safety standards.

The main difference between most of the countries that make up IRTAD and the countries of Latin America is the degree of experience in the subject. IRTAD has been working continuously for almost three decades, which has allowed it to manage more complex indicators such as, for example, type of injuries by vehicle and by location within the vehicle.

The key to the progress achieved by the OISEVI is related to the work carried out with each country, making it possible to learn about other aspects linked to their political realities and economic, cultural, and social particularities, which are undoubtedly central elements for any task related to road safety.

Experience 1. Creation of the Colombian National Road Safety Agency based on international experience.

In 2012, road safety was declared a state policy priority in Colombia. The Government's National Development Plan (PND) 2010-2014 included this issue as one of its main focus areas and the Congress of the Republic of Colombia adopted it as a priority issue within its policy agenda. To implement these procedures, the national government requested a technical cooperation loan from the IDB, called the Support Program for the Implementation of the National Road Safety Policy, aimed at consolidating a national road safety policy and which was structured according to the following components: a) support for the implementation of the National Road Safety Plan as well as an awareness campaign; b) consolidation of the National Road Safety Observatory, and c) support for the formulation of local and regional road safety plans. At the same time, *document 3764 of 2013,* issued by Colombia's National Council for Economic and Social Policy (Conpes), established the main elements that justified the design of the operation with the IDB and that were related to the high incidence of deaths and injuries associated with traffic crashes in the country during the period 2000-2011[4].

In this context, the development of an institutional framework for road safety management emerged as a priority action of its National Road Safety Plan (PNSV). This comprehensive reform was led by the Ministry of Transportation (MT), which, based on international experiences and evidence of similar institutional reforms, built what is now Colombia's National Road Safety Agency (ANSV). Among others, several World Bank studies[5] were taken as examples, which establish that a coordinating or leading entity with sufficient funding and a national strategy can be decisive in providing a sustainable response to the problem of road safety when government and non-government entities work together and base their work on measurable results

4 During the period 2000-2011, there were more than 69,000 deaths and 500,000 injuries due to traffic accidents, and in 2011 alone there were 5,792 fatalities, an increase of 1.5 % compared to 2010; likewise, during 2011 there were 40,806 injuries reported, corresponding to an increase of 3.6 % compared to the previous year. Among the victims, the main vulnerable groups were motorcyclists, followed by pedestrians and cyclists (with 34 %, %29 and 6 % of participation, respectively). CONPES Document 3764 of 2013.

5 World Bank Global Road Safety Facility (2019). From Tony Bliss and Breen Jeanne, Implementing the Recommendations of the World Report on Road Traffic Injury Prevention. Country Guidelines for the Conduct of Road Safety Management Capacity Reviews and the Specification of Lead Agency Reforms, Investment Strategies and Safe System Projects.

Likewise, according to the analysis of Jesús Monclús, an international expert on the recommendations of different international organizations and recognized for his work in favor of road safety (United Nations, International Road Prevention, Organization for Economic Cooperation and Development, World Bank, World Road Association, European Council of Ministers of Transport, among others):

> [...] In general terms, three possible levels of action in road safety can be distinguished: i) a political and institutional framework, or higher level, which defines the conditions in which all road safety actions are developed; ii) road safety plans or strategies where the different actions are articulated and coordinated, and where the main lines of operation of the road safety system are indicated; and iii) specific road safety measures, including their design, implementation and evaluation. (Monclús, 2007)

Another relevant example, which served as a reference for Colombia, was the case of Spain, which since 2004 has focused on a strategy based on a solid institutional framework, political will, and the implementation of its National Road Safety Plan. The Spanish plan aimed at achieving a change in driver behavior and respect for traffic regulations through the implementation of communication, surveillance, and control campaigns, as well as effective improvements in the control and sanctioning system. In addition, the Spanish Road Safety Observatory was instrumental in determining the priorities for action of the National Road Safety Plan. The results showed, for the period 2004-2010: a) a decrease in drivers under the influence of alcohol, from 3.3% to 1.8%; b) an increase in the use of seat belts by drivers on the road, from 71% to 91%; c) increased helmet use, which rose to over 99%, and d) a decrease in speeding offenders in traffic police controls, from 3.2% to 2.6%. All these improvements account for a reduction of road crash mortality rates by 54% for the period 2003-2010, from 12.8 to 5.4 deaths per 100,000 people (IDB, 2 200).

Additionally, in Argentina's case, the creation of the National Road Safety Agency in 2008 managed to reduce the number of fatalities by 12 % in 2016. This was the result of constant road control operations, which included speed, breathalyzer, seat belt and helmet checks. In the case of motorcyclists changed behaviors included not using a cell phone while driving, low beam lights on and documentation. On the other hand, the Argentine case showed a 12% reduction in mortality in the period 2008-2011, as a consequence of: a) the creation of a solid institutional framework, through an agency that leads strategic and operational planning in road safety, and b) the existence of accurate data and reliable statistics that allow for the study of the magnitude and characteristics of the road crash phenomenon. (Raffo, Bliss, Shotten, Sleet and Blanchard, 2013).

Because of the structuring and *implementation of the ANSV in Colombia*, it was possible to generate the consolidation of the institutional design for road safety established by Law 1702 of 2013. Between 2014 and the present day, the MT has worked with financial and technical support from the IDB on the analysis of the organizational aspects for the operation of the ANSV, created by law at the end of 2013, as well as the budgetary aspects for the incorporation of the entity's resources.

Initially, with the financial and technical support of the IDB, the MT worked on the analysis of the organizational aspects for the operation of the ANSV, created by law at the end of 2013, as well as on the budgetary aspects for the incorporation of the entity's resources in the General Budget of Colombia for 2015. Subsequently, and as a result of the activities described above, during the first half of 2015, the issuance of regulatory decrees 787 and 788, dated April 21, 2015, referring to the internal structure and personnel plant of the ANSV, respectively, was achieved, with their own administrative formalities and procedures approved.

Taking into account the need to support not only the development of the regulatory aspects of the ANSV, but also the initial exercise of its functions, during 2016, and within the framework of the Cooperation Agreement No. 464, of 2015 (signed between the MT and the ANSV to provide the necessary administrative, technical and logistical support until the Agency had its staff), the MT provided legal and technical support to 16 territorial entities and traffic agencies that signed financing or co-financing agreements with the ANSV. These agreements were aimed at implementing road safety programs to reduce fatalities, thus constituting the first institutional actions in favor of the objectives set forth in the PNSV.

In conclusion, the articulated work between the MT and the ANSV, which was supported and closely followed by the IDB between 2014 and 2017, mitigated any risk related to inter-institutional coordination for the implementation of the road safety policy. From then on, and up to the present, the annual budget availability has ensured the sustainability of the reform sought, allowing the priorities and strategic lines of action defined in the ANSV plans to have been internalized and given continuity. Specifically, the *Agency's* institutional management and investments have provided continual support to the actions proposed since its creation through investment in projects aimed at fulfilling its strategic objectives.

Currently, the ANSV of Colombia has a *central leadership* in the management and implementation of its road safety policy, as more than one million people have been informed on road crash prevention throughout the national territory. Additionally, 27 municipalities have structured and implemented local safety plans, 150 educational centers have benefited from safe mobility plans in school environments, and the rate of fatalities between the years 2017-2019 has remained stable rather than grown 2010-2016 (ANSV, 2020).

Experience 2. Institutional framework in the Dominican Republic: creation and operation of Intrant/OPSEV

BACKGROUND

In 2013, the IDB approved non-reimbursable resources to support the authorities of the Dominican Republic in the formulation of policy guidelines and guiding measures for a Road Safety Strategy in the implementation of its most important aspects: the Road Safety Council, the Road Safety Observatory and the development of an investment program for the reduction of crashes and fatalities. The activities in the Dominican Republic had the additional support of a consortium formed by the Korean companies the Korean Expressway Corporation (KEC) and the Korean Traffic Authority (KRTA), which shared their experience in road safety within the scope of the trilateral knowledge transfer program of the Export-Import Bank of Korea (Korean Eximbank).

CONTEXT

The approval of Law 63-17, on Mobility, Land Transportation, Transit and Road Safety, as well as the start of operations of the National Transit Institute (Intrant) and its dependencies, especially the Permanent Road Safety Observatory (Opsevi) and the National School of Road Education (Enevial) have represented the biggest reform of the transportation sector in recent history. Previous significant developments in transportation reform included the enactment of the previous traffic law in 1967, and the reform of the government's financial administration in 2006, when the Ministries of Finance and Economy, Planning and Development were created.

At the same time, the country initiated the drafting of the *National Strategic Plan for Road Safety of the Dominican Republic* (PENSV) 2017-2020, the preparation of which was entrusted to the Presidential Commission for Road Safety, with the support of PAHO-WHO and the University Institute for Research in Traffic and Road Safety (Intrant) of the University of Valencia. The Plan aims to give immediate attention to the factors that cause crashes, propose urgent measures and even the drafting specific plans for motorcyclists and pedestrians. In fact, the plan is distinguished by its comprehensive nature, covering all the factors and users that have responsibility in the field of traffic and road safety, including both those involved in road crashes from a scientific point of view, as well as those inherent to the dynamics of the country. The plan is structured in a set of six strategic axes (institutionalism, mobility, education, enforcement, responsiveness, and information), which are composed of 21 specific objectives and 136 lines of action.

LEGISLATIVE, REGULATORY AND POLICY DEVELOPMENT

Law 63-17 attributed to Intrant the elaboration of more than thirty regulations developing its content, which were consolidated into 22 regulations, with the advice of both local experts and international specialists from the University Institute for Traffic and Road Safety Research of the University of Valencia. Among these regulations, the country established the Organic Regulations of Intrant (decree 177-18), as well as six regulations enacted and published by the government (Official Gazette # 10927, January 8, 2019), in addition to eight other regulations recently enacted by the Executive Branch and five new ones in public consultation until August 10, 2020, whose deadline has been extended due to the current state of emergency by COVID-19.

Thus, in the Dominican Republic, issues related to the transportation sector are being *regulated,* some of them for the first time. For instance, the technical vehicle inspection; the psychophysical examination for obtaining a driver's license; road education; the regulation of cargo transportation, cabs, school, and tourist transportation; local road safety plans, and registries, are all new regulations, just to mention a few.

However, the law determines the development and approval of regulations (in this case, by the Executive Branch), so these steps are of a general nature and call for technical regulations be derived from them, with more specific determinations. So far, *18 technical regulations* have been developed, of which eight have been publicized and ten are in draft form, pending publication for reduced public consultation, according to the following lists.

THE DATA AND THE OBSERVATORY

A key axis of the PENSV, which represents historic progress for the country, is that of Information, with the creation of the Permanent Road Safety Observatory (Opsevi), the objective of which is to "produce reliable information on road safety", concentrating the integration of all road safety data disseminated by different sources belonging to the multitude of state institutions. The data collection includes not only crash data but has also extended its work to other types of indicators, lines of research and publication of technical bulletins on relevant mobility issues, including intelligent transportation systems. Likewise, Opsevi applied the National Road Safety Survey (ENSV) and the National Mobility Survey (ENMO), in 2018 and 2019.

Opsevi's progress was recognized as a case of good practices at the last Meeting of Data Coordinators of the Ibero-American Road Safety Program (OISEVI), held in Cartagena de Indias in October 2019, where countries such as Spain, Colombia, or Costa Rica, among others, recognized the great progress made by the Dominican Republic in this area.

However, Opsevi, with the support of Intras - and in keeping with one of its fundamental responsibilities regarding the conduct of research with scientific methodology and its dissemination -

has initiated a line of publication of the results obtained through prestigious scientific journals. Currently, Opsevi is developing, with the support of the IDB and Intras, a methodology for calculating the economic costs of road crash incidents in the country, based on research and publications of global institutions.

DEVELOPMENT FOR STRATEGIC PLANNING: THE PLANS

Regarding the effectiveness of public policy for the management of mobility and road safety, the fact that all efforts were consolidated into a comprehensive plan coordinated by a single, national governing body (Intrant) is an initial victory. Prior to this central plan, the Dominican Republic implemented road safety efforts in a decentralized way, which featured redundancy and a lack of coordination.

Based on the PENSV, INTRAT developed two particular plans to address specific at-risk groups from an epidemiological perspective. First, the National Strategic Plan for *Motorcycle* Road Safety 2019-2022 and second, the National Strategic Plan for *Pedestrian* Road Safety 2020-2023. Additionally, derived from the Regulation of Local Road Safety and Mobility Plans, INTRAT developed a methodological guide to support municipalities and is developing a guide for companies, public administrations and other organizations for the development of their corporate plans.

Currently, the National Strategic Plan for Road Safety for Bicycles is being developed with the advice of Intras of the University of Valencia and the support of the IDB.

TRAINING, ROAD SAFETY EDUCATION AND SCHOOLS

With the aim of changing the behavior of road users, the National School of Road Education was created as a sub-organization of Intrant, which Law 63-17 assigns "to define and organize the general content of courses on traffic rules for violators of this law and its regulations, and the continuous training of national, provincial, municipal and local technicians and officials on road safety".

The challenge for the Dominican Republic in the new government cycle, 2021-2024, will be to consolidate what has been achieved and continue building on the foundations laid, towards a new era of safe mobility.

Experience 3. Integral Improvement of Road Safety in Paraguay.

For more than a decade, the IDB has been providing comprehensive support to Paraguay in programs or activities aimed at improving road safety conditions, with initiatives ranging from institutional strengthening and strategic planning to the rehabilitation of infrastructure with high road safety standards.

PUBLIC POLICIES, REGULATIONS AND INSTITUTIONS FOR ROAD SAFETY

In 2007, the IDB financed a comprehensive road audit that resulted in the National Road Safety Plan (PNSV) 2008-2013 and the creation of the National Road Safety Council to coordinate the inter-institutional strategic direction of the plan. Early efforts resulted in a reduction in the country's fatality rate per 100,000 people of 20% between 2008 and 2012. Since the initial planning support, the IDB continues to support the country with subsequent updates of the PNSV 2014-2018 and the PNSV 2021-2030, currently under implementation.

As a continuation of the efforts to reduce the road crash rate in the country, the IDB has supported the Ministry of Public Works and Communications (MOPC) and the National Traffic and Road Safety Agency (ANTSV) of the Republic of Paraguay in the development and implementation of the Traffic Accident Information System (SIAT), through program PR-L1075, Integration, Rehabilitation and Road Maintenance Corridors. The SIAT is a geo-location referenced platform with unique records of the multiple entities involved in crashes, providing comprehensive information that is useful in designing evidence-based policies and programs. The SIAT will allow a better use of the country's resources by prioritizing programs in critical areas where the highest number of crashes are occurring, and at the same time, it will contribute to the design of programs that protect those demographic and modal groups (related to traffic modes) identified as vulnerable.

The IDB has also financed the strengthening of traffic law enforcement capacity. The highway police have received support for improved operations through the acquisition of different goods and equipment for road safety control on the country's paved roads (vehicles, radio equipment, radars, and breathalyzers).

In the regulatory area, the IDB, with the support of the FIA, launched a multisectoral and integral roundtable between insurance companies, governments and civil society for the design and approval of a regulation for vehicle insurance since Paraguay is one of the three countries in the region that still do not have mandatory insurance. The IDB is currently supporting the preparation of an actuarial study, which will provide objective elements for the discussion of the bill in the National Congress, to ensure that the proposed compulsory insurance complies with three fundamental axes regarding coverage and prices: being politically viable, technically sustainable, and socially desirable.

INFRASTRUCTURE WITH THE BEST ROAD SAFETY STANDARDS

In the area of infrastructure, the IDB has financed the implementation of the International Road Assessment Program (iRAP) in Paraguay, to carry out road safety audits and define countermeasures in the network of paved roads in Paraguayan territory, under the responsibility of the MOPC. In 2010, a systematized inspection of approximately 4,000 km (approximately 90% of the paved roads at that time) was carried out.

In addition, under a contract with the Universidad Católica de Asunción, a study was carried out to identify the points and sections of concentration of the most severe traffic accidents, which will make it possible to draw up risk maps of the national road network and identify the 20 most critical points or sections of the network for their respective treatment. This includes proposals for low-cost solutions to reduce road crash rates and recommendations for medium- or long-term interventions. The IDB loans have also financed the rehabilitation of these road sections, considering the critical points identified by this study and by the iRAP inspection.

AWARENESS AND BEHAVIORAL CHANGE

As part of the activities promoted to improve road safety, the IDB supported the institutions that make up the National Road Safety Council and the National Coordination Committee, as well as civil society, in coordination with the media, to carry out Road Safety Weeks. The success of the implementation of this project has been reflected in the progress of the discussions and issues addressed in recent years, from awareness of the problem to the implementation of innovative initiatives to address the various risk factors.

With IDB financing, the Paraguayan government has also implemented the Caminos Seguros (Safe Roads) initiative to improve transportation infrastructure, encourage school attendance and create safe routes to school, applying road safety regulations and providing new mobility alternatives for students who must travel to more distant schools that offer extended day programs. To achieve this goal, cost-effective school transportation solutions will be identified and piloted in schools with these characteristics.

Finally, the IDB has supported the road safety initiatives of the Automobile and Touring Club (TACPY). Since 2011 IDB has contributed to the program *Juntos Podemos Salvar Millones de Vidas* (Together We Can Save Millions of Lives), which consists of bringing together private companies committed to developing road safety plans to provide road safety education to employees, clients, suppliers, and the surrounding community. IDB is currently in conversation with TACPY to support road safety initiatives including: a) training and monitoring of driver behavior with advanced technology; b) an International Seminar on Vehicle Standards (October 2018), and c) a pilot project for a motorcycle training center.

Experience 4. Safer infrastructure and better data for Jamaica

IDB support for road safety in the Caribbean began with the Road Improvement Program in Jamaica, the main objective of which was to improve mobility, safety, and accessibility, in addition to reducing transportation costs and road crash rates. The program has not only addressed the development of road safety conditions on the country's critical roads, but also strengthened the capacity of the Ministry of Transport and Housing to analyze crash data to generate recommendations quickly and efficiently.

The program intervened on 371 kms of Jamaican roads, including signage for 200 km of roads, implementation, and restoration of 200 crosswalks and three pedestrian traffic signals, the installation of 2,000 warning and directional signs and six new illuminated traffic signs, and the implementation of a restoration program of key locations, and traffic signals were connected to a new traffic control center on the Northern Coastal Highway.

With the support of the UK Transport Research Laboratory (TRL), Jamaica has developed a pilot observatory to optimize the collection of information through the creation of software that stores georeferenced data on the location of the traffic incident. The traffic crash database was updated, providing evidence for the resolution of black spots on the country's roads. Officials inside the relevant government agencies (Ministry of Transportation and Housing, Ministry of National Security and Ministry of Health) were trained in traffic crash investigation and management of road safety audits through courses and seminars.

In the five years prior to the implementation of the program (2005-2009), deaths due to road traffic crashes averaged 347 per year, while in the five years after the program (2010-2014) this average dropped to 305 representing a 12% reduction after the program's implementation[6]. It is worth noting that in 2012 the number of road deaths was 260, the lowest number in more than twenty years.

6 However, the project team did not implement an impact evaluation to assess any causal relationship between the intervention and road crashes.

Experience 5. Road safety in Haiti, a pending challenge

Since 2013, the IDB has financed activities to diagnose the condition of road safety in Haiti, and for the implementation of measures to reduce road crashes in the country. This support has covered all areas of road safety in the country.

In the institutional area, the IDB financed the creation and strengthening of a Road Safety Unit in the Ministry of Public Works, Transport and Communications (MTPTC), the development of a National Road Safety Strategy 2015-2020 and the creation of a multisectoral roundtable dedicated to road safety, made up of the main users related to this issue (dedicated to intersectoral coordination and different activities, such as awareness-raising). The IDB also financed the creation and implementation of an advanced system for collecting data on traffic crash victims, which previously did not exist in the country. Two hundred police officers from 10 departments were trained and provided with data collection protocols, geo-referenced software for recording traffic crashes, equipment for the control room at the Traffic Police Premises (DCPR) and tablets.

In the area of road safety awareness, the IDB has financed communication campaigns on the country's main roads, such as the RN1 campaign. This campaign was financed with resources from the Korean Fund for Poverty Reduction and included television and radio content in the form of slogans such as "speed kills", "alcohol and driving do not mix" and "helmets save lives".

Finally, in the area of infrastructure, the IDB financed the construction of an 80 km safe corridor on RN1, one of the country's main highways, a project that included the installation of road signs donated by the specialized firm 3M. Part of this financing was used to adopt measures for safer road design in the country.

However, as indicated in the IDB's recently published *technical note on road safety in Haiti,* performance in addressing road safety challenges has remained partial due to significant deficiencies in institutional capacity to undertake recommended actions, lack of accurate and complete data, as well as the absence of enforcement measures. These problems persist at all levels.

With respect to the magnitude of the road safety problem in Haiti, the actions undertaken during the last decade do not seem to have produced significant impacts. Regarding the resolution of the problems related to the reduction of traffic crash, the results continue to be limited. The current institutional structure does not allow for effective support of concrete road safety actions, producing a negative impact on the creation of

effective coordination. As a result, the National Road Safety Strategy has remained largely unimplemented, and several areas of road safety have not been addressed at all - in particular, actions related to law enforcement, the application of uniform road safety standards for vehicles and users, and the generation of accurate data.

Despite some efforts on the part of traffic police officers, the crash data collection system has also yielded limited results. The fact that registration is not a mandatory task for police officers and the lack of commitment to allocate resources to the system by high-level officials are factors that have had a negative effect on the success of this tool. Likewise, the few good results obtained in the education and training of the personnel of the Ministry of Public Works, Transport and Communications and the Traffic Police in road safety have not been complimented by an institutional process capable of translating these new competencies into concrete actions for road safety.

In conclusion, reducing the number of traffic crashes remains a major challenge for Haiti. Strong leadership, supported by a political vision, will be essential to make progress in this area. Based on these challenges, the following priority areas and lines of action have been identified for the coming years in Haiti:

- In the institutional area, the reactivation and expansion of the coverage of the data collection system and analysis of the information collected by the National Police, as well as its respective monitoring and dissemination, are crucial.

- In the area of infrastructure, the following developments are required a) the application of road safety audits for new works to be financed by the IDB (particularly on the RN1 and RD501); b) the training of local technical capacities in the Ministry of Public Works and Transport to systematize audits in all future road projects, and c) the implementation of traffic calming measures at certain critical points in the Port-au-Prince metropolitan area.

- In the area of awareness-raising, we plan to: a) implement a safe access program in selected schools in the Port-au-Prince metropolitan area, with awareness campaigns for children, and b) carry out awareness campaigns on the use of helmets for motorcyclists.

REFLECTIONS ON ROAD SAFETY INSTITUTIONS

As documented above, the countries of the LAC have tried to strengthen their road safety capacities and institutions (either by national agencies or departments in ministries of transportation), launching road safety strategies, defining a budget for the implementation of the strategies, and creating their road safety observatories. The cases of Colombia and the Dominican Republic, which have strengthened their institutional framework with the creation and implementation of new national agencies, stand out as success stories

However, in many cases these efforts did not translate into effective implementation of road safety activities or significant reductions in traffic crashes. Without being exhaustive, some hypotheses can be put forward as to the possible causes of these non-ideal results

1. **In LAC there is not a lack of technical capacity, but rather a lack of political commitment to give road safety the relevance and support it requires.** In this regard, greater political attention should be paid to the need for data on road safety. It is necessary to increase reliable information and continue working towards improving primary data collection processes. Not all countries have the capacity to fully account for indicators and variables, as some do not have the relevant data (for example, kilometers traveled by type of vehicle). The process to develop better information is a lengthy data process.

2. **Some government experts do not have defined professional careers within road safety agencies and these agencies experience high turnover.** If after each change of government, the personnel changes, the acquired experience, and knowledge is lost, data collection will not improve.

3. **Although many of the lead organizations have a defined mandate to drive the agenda and funding to implement coordinated actions with other entities, their actions are limited in terms of necessary legislative changes or even ministerial decrees.** The main modifications in road safety policies come from legislative changes, to be discussed and approved in Congress, or from ministerial decrees, but not from the agencies.

4. **The agencies' road safety strategies do not take into consideration the institutional reality of the countries and subnational entities.** Agencies are usually responsible for monitoring and evaluating the progress of the strategy, and for participating as implementers of some actions; however, they do not have the power to influence issues of other

ministries or subnational entities or do not have the personnel or financial resources necessary to implement even the activities that fall under their direct responsibility. Perhaps activities to improve the institutional framework should be prioritized according to the human and financial resources and commitments of the other organizations.

5. **On the other hand, road safety strategies have defined ambitious goals that are often not commensurate with the magnitude of the interventions and timelines proposed.** For example, some plans include activities to be accomplished in five years, across all the pillars established by the United Nations. As has been observed, in most countries the expected activities have not been implemented and many of the targets have been repeated in subsequent plans.

6. **Considering that most of the fatalities have occurred in the urban environment, the governing entities have little influence on the implementation of local road safety plans and activities at the state, province, or city level.** This fact impacts the effectiveness of actions at the national level to reduce road crashes in urban environments. The focus should be on major cities, defining roles and plans for work in the urban environment.

2.2. Safer transit and mobility infrastructure

OBJECTIVES OF PILLAR 2 OF THE DECADE OF ACTION

ROAD SAFETY AND MOBILITY

This pillar emphasizes the need to improve the safety of road networks for the benefit of all users, especially the most vulnerable, i.e., pedestrians, cyclists, and motorcyclists. Proposed activities include taking measures to improve the planning, design, construction, and operation of roadways with safety in mind; ensuring that road safety is regularly assessed; and encouraging the relevant authorities to consider all forms of transport and types of safe infrastructure when responding to the mobility needs of road users.

Source: WHO (2011)

Until recently, roads were not always planned, designed, built, nor managed with the safety of all road users in mind. However, the Safe System approach to road safety[7] led to the improvement of infrastructure safety, working from a perspective of shared responsibility among all institutions involved. This is the approach in force in most European Union countries, including Spain, as well as in the European Commission; Directive 2019/1936 itself, on road infrastructure safety management, published in 2019 as a modification of Directive 2008/96/EC, includes the Safe Systems a starting point. In 2021, the United States released its National Road Safety Strategy, which is founded upon the Safe System approach.

In global terms, the approach to infrastructure safety could be summarized as a two-pronged approach to the problem seeking interventions that are both preventive and palliative. The preventative approach detects problems that may occur on a road before claims are generated, while the palliative approach seeks to address the problems that have already occurred on a transit network. Examples of palliative approaches are the identification and management of sections with high concentration of crashes, while examples of preventive tools include road safety audits and inspections, or road safety impact assessments.

7 The Safe System approach works by building and reinforcing multiple layers of protection to prevent crashes from happening in the first place and minimize the harm caused to those involved when crashes do occur. It is a holistic and comprehensive approach that provides a guiding framework to make places safer for all people. This is a shift from a conventional safety approach because it focuses on both human error and human vulnerability, and designs a system with many redundancies in place to protect everyone (DOT, 2022). For more information: "What is a Safe System approach?", at the DOT webpage.

In order to implement the virtuous circle of safe infrastructure, governments should focus their efforts on the implementation of four core activities:

a) TECHNICAL STANDARDS FOR ROAD DESIGN: a set of technical frameworks that take into consideration the most modern standards for road construction, the types of users that circulate on them and the interaction between users (motorized four-wheeled vehicles, motorcyclists, cyclists, pedestrians, animal-drawn vehicles or urban micro-mobility), as well as the specificities of these roads (for example, urban or rural, high traffic or low traffic roads, paved or unpaved roads) is crucial for safe transit and mobility. These standards should be mandatory for the construction and periodic maintenance of all roads in the country, provinces, and cities.

b) SYSTEM OF ROAD SAFETY AUDITS AND INSPECTIONS: a set of regulations that guarantee the obligatory nature of road safety audits (RSA) and road safety inspections (RSI), as well as the continuous application of these instruments for monitoring and evaluating the quality of roads is another crucial aspect of overall road safety. These regulations should define the criteria and procedures for the implementation of RSAs and RSIs and encourage the application of most of the measures recommended in the reports of audits and VS inspections, always ensuring a balance between costs, feasibility, and effectiveness. A system of safety audits and inspections allows the definition of a detailed road plan that defines the measures to be implemented to obtain a safer road infrastructure.

c) INTEGRATED ROAD ASSET MANAGEMENT SYSTEM: a consistent system for monitoring the quality of roads and changes in their use patterns, and for periodic maintenance, taking into account compliance with regulations is crucial for overall road safety. This system, for example, should be integrated with the traffic incident database, which allows the identification of black spots on the roads and should consider the diagnoses of the RSAs and RSIs, to analyze the main weaknesses of the infrastructure and implement the necessary measures to reduce the number of road crash incidents.

D) TECHNICAL CAPACITIES DEVELOPED FOR ROAD SAFETY: a technical body that knows about road safety issues in a broad manner, and also understands the measures provided for in the technical standards and road safety audits and inspections is also a crucial element of road safety. Road agency officials in the LAC region must have the specific knowledge necessary to analyze designs and ensure that they comply with the technical standards defined in the road construction manuals; to supervise the implementation of the safety measures defined in these designs or in the RSA and RSI reports; to ensure that road maintenance complies with the technical standards defined in the manuals; and to supervise the implementation of the safety

measures defined in the RSA and RSI reports; to guarantee the maintenance of roads in compliance with road safety standards; to technically analyze the quality of the RSA and RSI reports of the consultants or independent firms hired; and, finally, to guarantee that private concessions have complied with road safety standards in the construction, operation and maintenance of private roads.

Latin American and Caribbean cities' road infrastructure must be able to accommodate and avoid collisions between multiple users, such as pedestrians public transport and micro-mobility users, motorcyclists, four-wheelers and cyclists (of all ages and physical conditions); roads must meet the different needs of these users. In cities, transport services play a fundamental role in reducing crashes, while the promotion of sustainable mobility is correlated with a safer city.

The following section will detail the main elements and best practices, both international and regional, related to each of these four pillars, offering support to government entities for the implementation of the virtuous circle of safe infrastructure. It will also detail the relationship between sustainable mobility in cities and road safety.

2.2.1. TECHNICAL STANDARDS FOR ROAD DESIGN

Road design manuals are the main instrument for safe infrastructure, since they guide the decisions of road agencies in each country, province, or city regarding the application of road safety measures necessary to reduce incidents on their roads. In general terms, these manuals should be based on two basic concepts: roads should be **self-explanatory** and **human-centered.**

Self-explanatory roads are understood to be those in which the design of the road, its equipment and its environment, make it easy for drivers to understand how they should behave at any given moment, adjusting to their expectations and avoiding surprising situations, and encourage them to select operating speeds in harmony with the posted speed limit (FHA, 2018). In addition, a self-explanatory road should equally comprehensible for all users, including vulnerable ones, and consider the different environmental conditions (different levels of luminosity during the day, night, dawn, or dusk, etc).

According to the Federal Highway Administration (FHA), the main objective of the self-explanatory road (in its expression, "self-enforcing road) is to produce speed compliance, changing driver behavior by using geometric elements resulting in operating speeds commensurate with the intended road purpose (FHA, 2018).

There are several complementary criteria to improve the properties of a road to consider it as self-explanatory, among them, the following are worth mentioning.

LEGIBILITY: property that allows the road and its surroundings to be well perceived by users and correctly interpreted. The layout of the road, its state of preservation and its equipment are

fundamental to legibility; it is estimated that 80% of the information that reaches the user comes through the eyes, so it is essential that each element of the road is adequately visible in all circumstances, even for users with very limited vision. Roads and its equipment should also include elements for users with no vision, by being legible through other sensory systems (for example, hearing and touch).

CREDIBILITY: guarantee of coherence between the reality of the road and the expectations generated in the road users. In relation to this aspect, it is important that the road signs respond to the reality of the road design, since, sometimes, not enough traffic control devices (road signs, pavements markings, etc.) can generate a situation causing loss of confidence or credibility on the part of the users.

ADAPTATION TO THE SITUATION: adaptation refers to the effort of assimilation and decision making required by the user on each stretch of road, depending on its layout and the amount of information available via signage, the environment, or other elements.

CONSISTENCY: The concept of consistency in geometric design is related to the objective of achieving maximum conformity between the geometric characteristics of the road and the resulting operational characteristics, as well as the driver's expectations as he/she travels along the road. The objective of a consistent design is to ensure that users maintain a uniform and unsurprising driving experience as a result of the coherence between the geometric design of the road and its equipment, for each road category. This consistency should allow road users to act predictably according to their accumulated experience (*a priori* expectations) and enable them to gain experience from the perception of the characteristics of the route as they travel along it (*ad hoc* expectations). If the expected geometric characteristics cohere with those that exist on the road, the road has a good degree of consistency, which minimizes the probability of making mistakes or unsafe maneuvers.

Safety design manuals can be developed as a complement to road design manuals or incorporated into the latter. In addition to being a reference in road construction, the best practice defines that the manuals should be mandatory for the construction, operation, and maintenance of all roads under the administrative or road concession entity, being the supervising entity's power to verify that the road construction and operation companies are complying with the defined regulations.

Table 6. What is a safety design manual?

The safe design manual is a support document for roadway design that includes elements for identifying and quantifying road safety problems, presenting possible solutions to the problems encountered, and evaluating the cost-benefit of these solutions. In general, these manuals also contain the parameters for implementing road safety audits and inspections, defining concepts, criteria and processes. *Australia's* road safety manual, one of the most comprehensive, comprises nine sections: a statistical overview of road safety in the country; road safety strategy and assessment; speed management; the role of communities and participation in improving road safety; road safety on rural roads; road safety auditing and implementation; road safety risk factor assessment and management; black spot treatment measures; and roadside hazard management. In order for the manuals to become mandatory reference standards, especially for the implementation of road safety audits and inspections, the executing agencies must make their use mandatory via decree or regulations, always refer to them in the terms of reference of works tenders and supervise their compliance.

Another important road safety manual is the USA *AASHTO's Highway Safety Manual*, that incorporates quantitative safety analysis in the highway transportation project planning and development processes. The manual includes guidance on: human factors; the road safety management process (network screening, site assessment, project prioritization, and safety effectiveness evaluation), predictive methods for infrastructure improvement project alternative analysis and development/design.

Finally, the PIARC Road Safety Manual is a great reference to design to help countries at all stages of infrastructure development to fulfill the road safety objectives.

For this document, the IDB has developed a diagnosis of the state of road design and road safety standards in LAC countries in relation to the design of safe roads. The following elements were analyzed.

- Existing regulations in the countries in relation to road design (own manual, regional regulations, reference manuals of other countries or private entities).
- The content of these manuals (e.g., chapters on topography, geometric design, pavement design, etc.).
- The level of adoption of these manuals (mandatory by law, decree, resolution or simply recommended).
- The nature of the supervision of road designs (mandatory or not).
- Existing regulations on road safety measures on the country's roads and their level of adoption (mandatory or recommended).

- The content of the SV manuals (intersection design, bicycle lanes and paths, urban crossing design and pedestrian provisions, cross-section and roadside design, wildlife crossing design, rest area design, standardized signage, geometric design considerations, and pavement considerations).

- Existing regulations for road safety audits and inspections (existence of guidelines and their mandatory adoption).

- Level of road safety standards in concession contracts.

With the results of the study, the countries were divided into four clusters, as shown in Figure 2.3. Only six LAC countries have adequate road design regulations and a modern manual with road safety measures for safe infrastructure. This is found in countries that have a better institutional capacity for infrastructure construction. However, only Mexico, at the national level, mandates road safety audits and inspections on federal highways. In Costa Rica, for example, the National Laboratory of Materials and Structural Models of the University of Costa Rica (LanammeCR) is empowered by law to monitor the quality of the national road network, which includes road safety audits and inspections, but does not guarantee that they are mandatory. In general, road safety audits are implemented in road designs at the request of the international bodies that finance them.

There is also a significant lag in the Caribbean and Central American countries. In the case of the Caribbean, this is due to the lack of solid road design standards and road safety manuals the countries refer to various foreign standards in the different bidding documents, such as the Aashto standards[8], but never made them mandatory through manuals or regulations. In Central America, the countries have used the *Central American Manual of Standards for Geometric Design of Roads with a Risk Management and Road Safety Approach* of the Secretariat for Central American Economic Integration (SIECA), a manual that, although it has been updated in design standards, is not mandatory and is for reference only. In addition, the practice of audits and inspections of VS in these countries is not widespread.

[8] They do not always refer to the three manuals – AASHTO "Green Book", AASHTO Highway Safety Manual and the AASHTO Roadside Design Guide, which have to be used all together. In general, the AASHTO Green Book is used alone.

Figure 2. 3 Diagnosis of road safety regulations in the region

Criteria	Adequate road design regulations, with mandatory character	Road design regulations in need of improvement or mandatory requirement	Incomplete or non-existent road design regulations
Up-to-date road safety manuals, and mandatory RSA and RSIs	Mexico[a]		
Existing road safety manuals, but not mandatory for RSAs and RSIs	Argentina[b] Brazil[c] Colombia Chile Costa Rica Uruguay[d]	Bolivia[e] Ecuador El Salvador Honduras Jamaica Paraguay Panamá Perú[f]	
Non-existent road safety manuals		Guatemala Guyana Nicaragua República Dominicana Surinam Trinidad y Tobago Haití[g]	Bahamas Barbados Belice

[a]The federal regulations are for interurban roads. For urban roads, the Urban Streets Manual was prepared with the support of the IDB and is in the process of becoming mandatory (see Table 7). At the state level, in general, there are no road safety manuals.

[b]This is a reality for federal interurban roads. However, at the provincial and municipal level, mainly on rural roads, the practice is not common and the guides are merely recommended. The ANSV has prepared a guide for the recommended use of road safety audits and inspections.

[c]At the state road network level, regulations vary widely. With the exception of the state of São Paulo, the other Brazilian states do not have road safety manuals or road safety audit and inspection mechanisms, although they do have mandatory standards for road construction and rehabilitation.

[d]In Uruguay, a set of design and road safety standards are used as mandatory, such as AASHTO, *the Inter-American Manual of Traffic Control Devices for Streets and Highways, the Uruguayan Standard for Construction Site Signaling, the Uruguayan Standard for Vertical and Horizontal Signaling and the Specifications for Road Safety Equipment.*

[e]Bolivia's technical design manuals (Bolivian Highway Administration) are outdated since they were published in 2006-2007. In the specific case of the Traffic Control Devices Manual, it does not include the latest advances, materials, degrees of retro reflectivity, thickness of horizontal demarcation, size of text in vertical signage, etc. that are handled at the international level; in other words, the level of demand or control established in the manual does not comply with international standards. Chapter 5 includes road safety audits, although it does not establish the need or obligation to carry them out. On the other hand, there is no reference to guardrails designed according to their containment behavior for vehicles on the road. For all these reasons, it is considered that the country has road safety guidelines for road infrastructure, but there is a strong need for updating.

[f]Although Peru's design manual is up to date, the design and ITS manuals are from 2013, and there are opportunities for improvement in the urban geometric design manual. In the case of this country, RSA and RSI are mandatory, but only for new projects, and their use is not yet widespread.

[g]The Standard Specifications for Road and Bridge Construction of the Ministry of Public Works, Transport and Communications (MTPTC) are mandatory. As these standards are relatively old and have never been updated, in practice, a series of supplements to these standards are usually added to the bidding documents for construction works, depending on the type of work.

- Good benchmark in road design and road safety standards
- Countries with adequate regulations but need to improve the system of VS audits and inspections
- Countries that need to improve some elements of RSA and RSI or SV auditing and inspection system
- Countries in need of improving road design regulations and system of audits and inspections of VS

Although some countries in the region have made progress in their road design regulations and road safety measures, and have defined them as mandatory in road construction, little progress has been made in defining road design regulations in the urban environment. This is due to several factors; for example, since the responsibility for urban roads is under other jurisdictions (provinces and states) and the institutional capacity to implement transportation programs in these contexts is generally low, in the urban environment the focus remains on the construction of roads for vehicles, leaving aside other types of users.

However, some regional and national efforts have been established to support cities with safer road design tools. The *World Resources Institute* (WRI) launched a design guide known as *Safer Cities by Design in 2015,* which aims to collect global best practices in creating safer cities and presents general guidelines for adopting proven solutions that generate safe urban environments. The guide describes road safety elements, such as traffic calming measures, measures on arterial roads and intersections, pedestrian spaces and access to public space, bicycle infrastructure, and safe access to mass transit stations.

At the same time, the GDCI, an association of the transportation departments of 86 cities in the United States, has developed *a series of urban design guides* that can be adapted to the Latin American context. These include the design guide for urban roads, roads for children, bicycle lanes or intersections and public transportation. The experience explains the case of Fortaleza, Brazil, with the Global City Design Initiative.

With IDB support, Mexico City has created its guides for low-cost, high-impact measures for the city, and the federal government has also worked on a guide for urban environment measures for cities (Table 7). At the same time, Colombia has also produced its *recommended guidelines on cycling infrastructure design for cities.* All the guidelines resulting from these efforts are of a recommendatory nature, and it is necessary that cities and provinces adopt them as mandatory in the construction and rehabilitation of urban roads going forward.

Table 7. The guidelines for low-cost, high-impact interventions for Mexico City

Since 2014, the IDB has been supporting Mexico, at the national and subnational levels, in reducing traffic crashes, as well as related deaths and serious injuries. Through non-reimbursable resources from Infrafund and the UK Sustainable Infrastructure Program, the IDB has financed the development of road safety programs, street design guidelines and safe mobility campaigns, among others.

At the national level, in conjunction with the National Council for the Prevention of Accidents (Conapra), which is part of the Ministry of Health, the IDB collaborated in the preparation of the *Guide for Low-Cost, High-Impact Interventions to Improve Road Safety in Mexican Cities.* This guide proposes the development of simplified road safety inspections to improve road safety in existing infrastructure. The document is an input for local governments, which have very short administrative periods (typically three years) to design, implement and measure the impact of their road safety actions in the urban environment, where half of the country's traffic-related deaths occur.

At the national level, the IDB also supported the Ministry of Agrarian, Territorial and Urban Development in the preparation of the *Manual of Streets for Mexican Cities.* This manual contains optimal design standards for new roads and sidewalks in the urban context. Its objective is to ensure that state and municipal authorities follow international standards adapted to the Mexican reality, in order to achieve greater road safety, mainly for pedestrians and cyclists.

Experience 6. Improving mobility safety in Fortaleza with GDCI

SAVING LIVES ON THE STREETS OF FORTALEZA

Between 2014 and 2019, the city of Fortaleza, Brazil, reduced traffic fatalities by 48.6%. In this five-year period, fatality rates dropped from 14.7 to 7.4 per 100,000 people, resulting in 563 lives saved, compared to trends in previous years

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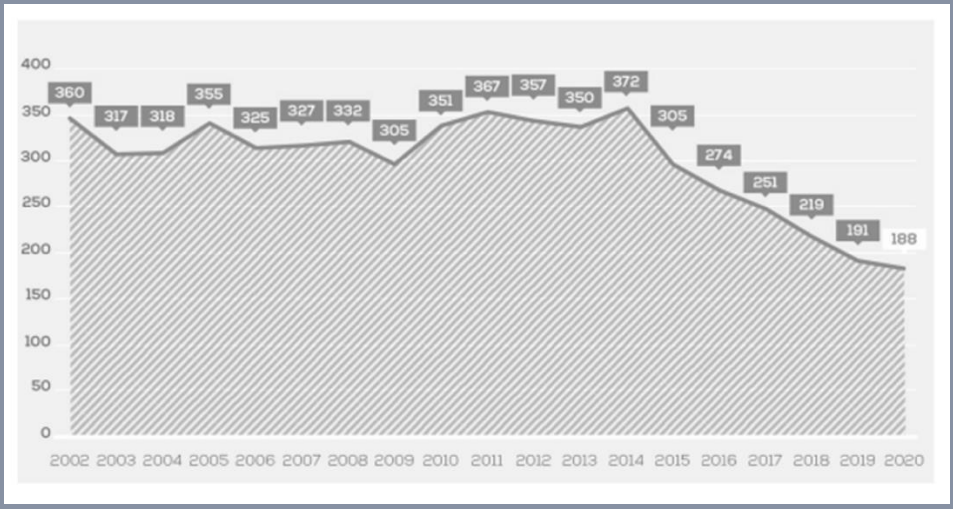
Graph 2. 1 Fatalities in Fortaleza, 2002-2020



Source: Fortaleza 2020 Annual Road Safety Report (Fortaleza City Hall, 2021).

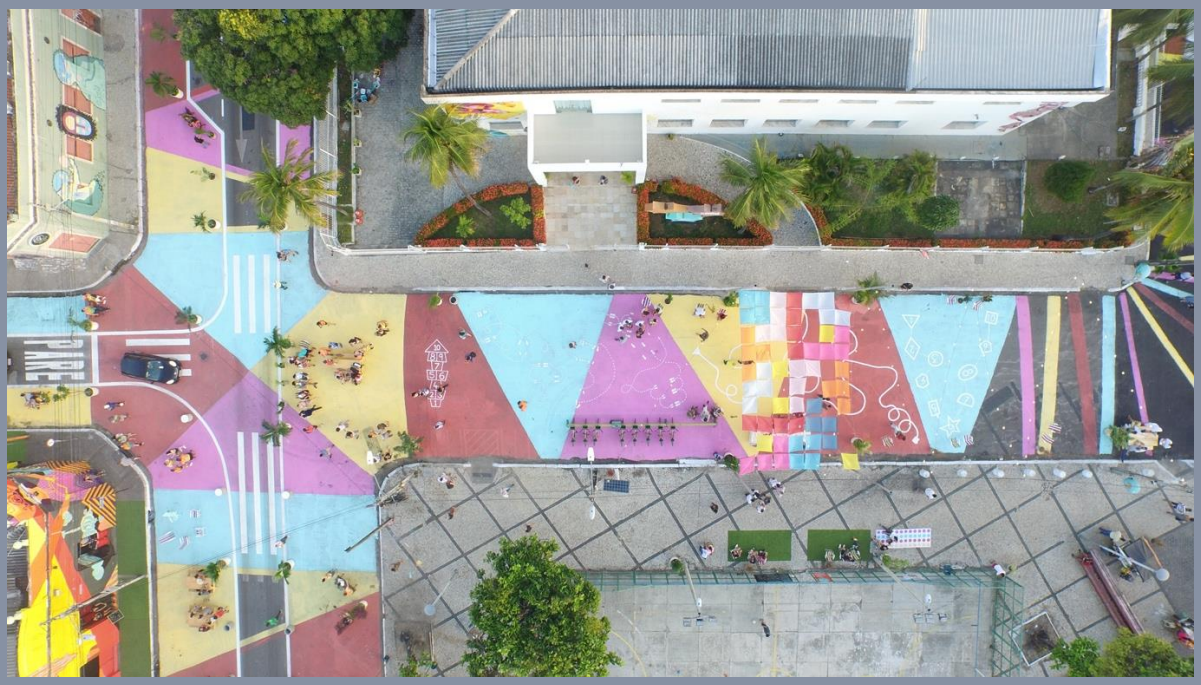
To achieve such exceptional results, the city combined strong political leadership from the 2013-2020 mayor's office, a highly skilled and committed team-supported by international experts from the Bloomberg Global Initiative for Road Safety (BIGRS), partner organizations-and the implementation of sustainable road and transportation safety measures over time through IDB financing. Fortaleza developed a comprehensive, evidence-based road safety strategy that included concerted efforts around improved data collection, targeted enforcement, strategic communication, and safer mobility infrastructure.

Better street design played a key role in making the city safer for all road users. With technical assistance from the Global Design Initiative (GDCI), the World Resources Institute (WRI) and the International Road Assessment Program (iRAP) under the BIGRS program, Fortaleza transformed several kilometers of urban roadway, adopting proven design techniques to reduce motor vehicle speeds and protect vulnerable road users, while reallocating road space to promote sustainable modes of transport.

CIDADE DA GENTE AND CAMINHOS DA ESCOLA PROGRAMS

A good example of these interventions and improvements are the projects implemented under the Cidade da Gente program, which have aimed to transform areas with a high density of conflict between motorized traffic and vulnerable road users into places that are safe for people and at the same time lively and vibrant. Using low-cost materials (such as paint, planters and furniture) and easy-to-implement techniques, city officials were able to adopt bold street designs and demonstrate their effectiveness. This approach, first tested in the Cidade 2000 neighborhood and the Dragão do Mar cultural district, inspired several other changes and helped promote safer street design practices and the road safety agenda in Fortaleza.

Figure 2. 4 Cidade da Gente intervention in the cultural district of Dragão do Mar.



Source: Victor Macedo, city of Fortaleza.

Following these interventions, Cidade da Gente's community-driven approach inspired another program, Caminhos da Escola ('roads to school'), which focused on improving safety and accessibility in municipal schools and other public facilities in high-impact locations. In 2019, GDCI supported the city team to implement its first intervention in Cristo Redentor, a high-density, low-income area of the city. The site's redesign included sidewalk extensions, compact intersections with shorter crosswalks and narrower travel lanes, plus a 1,000 square meter plaza for children to play and enjoy their neighborhood front yard, while maintaining access to public transportation and school buses.

Figure 2. 5 Caminhos da Escola intervention in the Cristo Redentor neighborhood, before and after.

Source: Paulo Winz, GDCI.

MANAGING VELOCITIES THROUGH POLICY AND DESIGN

With the support of BIGRS partners, Fortaleza took a proactive, design-oriented approach to speed management. Along with speed limit reductions, Fortaleza applied proven design techniques to promote safer speeds on city streets, from traffic-calmed, neighborhood-scale zones to the redesign of high-speed urban arterials. In 2018, West-West Avenue was identified as the second most dangerous corridor in the city, where 106 fatalities were recorded over a ten-year period. As this artery runs through several neighborhoods and lacked safe pedestrian infrastructure, many pedestrians risked their lives crossing the avenue as they encountered speeding vehicles. The city readjusted the corridor's speed limit from 60 km/h to 50 km/h and implemented a combination of

physical and operational changes, such as new traffic signals with pedestrian phases, mass transit lanes and bicycle lanes in each direction, the reduction of travel lane widths, and the redesign of critical intersections. The solution, focused on protecting vulnerable road users, not only reduced the total number of fatalities by 34.2%, but also reduced the number of pedestrian fatalities by 40.6.

In addition to focusing on critical corridors, which account for approximately half of the fatalities in the city, Fortaleza developed initiatives to address the other half, more evenly dispersed across the street network. These included visibility improvements at intersections in inner-city neighborhoods with many crashes, the implementation of traffic calming measures around schools and other key points, and the creation of traffic calming zones throughout the area. In these zones, in addition to reducing speed limits to 30 km/h, design techniques such as curb extensions, compact intersections with shorter crosswalks, and narrower travel lanes were used to self-enforce the new regulations.

For example, in the traffic calmed zone of Vila União, a neighborhood around the Albert Sabin Children's Hospital, the new design reused almost 2000 m2 of road space as widened sidewalks and curb extensions, generating narrower travel lanes and shorter crosswalk distances.

Together with vertical deflection elements such as raised crosswalks and speed bumps, the intervention resulted in 98% driver compliance with the new 30 km/p/h speed limit, virtually eliminating the need for speed enforcement in the neighborhood. All pedestrians surveyed in front of the hospital reported feeling "safe" or "very safe" when crossing the street, compared to only 2.2% favorable responses before the transformation.

INVESTING IN SUSTAINABLE MOBILITY FOR GREATER SAFETY

Investments in sustainable mobility, with IDB financing, were an integral part of Fortaleza's road safety strategy. In less than a decade, the city expanded its network of dedicated public transport lanes from 3 km to 125 km and the bicycle network grew from 69 km to 384 km. By reallocating street space to sustainable modes of transportation, roads become narrower, and this directly reduces motor vehicle speeds and crossing distances for vulnerable road users, generating positive safety outcomes. BRT lines also cut times in half, promoting faster and more reliable public transport, and bringing 50% of the population within 300 meters of bicycle paths, the highest percentage in Brazil. By making walking, cycling and public transport more accessible and convenient, the city managed to reduce higher risk motorized trips, while increasing physical activity levels and saving at least 100,000 tons of GHG emissions each year.

Through careful evaluation of local street transformations and inspired by international best practices showcased in the GDCI Global Street Design Guide, Fortaleza improved the city's bicycle infrastructure design standards and was

inspired to design more protected paths for cyclists of all ages and abilities. Combined with other initiatives, such as public bike-sharing systems and bike racks, the expanded cycling network generated a *4.9% share of trips made*, compared to 1% in São Paulo, for example.

Figure 2. 6 Protected bicycle lane on Santos Dumont Avenue.

Source: Paulo Winz, GDCI.

Fortaleza also focused on improving pedestrian accessibility. A good example is the temporary transformation of downtown Barão do Rio Branco, the district with the highest pedestrian fatality rates. In this commercial street redesign, a traffic lane was reused as an accessible sidewalk extension with enough space to accommodate people walking or sitting as well as street vendors. Sidewalk extensions were also added to help reduce vehicle turning speeds and reduce crosswalk distances. The project resulted in 92% fewer pedestrians walking outside designated facilities, three times as many children visiting the area with their families, and 94% compliance with the 30 km/h speed limit, up from 58% previously.

GDCI AND THE BIGRS PROGRAM

BIGRS- GDCI provided technical assistance to the municipality of Fortaleza between 2016-2019 as part of the Bloomberg Global Road Safety Initiative, under the safe infrastructure and urban design pillar, together with partners WRI and iRAP. GDCI partnered with the city to implement 14 street transformation projects, repurposing nearly 15 000 m2 of underutilized road space into safe facilities for vulnerable road users. The organization trained more than 250 local professionals through capacity building workshops and presented concepts from the Global Street Design Guide (GSDG) to an audience of more than 450 people, including city staff, consultants, academics, advocacy groups, and journalists, to inspire change toward a safer, healthier, and more sustainable approach to urban mobility. During the same phase of the BIGRS program, GDCI developed and published the GSDG and provided technical assistance to four additional cities: São Paulo, Bogota, Mumbai, and Addis Ababa. The organization is currently involved in the third phase of the program, collaborating with several cities in South America, Africa, and Asia, for which Fortaleza serves as an inspirational model.

2.2.2. ROAD SAFETY AUDIT AND INSPECTION SYSTEM

Audits and inspections are essential tools for the construction and maintenance of safe road infrastructure. A road safety audit (RSA) is understood as a "formal, systematic, proactive, documented and confidential examination of a future road or the reconstruction of an existing one, conducted by an independent, trained and multidisciplinary audit team, which identifies the road crash potential and road safety performance for all users of the project, which recognizes and proposes opportunities for improvement" (IDB, 2018). It is important to highlight that an RSA is not a control of compliance with a country's design standards, since, in many cases, these standards do not guarantee that a road is safe. The purpose of the RSA is to anticipate potential points of conflict as early as possible in an analysis of engineering designs, taking into consideration all types of road users. It should be noted that the RSA not only considers engineering and traffic elements, but also has a component of analysis on the social impact of road projects and of human factors. To this end, community consultations play an important role in the process. Table 8 details Costa Rica's experience with citizen consultations.

Table 8. The role of citizen consultations in road safety audits: Costa Rica's experience

"We have learned that, through citizen consultations, we can improve many aspects of projects that are not usually considered from the technical and engineering perspective, both perspectives seen from the eyes of third parties who do not live in the area and do not fully understand the day-to-day life of the place where we are going to build a project.

"Abraham Pérez K. in charge of socio-environmental management of PIV-I.

The IDB's socio-environmental policies and safeguards require a two-way citizen consultation in the early stages of a project. In practical terms, the two-way concept implies that the project is presented in all its details to the citizens by the executing agency in a public event, with wide dissemination and seeking the greatest possible representation of the community.

During the consultation, the benefits to the community related to the project are explained in an accessible manner, as well as the possible direct and indirect impacts that the project, both during its construction phase and during its operation, could have on these communities. The executor also presents the mitigation and compensation measures designed to address these impacts.

From the consultations carried out in Costa Rica, it can be concluded that the three recurring themes expressed by community members during the consultations are as follows:

a) **ACCESSIBILITY AND FUNCTIONALITY:** One of the biggest concerns of citizens are about the change in their travel patterns because of the project. Questions such as: How will I get to my house or property? How much will the road changes impact the flow of customers to my business? How much additional distance will I have to drive or walk to get to my destination? And how far will I have to walk to get to my destination? All of these are frequent questions.

b) **RISK MANAGEMENT:** Stormwater management and slope and embankment stability, both during construction and operation, is a major concern for community members. They are well aware of the historical behavior of rivers and streams, flood sites, and other risks to the project.

c) **ROAD SAFETY:** In this area, community members are very interested to know how safety concerns will be handled during construction, particularly with reference to the increased volume of heavy equipment on community roads and in front of schools, the design provisions incorporated in the project for non-motorized users, such as walkways and sidewalks, or with respect to signage and bicycle lanes. People always expect the project to improve their mobility and safety.

The consultation cycle with communities is completed when the technical and financial possibilities of incorporating changes as a result of their contributions to the project are analyzed in its design phase. One of the great lessons learned in this area has to do with the appropriate management of the communities' expectations, since openness to making changes in the project must be handled with great caution.

PUBLIC CONSULTATION PROCESS IN A COMMUNITY OF THE CAÑAS-LIBERIA PROJECT

Communities, local governments, and organized groups see major projects as an opportunity to satisfy other needs, and may even condition their support for the project on the fulfillment of their expectations.

From their side, the RSAs should not neglect the valuable information gathered from these consultations: black spots that cause accidents, culture and customs, travel and infrastructure use patterns of all user groups, information and training needs of users and neighbors during all phases of the project.

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Audits can be applied during both the preconstruction phase (planning, preliminary design, or detailed design) and during construction. However, it is recommended that they take place as early as possible, to allow for more efficient and less costly interventions. The recommendations are not mandatory, as it is up to the project developer to define the measures he accepts to implement, based on their feasibility and relevance (IDB, 2018).

The RSA involves three *stakeholders*, who have their own roles in the process. The audit team must be an independent group, not having participated in any of the program phases. Being part of the planning or design development produces an inconvenient bias in the appraisals (IDB, 2018). The other two parties are the designers and the client. The figure below details the role of each of these groups.

Figure 2. 7 The RSA team and its roles

Source: Technical guide for the implementation of road safety audits in Latin American and Caribbean countries (IDB, 2018)

Road safety inspections (RSI) are a "proactive tool developed through a systematic and regular process of on-site review of a road section or road by a trained, independent team of road safety experts to identify dangerous aspects, deficiencies or shortcomings likely to trigger a traffic crash, propose treatment measures and monitor their implementation". RSIs are useful to define an investment plan to improve road safety on the evaluated roads and should be done periodically, as a monitoring and evaluation mechanism. One of the best-known RSI methodologies is the one developed by the International Road Assessment Program (iRAP). In addition, new technologies have been tested for road safety inspections in urban environments, using street safety cameras. An interesting example was the pilot carried out in the city of Cochabamba, where artificial intelligence was used to evaluate the level of safety at intersections and traffic circles. Experiences 7 and 8, detail this work in the region.

Experience 7. iRAP-IDB Initiative to improve road safety on LAC roads

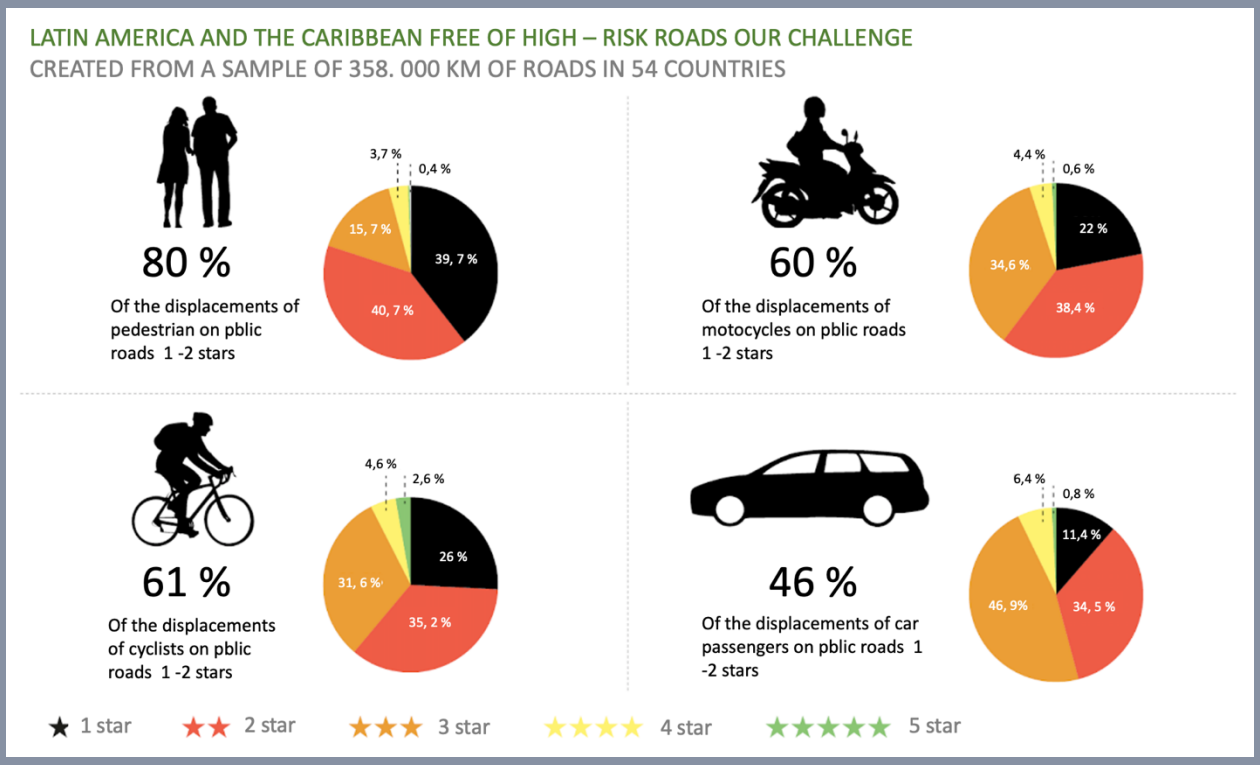
In February 2020, during the Third Global Ministerial Conference on Road Safety in Sweden, the IDB signed a partnership agreement with the international charity iRAP to promote programs and projects to significantly improve road safety in LAC. This five-year partnership will focus on achieving a measurable reduction in road trauma in the region and will contribute to the SDGs and the Global Road Safety Performance Targets, in particular Target 3: "By 2030, all new roads meet technical standards for all road users that take road safety into account, or have three stars or more " and to Target 4: "By 2030, more than 75% of trips on existing roads will be on roads that meet technical standards for all road users that take road safety into account."

iRAP has been active in over 100 countries and works with governments, development banks, FIA mobility clubs, research organizations and road safety NGOs to provide them with free tools, systems, and training to help make their roads safer. *iRAP's* star rating methodology provides a simple, objective measure of the level of safety that is *built into* the road for vehicle occupants, motorcyclists, cyclists and pedestrians. A 1-star road is the least safe, and a 5-star road is the safest. Each additional star represents half the cost of a crash in terms of the number of people killed or seriously injured. It is important to note that star ratings can be completed without reference to detailed crash data, which is often not available in low- and middle-income countries. Globally, iRAP and its partners have star ratings for more than 1.1 million kilometers of road, resulting in the improvement of infrastructure safety using a USD 79 billion-dollar investment and the training of more than 25,000 engineers.

Ideally, all roads would be 5-star (i.e., with the highest levels of safety) for all user groups. While investments can be made in high-volume roads to cost-effectively bring them up to a 5-star level, roads of 3-star or higher for all users represent a realistic goal to be adopted by national or regional governments as well as road authorities. As part of an overall Safe System approach, bringing roads up to 3-stars or better will save lives and help meet the SDGs and the Global Road Safety Performance Targets.

The process begins with a road inspection by means of specially equipped vehicles capable of collecting geo-referenced images. In the case of a road design, the process begins with an inspection of the road designs. Once the survey images or designs are collected, trained coders proceed to review them using specialized software to record the attributes of that infrastructure. Finally, this attribute data is uploaded to iRAP's online platform, called *VIDA*, and forms the basis for a safer road investment plan and star rating. The process can be iterative, with possible improvement measures feeding back into the model to refine and optimize investments in safe road infrastructure.

Figure 2. 8 Diagnosis of ALC pathways, using the iRAP rating



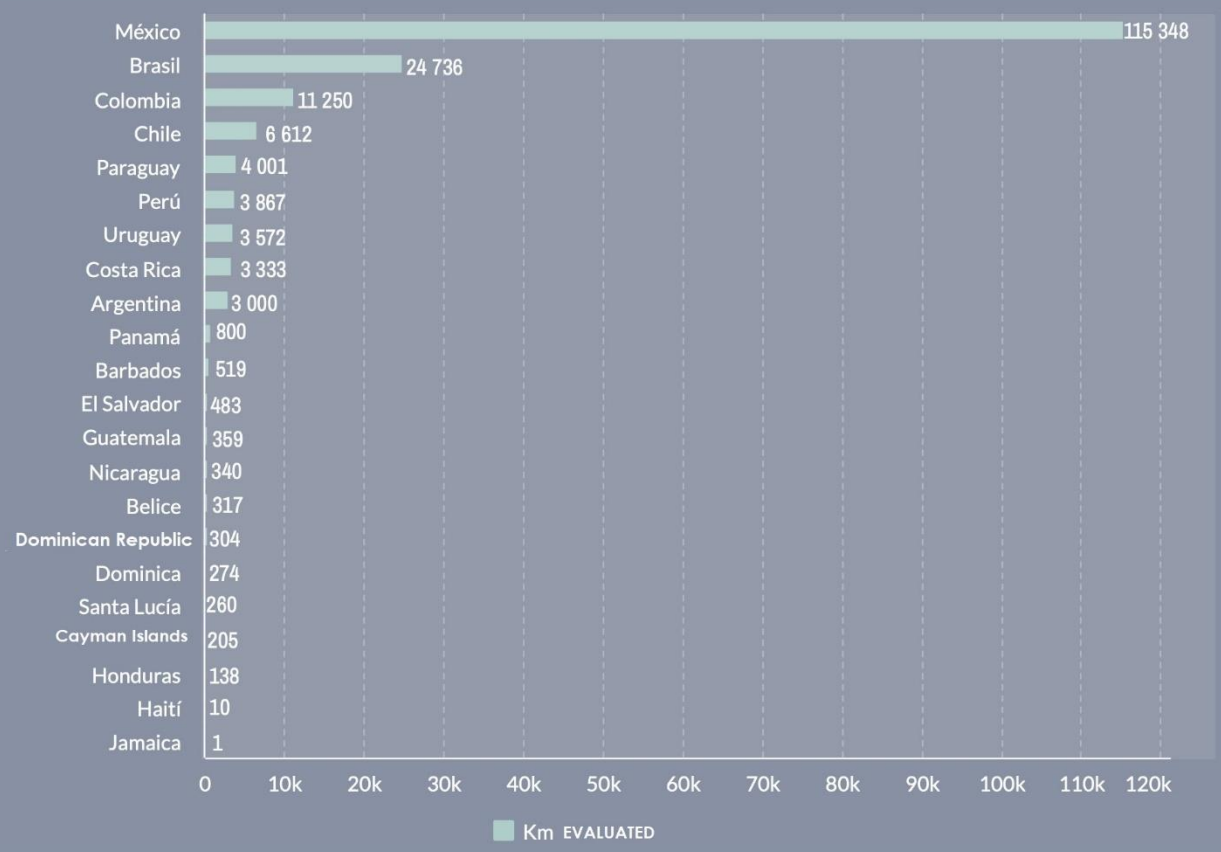
Fuente: vaccionesforroads.org/irap-big-data-tool/

HOW SAFE ARE THE ROADS IN LAC?

iRAP's Vaccines for Roads big data toolkit reveals the potential of the world's largest road infrastructure safety database to explore the human and financial impact of road injuries in LAC, determine how safe road infrastructure is and provide the case study for safer roads.

The iRAP-IDB Alliance. iRAP and its partners have already assessed more than 180,000 kms of roadways, as well as securing the USD 8.3 billion-dollar infrastructure investment while training more than 3,500 engineers in 22 countries in the region.

Figure 2. 9 iRAP star rating assessments in LAC countries, as of June 2021.



The iRAP-IDB partnership is prepares to implement road assessment programs (RAP) following the iRAP methodology in LAC to help reduce the number of road casualties and serious injuries caused by road crashes in the region.

The activities of this alliance are:

- Carry out activities that contribute to a measurable reduction in the number of deaths and serious injuries caused by road crashes in IDB borrowing member countries through the development and application of RAPs, following the iRAP methodology.

- Establish a clear medium-term framework for action over a five-year period with the objective of creating a platform to build confidence, motivation and interest in partners and countries to invest in specialized staff, training, assessments, and other RAP-related resources within the IDB, operations and investments.

- Develop local capacity in countries to lead, develop or support existing RAPs, and conduct or make use of iRAP methodology and assessment tools to improve transport infrastructure safety.

- Identify priority corridors for investment from existing and new RAP assessments and inspections, as well as support road improvement demonstration projects with IDB borrowing member countries in support of global road safety performance targets.

- Review the methodical evaluation of the impacts of past investments in safer road infrastructure to provide important guidance and recommendations for future investments; and

- Develop a communication, awareness and training plan, a training program, and a set of outreach materials

By improving 75% of LAC roads to a 3-star or better ranking by 2030, approximately 400,000 deaths and serious injuries could be prevented, saving $10 USD for every $10 USD spent, according to IRAP's Business Case for Safer Roads.

iRAP CASE STUDIES

MEXICO

Mexico's federal paved road network spans 42,801 km. With a commitment to reduce fatalities and serious injuries, the Ministry of Communications and Transport (SCT) partnered with iRAP to assess the safety of its road network and report on strategic investment to reduce lethal crashes, particularly those related to road departure and those involving vulnerable road users. The SCT rated its road network using the star rating in 2012, investing millions of pesos in road improvements recommended by iRAP. They re-examined the network in 2015 to assess the success of their investment. The results highlighted that 17% of the network had moved from a safety level of 1 or 2 stars to 3 stars or higher.

In the example of Capufe's Querétaro-Irapuato highway, in 2012 10% of the road was rated with 3 stars or more. In 2015, 89% was rated 3 stars or higher. During the same period, road fatalities were reduced by 52%.

Figure 2. 10 Querétaro-Irapuato highway, before and after improvement. Star rating changes

2012

Length (km)	%	Star rate (Veh. occupant)
0.90	0	5 Stars
2.00	1	4 Stars
19.30	9	3 Stars
121.10	58	2 Stars
65.90	32	1 Star
0.00	0	Not applicable
209.20	**100**	**Total**

2015

Length (km)	%	Star rate (Veh. occupant)
0.00	0	5 Stars
0.00	0	4 Stars
186.70	89	3 Stars
7.60	4	2 Stars
0.00	0	1 Star
15.10	7	Not applicable
209.40	**100**	**Total**

BELIZE

In 2009, Belize recorded 70 fatal traffic crashes nationally, and almost half of them occurred on a single road: the 80 km high-risk corridor between Belize City and Belmopan. iRAP conducted an assessment that created star ratings and provided investment plans for this high-risk corridor. The Caribbean Development Bank provided a loan of US$11.8 million, complemented by a government contribution of US$2.5 million, to support interventions to develop the country's road safety management capacity and improve road infrastructure safety and post-crash care. The specific road infrastructure improvements reported in iRAP's package of recommendations significantly reduced fatalities in the corridor: from 33 to 8 fatalities per year over a five-year average. In turn, the improvements implemented raised the road's star rating from 10% 3-star or better to 100% 3-star or better.

Figure 2. 11 Results achieved in Belize

ACCIDENTS WITH FATALITIES AT COUNTRY LEVEL VS			
YEAR	Accident fatalities		Percentage of accidents resulting in death on DC (DC/CW)
	Nivel país (NP)	Demonstration Corridor	
2009	70	33	47
2013	73	8	11
2014	84	9	11
2015	87	6	7
2016	86	7	8
2017	82	10	12

Source: iRAP (2020).

PACIFIC CORRIDOR

In 2011, iRAP partnered with the IDB to evaluate 4,346 kms of roads in seven countries (Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama) to identify high-risk stretches that required infrastructure investment to improve safety and reduce the number of deaths and serious injuries. The decision to conduct this study was made after the conclusion of the XI Heads of State of the Mesoamerican Countries Summit, during which the leaders decided to "prioritize the program to accelerate the Pacific Corridor of the Mesoamerican Network". The IDB used the iRAP methodology and protocols to

conduct a star rating of the Pacific Corridor. The assessment also provided an investment plan to improve the safety conditions of the entire network. The results of the study reported a comprehensive package of improvements that could be implemented during the 2011-2020 Decade of Action for Road Safety. Over the past ten years, the IDB has disbursed nearly US$1.76 billion for 30 road infrastructure and logistics operations in the seven countries. In 2020, the IDB decided to carry out a new evaluation in this network in order to monitor the performance of the investments and to have a comparative study of safety before and after the implementation of the investment package over the last ten years.

BRAZIL

The BrazilRAP Program, led locally by Brazil's National Department of Transport and Infrastructure (DNIT), aims to address the safety of the country's most at-risk roads. The partnership with the World Bank, LabTrans/UFSC and DNIT has resulted in star ratings on more than 20,000 km of roads. A combination of Brazilian government and World Bank-funded assessments are plans for 61,000 km over the next two years, linked to loan commitments to support the improvements.

Improving more than 75% of the roadways to a level of 3-stars or better by 2030 will save more than 17,000 lives each year, with an economic benefit of USD $12 for every USD 1 spent in Brazil.

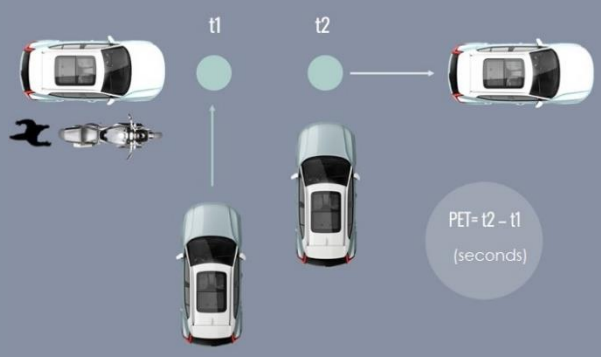
Experience 8. Can video analytics and artificial intelligence improve pedestrian safety?

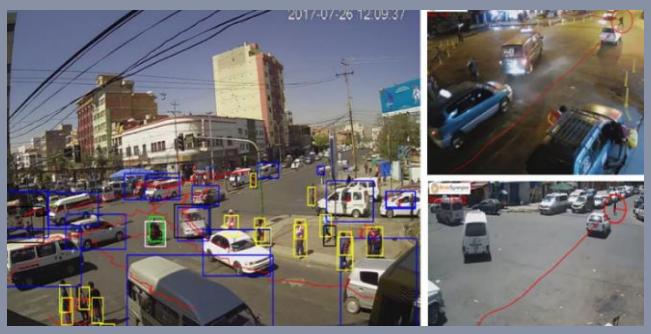
Poor data collection and analysis systems present a key challenge for the design, implementation, monitoring, and evaluation of road safety programs in LAC countries. Underreporting levels of traffic incidents are estimated to be as high as 50%. In the case of pedestrian injuries, it can take years to collect sufficient crash data for the identification of mechanisms and diagnosis of risk factors, as well as evaluation of the effectiveness of countermeasures.

Recent developments in road safety surrogate methods and video analytical tools using computer vision offer alternative methods, which may prove to be faster and less costly, when analyzing road user interactions or conflicts that, without becoming crashes, are frequently observed, where conflicts are defined as an event in which the interaction of two or more road users, others in a traffic flow situation in one or both road users must take evasive action such as braking or swerving to avoid a collision.

Such methods can be divided into time or distance proximity measures, such as post-encroachment time (PET) or time to collision (TTC). PET measures the time difference between the first and second road user arriving at the point of potential conflict (Figure 2.12) and approximates the risk of a collision. However, the severity of each interaction depends on factors such as user speeds, path angles, and the type of road users involved, among others. This approach is particularly attractive in cases where road safety data is incomplete, missing or the number of observed crashes is too small to be able to infer their causes, at the diagnostic stage, as well as to develop and implement proactive road safety programs and strategies that enable authorities to act before crashes occur.

Figure 2. 12 Potential conflict among users types





The applications and uses of surrogate methods were tested during a pilot project developed in the city of Cochabamba, Bolivia. The main objective of the project was to demonstrate the applicability of the surrogate measures approach for road safety analysis based on automated video analytics in the Latin American context, where traditional methods are difficult to apply.

THE STUDY

The team collected video data at sites of interest and, using an automated video analysis tool, trajectory data were generated for the calculation of surrogate indicators of collision risk, from which the effectiveness of low-cost temporary countermeasures at selected crosswalks at risky intersections in the city of Cochabamba, Bolivia were evaluated (Scholl, Elagataty, Ledezma-Navarro, Zamora, Miranda-Moreno, 2019)[9]-

Low-cost countermeasures or treatments to improve pedestrian safety were temporarily applied and evaluated at two intersections, a four-lane intersection with no signage and a traffic circle. Prior to the interventions, both sites lacked lane pavement markings or crosswalks, and vehicle turning radius and crossing distances were very long in the case of the old-style traffic circle. Vehicle-pedestrian interactions were detected using computer vision and more thorough learning techniques, from which a set of variables were generated, including types of road users trajectory, speeds of each user, vehicle traffic movements, pedestrian-vehicle interactions or conflicts, as well as the user arriving first at the interaction point, PET, and whether the event occurred at night or during peak hours.

9 More details of the case can be found at the following site: www.mdpi.com/2071-1050/11/17/4737.

RESULTS

- The multi-lane traffic circle examined in this study proved to be the most dangerous intersection for pedestrians. Vehicle speeds and operating volumes are much higher than those of regular intersections, along with longer crosswalk distances.

- Motorcycles increase the risk index by 55.8% for pedestrians, which is explained both by their higher speeds compared to cars, as well as lower post-encroachment time (PET) which presented an average of 4.13 seconds compared to the average of 4.95 seconds for conflicts with other vehicles.

- Compared to other types of motor vehicles, motorcycles in general represent a serious threat to road safety. This is explained by their tendency for higher operating speeds, a behavior that is even more pronounced at traffic circles. This is an important observation given the proliferation of motorcycle traffic in many Latin American cities and the consequent emerging safety problems.

- Turning movements, particularly at traffic circles, are highly statistically significant in predicting crash risk, increasing the risk index by 17.4%, and by an additional 61.3% at traffic circles. This appears to be mainly due to accelerations at higher vehicle speeds during these movements, which increase by 13.7 km/h.

- In the before-and-after analysis, the treatments to improve pedestrian safety at the four-branch intersection were effective in reducing speed and risk, while at the traffic circle the results suggest that the treatments were not sufficient to reduce speed and vehicle-pedestrian conflicts.

Figure 2. 13 Analysis before and after treatment

Source: Scholl et al. (2019).

CONCLUSIONS AND RECOMMENDATIONS FROM THE COCHABAMBA EXPERIENCE

Traffic circles are common in Cochabamba, and in Latin America in general, and as designed they pose a serious safety problem to pedestrians, due to high vehicle speeds and lack of protected crossings, as traffic volumes are much higher and crossing distances are generally longer than at crosswalks at regular intersections. In addition, the most dangerous vehicle movements were identified at left turns at single intersections and at turns into and out of traffic circles. Motorcycles are not only the most dangerous mode of motorized transport, but also a mode that impairs the safety of active road users (pedestrians and bicycles).

Only the treatments at the four-branch intersection were effective in reducing speed and risk. At the traffic circle, the treatment appears to have had a slight risk-lowering effect.

Given the complexity of the traffic safety problem at traffic circles, more complex design countermeasures should be studied and implemented using a similar approach. This could include transforming traditional traffic circles into traffic circles with elements that improve traffic safety, such as traffic signalization, other measures that reduce risk exposure and promote driver awareness of pedestrian vulnerability or even innovative intersections designs. Other designs could consider the inclusion of raised crosswalks (with or without vertical signage) further away from the intersection or with manually activated or intelligent traffic signals, among other possibilities.

The application of this methodology in other cities could help identify a set of key lessons and effective treatments to contribute to the improvement of pedestrian safety in a proactive and effective manner. Such a low-cost methodology significantly reduces diagnosis and evaluation times from long periods (years) to weeks or months.

A set of limitations of this study should be noted. From the standpoint of treatment efficacy, the results should be taken with caution, given that the locations involved in this analysis are not representative of all intersections in the city, and the sample of locations is small. The same caution applies to risk factors; a large sample of intersections in the same city or other cities should be considered before drawing general conclusions.

Future research is needed to further study the validation of surrogate safety measures and to compare surrogate indicators with actual crash events.

The diagnosis Road Safety Audits and Inspections in Latin America, conducted by the IDB, has shown that the countries of the region, although they have sporadically applied RSA and RSI in their projects, do not have regulations or parameters that force the systematic application of RSA and RSI in their roads. According to IDB (2018), few applications of RSAs were observed in the region, carried out more by the initiative of officials, state institutions or international organizations than by a policy that follows an effective plan for the region. No specific programs were identified for their mandatory application regulated by legislation in force, although cities such as Bogota have launched a resolution adopting a road safety audit guide. In this sense, the countries of the region should approve regulations that make the implementation of road safety audits and inspections on their roads mandatory, and that define the criteria and processes to implement them. As a reference, the IDB has launched guidelines for *road safety audits* and *road safety inspections,* which can be used by countries as a reference. Table 9 summarizes how benchmark countries have included audits and inspections in their regulatory framework.

Table 9. Model regulations for road safety audits and inspections in benchmark countries

Countries such as Spain, the United Kingdom, Australia, the United States and New Zealand have included specific regulations that make the implementation of road safety audits and inspections mandatory, complemented by guidelines that indicate the criteria and processes for their implementation. These countries have included in their road design manual, which is mandatory, chapters that define the mandatory nature and the process for the implementation of RSAs in new road projects in the country.

Likewise, all these nations have produced their reference guides: *FHWA Road Safety Audit Guidelines from the United States, Road Safety Audit* (SQA-0170-, 2014) from the United Kingdom, *Euro-Audits the European Road Safety Audit*, from the European Community, and *Guidelines for Road Safety Audit Practices: Transport Road and Traffic Authority* (2010) from Australia and New Zealand.

In Spain, which has a regulatory context more similar to that of Latin America, Royal Decree 345/2011 on the management of road infrastructure safety in the State Road Network was enacted. This decree incorporates into the legal system the European Community Directive 2008/96/EC, which regulates the application of the following methods: the assessment of the impact of road infrastructure on safety in the initial planning phase; road safety audits in the pre-project, project, pre-commissioning and initial in-service phases of roads; the safety classification of the sections of the network according to the concentration of road traffic crashes and the potential for improving safety, the priority treatment of sections with a high concentration of road crashes and those with the greatest potential for saving costs caused by road crashes; as well as the periodic performance of road safety inspections on roads in service. This same decree also establishes the composition of the RSA and RSI teams and the procedures.

Some Latin American countries have produced road safety audit guidelines, such as *Chile* and *Colombia*. However, these are not yet systematically applied.

2.2.3. ROAD SAFETY AND PRIVATE ROAD CONCESSIONS

In LAC there has been a growth in road concessions as a mechanism for increasing private investment in infrastructure and improving road infrastructure standards in the region. As part of the requirements for road concessions, some countries have begun to study strategies to include road safety issues in the bidding documents. In some countries, such as Brazil, the impact of road concessions to improve road safety on the country's roads has been studied. Alves, Emanuel and Pereira (2020) found that, on average, that 15 fewer fatalities were observed per 1,000 crashes per year on concession roads as compared to publicly operated ones, thus preventing 16,000 deaths between 2007 and 2017. This result was mainly due to the inclusion of specific requirements for road safety standards maintenance during road operation in the concession contracts. Experience shows that the requirement for the best road safety standards on roads must be met by both publicly and privately operated roads. This subsection will include some initiatives that may serve as an example for the countries of the region.

- #### ROAD DESIGN REQUIREMENTS AND ROAD SAFETY AUDITS

Some governments require, as part of contract specifications the implementation of an RSI on the road, as well as RSA on the concession projects. Both must be conducted by a firm independent of the infrastructure developer and concessionaire, with a report on the implementation of the measures recommended by the auditing team. If the measure cannot be implemented, it is the developer's task to explain why, subject to government approval.

Road safety manuals and road design manuals should be referenced in the bidding documents and, for the audit process, road safety audit and inspection manuals. Countries that have not yet updated their regulations have referenced manuals from other countries, which they consider to be more applicable and represent the best practices for road safety. In Jamaica, the Government has required the concessionaire Trans Jamaican Highway Limited to carry out an RSA on the designs, following the guidelines of the RSA manual of Ontario, Canada, or another equivalent guide.10 The measures must be implemented, and it is up to the concessionaire to provide reasons for non-implementation if they do not improve road safety.

- ### MAINTENANCE AND UPKEEP

For the maintenance and conservation phase of highways, what is known as the *progress clause* began to be applied in many contracts. This consists of requiring the concessionaire to maintain the roadway and its facilities, as well as road safety aspects (overall maintenance, road maintenance, road crash response, safety measures and management of the public domain), in accordance with the technical safety regulations for users. The objective is that the concessionaire studies the evolution of scientific data regarding the approval of new regulations during the concession process, without compensation from the grantor (Pérez de Villar Cruz, 2015).

- ### INCENTIVES FOR THE IMPROVEMENT OF ROAD SAFETY DURING OPERATION

There are two types of complementary incentives used in concession road contracts: negative incentives, i.e., penalties due to non-compliance with the road safety indicators defined in the contract, and positive incentives, which aim to provide incentives to the concessionaire, with bonuses in case they go beyond what was determined as a minimum. For example, in Brazil's third generation contracts, concessionaires are only authorized to install and collect tolls for road use when they reach the minimum indicators defined in the contract, including road safety, but which were more oriented towards maintaining safety devices and emergency services (negative incentives). Negative incentives only work when there is a defined correction plan to be implemented. Italy is an example of a country that uses positive incentives, as a system was developed based on the variation of the price-cap according to the level of safety, where road safety is one of the criteria to define the tariff cap (Pérez de Villar Cruz, 2015).

- ### INDICATORS APPLIED IN CONCESSIONS

Perez de Villar Cruz (2015) has identified the indicators used to monitor road safety on concession roads in some European countries. Figure 2.14 summarizes the main methodologies.

Figure 2. 14 Indicators for monitoring road safety on concession roads

Methodology	Examples
The indicator's progress, through comparative analysis (period of three to five years), of the number of crashes and fatalities on the same road over time,	Concessions granted by the autonomous communities in Spain
A comparative analysis of the indicator on the same road over time (period of three to five years), with adjustments for risk exposure. The road crash rate is divided by the annual traffic (millions or billions of vehicles/km).	E18 (Muurla-Lohja), in Finland M6 in Hungary IP-4 concession in Portugal New generation of Spanish roads
Comparative analysis of the indicator in relation to roads of similar characteristics, allowing for risk exposure adjustment.	E-18 (Grimstad-Kristiansad), in Norway A1 and M25, in the United Kingdom M-407 in Spain
Indicator related to road sections with highest road crash concentration (TCA). The indicators include not only crashes, but also a sub-indicator to determine the reaction time for the treatment of identified black spots and on the effectiveness of the treatment in reducing crashes.	A-1, A-2, A-3, A-31, A-4, in Spain

Source: Own elaboration, based on Pérez de Villar Cruz (2015).

Note: For details on the advantages and disadvantages, and calculation formulas, refer to the source material for this figure.

However, the author notes that the first experiences with key performance indicators (KPIs) have not been as successful as expected. In general, the study points out that concessionaires have argued that these indicators do not present a mechanism that guarantees that their results are a direct consequence of the concessionaire's performance, with the road crash rate being a phenomenon largely influenced by aspects unrelated to infrastructure. In fact, Pérez de Villar

Cruz, analyzing the payment or fine to the concessionaire for compliance with the indicators defined in the first-generation concessions in Spain, has concluded that penalties for non-compliance added to other problems in the concession (such as cost overrun in works, drop in traffic or non-compliance with other indicators) can lead to economic unviability of the concessionaire company (Pérez de Villar Cruz, 2015, p. 67).

In Brazil, for example, attempts at road safety KPIs in concessions were frustrated because, according to the concessionaires, the problem was not in the infrastructure, but in the control and behavior of users. Therefore, education and awareness-raising activities have been implemented with road agencies, which did not bring any practical results.

The experience presents a novel solution that has begun to be used in some concessions in Brazil and can serve as a model for the inclusion of positive incentives to concessionaires.

- ### HOW HAS LAC INCLUDED ROAD SAFETY IN CONCESSIONS?

The countries in the region have included in their most recent concession contracts indicators associated with compliance with the road safety devices indicated in the engineering designs and, during operation, they are monitored and penalized if they do not comply with indicators associated with the level of service. These indicators are maintenance of road safety devices and vegetation friction. There is no solid experience in the region with regard to the implementation of road safety indicators that evaluate road safety as a whole -either through audits or inspections every two or three years- or road incident indicators. The only exception is the new concessions at the federal level and in the state of São Paulo, Brazil (see experience 9).

Experience 9. Private concessions and iRAP: road safety inspections as monitoring and evaluation of road safety on concession roads

In some countries, the iRAP star rating methodology has been implemented to create KPIs for private concessions. In the case of the state of São Paulo, a bonus system was included in the concession contract, through which, after a previous evaluation with the iRAP methodology, the concessionaire could apply improvement measures, and go through a reevaluation. If a greater number of sections with 3 stars or more can be achieved, they receive monetary benefits from a fund that is financed with mandatory contributions from the concessions.

Figure 2. 15 Methodology for including iRAP in Brazilian road concessions.

Source: iRAP.

In 2020, the operation of 1,200 km of the Piracicaba-Panorama highway was concessioned for thirty years, with investments of more than USD 600 million. During the structuring of the public-private partnership, the engineering company Pavesys, with the support of the International Finance Corporation (IFC) and iRAP, implemented a road inspection with the iRAP methodology, classifying the analyzed sections by stars and defining an investment plan necessary to improve the road safety of the analyzed road infrastructure. As part of the contract KPIs, a simulation of the star rating for all planned interventions on the network defined the results to

be achieved by the concessionaire as the main criterion for evaluating road safety and the positive incentives in case of compliance.

Some concession companies have also been proactive in terms of road safety on the roads they manage. The concessionaire Abertis, for example, signed an agreement with iRAP for the inspection of around 6,000 km of concession roads in different countries around the world, including countries such as Brazil, Argentina, Chile, and Puerto Rico. The periodic inspection defines the operational plan for investments to improve road safety.

The role of concessionaires can go beyond just building and maintaining safe infrastructure. If the right incentives are applied, concessionaires can implement activities such as emergency services and post-disaster care, road education campaigns for drivers and for communities located near the road (with special emphasis on educational institutions where access to their facilities is on the main road), and even conduct studies on road user behavior as a way to improve interventions and campaigns.

Figure 2. 16 KPI results for receiving contractually defined benefits

User	YEAR 0	YEAR 2	YEAR 6	YEAR 10	YEAR 14	YEAR 18	YEAR 22	YEAR 26	YEAR 30
Vehicle Ocupantes	77 %	78 %	96 %	96 %	96 %	94 %	90 %	90 %	88 %
Motocycle	61 %	60 %	75 %	75 %	69 %	73 %	72 %	73 %	64 %
Pedestrians	64 %	63 %	77 %	77 %	78 %	76 %	76 %	76 %	76 %
Cyclists	67 %	66 %	82 %	82 %	80 %	74 %	71%	71 %	68 %

Straight	Year 0	Year 2	Year 6	Year 10	Year 14	Year 18	Year 22	Year 26	Year 30
191-1	3	3	3	3	3	3	3	4	4
191-2	3	3	4	4	4	4	4	5	5
191-3	3	3	3	3	3	3	3	4	4
191-4	2	2	3	3	2	2	2	2	3
191-5	2	3	3	3	3	3	3	2	4
197-1	3	3	3	3	3	2	2	2	2
197-2	3	3	3	3	3	3	3	3	3
197-3	4	4	4	4	4	4	4	4	4
197-4	4	4	4	4	4	4	3	3	3
225-1	2	2	3	3	3	2	2	2	2
225-2	1	1	3	3	3	3	3	3	3
225-3	2	2	3	3	3	3	3	3	3
225-4	3	3	4	4	4	4	3	3	3
225-5	2	2	3	3	3	3	2	2	2
225-6	2	2	3	3	3	2	2	2	2
225-7	2	2	3	3	3	3	3	3	3
225-8	3	3	3	3	3	3	3	3	3
225-9	2	2	3	3	3	3	3	3	2
225-10	3	3	3	3	3	3	3	3	3
225-11	2	2	3	3	3	3	2	2	2
225-12	2	2	3	3	3	3	3	3	3
225-13	2	2	3	3	3	3	3	3	3
225-14	2	2	3	3	3	3	3	3	3
225-15	2	2	3	3	3	3	2	2	2
225-16	1	1	2	2	2	2	2	2	2
225-17	2	2	3	3	3	3	2	2	2
261-1	4	4	4	4	4	4	4	4	4
261-2	3	3	3	3	3	3	3	3	3
261-3	5	5	5	5	5	4	4	4	4
261-4	4	4	4	4	4	4	4	4	4
284-1	3	3	4	4	3	3	3	3	2

2.2.4. ROAD MAINTENANCE AND INTEGRATED ROAD ASSET MANAGEMENT SYSTEM

Although it is difficult to establish a quantitative relationship between the state of maintenance of a road and its road crash rates, a well-maintained road provides greater safety margins for its users, in the face of possible errors or distractions, or in more difficult situations, such as at night or under adverse weather conditions. Adequate maintenance is one of the parameters that characterize roads that could be considered *a road that forgives human error*.

Road equipment is a fundamental element of driving safety, as it provides information about what is expected of the driver at any given moment (vertical signage, beacons, road markings), guides the user especially in dark or adverse weather conditions (road markings, beacon elements), provides greater safety in unique circumstances (lighting, beacon elements) and reduces the consequences of incidents (vehicle restraint systems). Well-installed and well-maintained equipment provides greater safety margins on the road.

This point also accounts for the importance of clearing and pruning the vegetation (bushes, shrubs, and tree shoots) that may have grown on the margins of the road and the collection of the waste produced. This will ensure improved visibility, especially around curves, as well as the correct perception of signage.

An important element of monitoring safe road infrastructure is the periodic identification of the points where the highest concentration of incidents occurs and the status of road safety equipment. Monitoring of road safety conditions should be incorporated into the road asset management system, along with pavement condition assessment, inventory construction and a maintenance program. Table 10 reports the experience of the Philippines, which, with iRAP support, has integrated road safety analysis into road asset management. In addition, Table 11 explains how artificial intelligence can be useful in better road asset management.

Table 10. Road asset management and road safety in the Philippines

The Department of Public Works and Highways (DPWH) of the Philippines evaluates the pavement condition of its national roads on a regular basis by collecting IRI (International Roughness Index) data, videos and images. These videos and images have been used by iRAP to evaluate the performance of the country's national roads periodically in a cost-effective manner.

There are other ways to incorporate road asset management data (known as the *four iRAP protocols):*

- Include information already available from road safety equipment (e.g., location of safety barriers) in the iRAP system.
- Include road safety countermeasures identified in iRAP assessments in maintenance programs and quantify the benefits.
- iRAP evaluation metrics, such as fatality estimates and fatalities avoided by the work performed, can be used in the Highway Development and Management Model (HDM4).

Table 11. How can artificial intelligence contribute to better road management from a road safety perspective?

The IDB promotes the use of digital technologies to improve road safety in the LAC region. It has worked with iRAP to apply artificial intelligence to characterize roads in the region through computer vision.

Traditionally, obtaining the road safety characteristics of any location is a manual job. Expert (human) coders look at about 800 images per kilometer of roadway to determine the condition of the pavement, the number of lanes and the width of each lane, the existence of pedestrian barriers, the lighting present, the existence of median striping, etc. The manual labeling of road characteristics takes considerable time: according to IDB comparisons, to analyze 10,000 km of roads requires the work of 10 to 13 full-time experts for three months.

Therefore, BID and iRAP created an alliance with the objective of accelerating the labeling process and making it more efficient. Thus, VIASegura was born/ This program performs these processes through sophisticated deep learning vision algorithms using convolutional neural networks. Models such as YOLOV4 (Bochkovskiy, Wang and Liao, 2020), VGG16 (Simonyan and Zisserman, 2014), Lanenet (Ze Wang, Weiqiang Ren, Qiang Qiu, 2018) and previous IDB[a] developments have been adapted to automate the elicitation of some of the features needed to perform the iRAP road safety rating. In particular, the IDB has developed algorithms that allow for the determination of 20 the 47 total variables required, with accuracies ranging from %67 to 96 %. The time required to analyze 10,000 km of roads with the algorithms developed by the IDB is only two weeks.[b]

For the training of the developed algorithms, 122,500 images were used, corresponding to surveys conducted in LAC in 2018; tests were performed on 52,500 images. With VIASegura, the IDB contributes to the digital transformation of the transport sector in LAC, reducing the costs of data collection and analysis, and significantly reducing the time required for analysis.

[a] During 2020, the IDB developed the Pavimenta2 tool, based on convolutional neural networks for the detection, classification and measurement of pavement defects, and the detection and classification of vertical traffic signs, based on videos taken by a digital camera in a conventional vehicle traveling at a speed equal to or lower than the limit established for each route.

b Calculation performed by IDB using, for processing, a cloud server with 16 processors and two GPUs.

2.2.5. TECHNICAL TRAINING

The technical capabilities developed for the conduct and supervision of RSAs and RSIs are an important foundation for the maintenance of safe infrastructure in LAC countries. To develop these technical capacities, countries need to have staff knowledgeable about technical aspects of road safety and RSAs and RSIs in road agencies, requirements for contracting independent RSA and RSI teams, and a competitive market of locally trained, independent auditors and inspectors (universities, specialized companies, etc.).

The condition of the RSAs and RSIs in LAC is that few countries in the region set formal requirements for the hiring of a road safety auditor in all phases of the project and do not have a formal certification process for auditors. In addition, there are very few formal programs to prepare professionals or specialists in VS, let alone road safety auditors. A few countries, such as Argentina, Colombia, and Chile, have offered theoretical and practical diploma courses with requirements of more than 100 hours. In the same countries, traffic and transport engineering professionals have practiced the profession of road safety auditor, without being certified (IDB, 2018). However, some specific initiatives have taken place, such as the training experience of World Resources Institute and Bogota (see Tables 12 and 13).

The following tasks are still pending in the region.

- **Create institutional capacity to lead the RSAs and RSIs.** The public policy on road safety audits and inspections should oversee a group, area or division attached to the government entity in charge of leading road safety in the country. This group must fulfill the functions of planning, structuring, promoting, and monitoring the objectives, scopes, and achievements of the RSA and RSI with homogeneous criteria and requirements.
- **To train and guarantee the continuity of RSA and RSI professionals**, so that, with full knowledge, they can perform the function of auditors. The findings and recommendations of these professionals must be based on criteria demonstrated by science, technology, and their own experience.
- **Include road safety and the essential principles of RSA and RSI in the academic training of professionals** in road engineering, architecture and other disciplines related to the planning, construction, and maintenance of road infrastructure, to promote the mastery of knowledge, instill the need for investigative analysis and disseminate best practices resulting from each country's own monitoring.
- **Regulate the specialization of road safety auditor and inspector,** establishing the academic and experience requirements to become a lead auditor, basic auditor, or inspector, or to demonstrate the suitability and capacity to carry out an audit.

Table 12. Training and certifications in road safety, RSAs and RSIs

In countries such as the United States, Australia, New Zealand and European countries, especially Spain, there is already a strong market for road safety auditors and inspectors and an accreditation and certification process established by the government.

By means of *Order FOM/1649/2012,* the Spanish Government regulates the procedure for accreditation and certification of aptitude of road safety auditors of the State Road Network. The order establishes the specialties required for accreditation and certification, the details of the aptitude test process called by the State, the admission requirements (five years of experience in road construction, university degree in the area and having completed the initial training program for road safety auditors of the State Road Network). Certificates must be renewed every five years. In Spain, only certified road safety auditors and road safety inspectors can be hired to audit RSAs and RSIs.

As a result of these requirements, independent bodies from civil society came forward to support the Spanish Government with trainings and information on auditors and inspectors. The Association of Road Safety Auditors in Spain was founded, which aims to manage a database of accredited road safety auditors, support the Directorate General of Roads in designing a profile to perform RSAs and RSIs, and organize training and refresher courses on audits and SV inspections. In addition, the Spanish Road Association has organized courses on road safety audits since 2005, in collaboration with the country's universities.

In LAC, training has been structured by public institutes, universities and private associations in a few countries. The audit courses of the Mexican Institute of Transport, the National Laboratory of Materials and Structural Models of the University of Costa Rica (Lanmme-UCR) and the Ibero-American Road Institute stand out. Regionally, the World Resources Institute (WRI), the IDB, the CAF and the World Bank have financed courses for road safety auditors and inspectors or road safety courses for road agency technicians, usually incorporated in their loans or grants. WRI, for example, has focused on road safety audits and inspections in the urban environment (Table 13).

The IDB has launched a regional initiative for road safety training in the form of a free Massive Open Online Course (MOOC), which brings together best practices in road safety in the region. It has already trained and certified 1,443 students in five editions and is available in Spanish. This year, the English edition of the MOOC was launched for Caribbean countries in three mini-courses.

Table 13. Experiences in road safety audits and inspections training in Latin America

Over the course of twelve years, WRI has developed road safety audits and inspections in several countries, including Mexico, Colombia, Argentina, Brazil, and Bolivia among others. These trainings are made available to officials from the three levels of government (federal, state and municipal) whose functions are related to the planning, design, construction, management and maintenance of urban mobility projects. Road safety audits and inspections represent a crucial means of proactively identifying any type of road safety problem that may cause serious incidents or injuries in proposed projects (in the case of RSAs) or in existing or under construction road infrastructure in need of improvement (in the case of RSIs). RSAs and RSIs should present clear recommendations on roadway design improvements aligned with the Safe System approach to ensure the safety of vulnerable road users. Therefore, improving the technical knowledge of RSAs and RSIs of local officials is crucial to achieve significant changes at scale in the cities of the LAC region. Three case studies of training activities conducted by WRI and partner organizations in recent years are presented below.

CALI, COLOMBIA

WRI, Vital Strategies and the Secretariat of Mobility of Cali audited three sections of the Eastern Trunk of the new Cali BRT. Before initiating the audit process, trainers approached the city team to inform and train officials on the important aspects of the audit from a technical perspective. The audit team explained how the audit would be conducted in compliance with the Safe System approach for road safety, as well as the phases and scope of the audit. About sixteen people from the technical team of the Secretariat of Mobility and Metrocali, in charge of the new trunk road project, participated in the meetings. These meetings familiarized the city team with the nature and scope of an audit and opened up communication between the two groups, both regarding the design and execution of the audit, its objectives and its approach.

BRASILIA, BRAZIL

With the support of the Development Bank of Latin America (CAF), WRI developed the Road Safety Audit Training for Executing Agencies. This course consisted of 69 online classes, including 16 hours of recorded content on various topics related to road safety, as well as specific content about RSAs and RSIs. Twenty-six government officials from 13 cities and one state in Brazil were trained. In pre-course surveys, the trainees reported an average knowledge of 37 on a scale of 100 regarding the audit process, while the post-course survey showed that their knowledge had increased, on average, to 82 out of 100. The objective of this training was to develop and strengthen the technical capacities of the executing agencies of operations financed by CAF in Brazil by

disseminating knowledge and improving practices in road safety audits. The project was designed, with the implementation of a classroom course, applied in the city of Brasilia D. F., Brazil, and included theoretical and practical presentations on road safety audits. and the presentations also included theoretical content and a practical activity. Unfortunately, due to the COVID-19 global pandemic, WRI and CAF had to narrow the scope of the course, which resulted in the delivery of 100% online classes. Despite this format change, students were able to keep up with the pace of the course, and the vast majority completed the assignments and attended all video lessons.

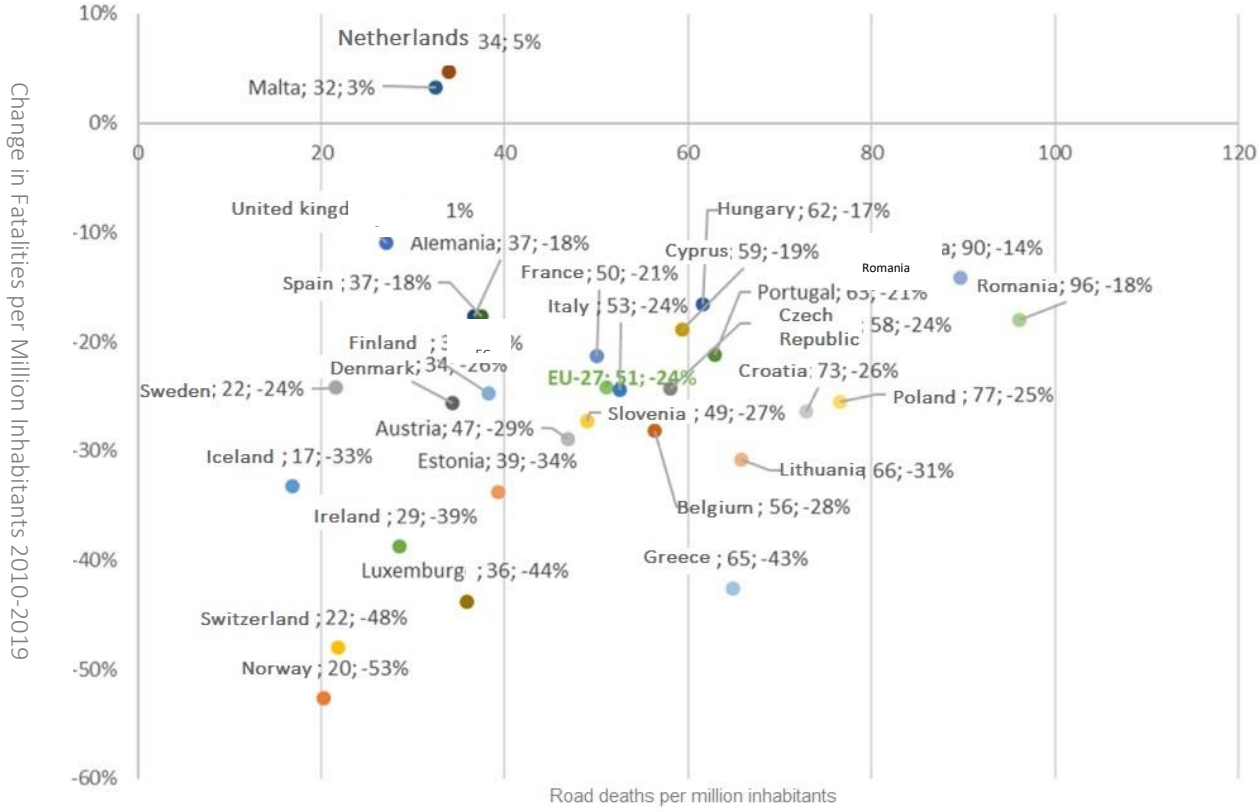
MEXICO

Through technical advice and training, WRI Mexico helped integrate road safety audit and inspection processes to the main BRT systems in Mexico City, such as Metrobús, Macrobús, Optibús and Ruta. WRI Mexico has been the technical advisory arm of the Mass Transit Program (Protram) for eight years. Technical capacity building, the issuance of general and specific recommendations, the exchange of experiences, as well as WRI's participation in the updating of standards, regulations and guidelines have facilitated the conversation in large metropolitan areas, as well as in medium-sized cities, to achieve essential measures such as the definition of speed limits, road hierarchy, recognition of vulnerable users or minimum accessibility criteria, as well as other factors.

2.2.6. TOWARDS A POLICY THAT STIMULATES SUSTAINABLE MOBILITY AND ITS ROLE IN REDUCING EXPOSURE TO ROAD CRASH INCIDENTS

The Safe System approach focuses on road risk mitigation measures through infrastructure design improvements, setting speeds appropriate to the function and structure of the road, safer vehicles, competent road users, and timely and adequate care for victims (PIARC, 2019). The Safe System approach has proven its effectiveness in European that have implemented this system and seen a significant reduction in fatalities over the last decade (see Figure 2.17).

Figure 2. 17 Road fatalities in 2019 and change in rate 2010-2019 in European countries.



Source: Own elaboration based on data from the European Commission (2020).

The European nations with the greatest progress in road safety, such as Iceland, Norway, Sweden, Switzerland, the United Kingdom, and Ireland, have rates below 30 road fatalities per million inhabitants. These low rates result from the application of the Safe Systems approach, and the reduction in dangerous road incidents continues, while people's access to commerce improves. For example, Norway reduced fatalities by 53%, Switzerland by 48%, Ireland by 39%, Iceland by 33% and Sweden by 24% between 2010 and 2019 (European Commission, 2020). On average, the nations of the European community (EU-27) have 51 deaths per million inhabitants and have reduced the death rate by 24% between 2010 and 2020. The overall progress can be attributed mainly to the implementation of public policies for the improvement of infrastructure, control of risky behaviors and use of safer vehicles, so that the risk of fatal injuries is reduced, even in cases of error or recklessness of the various road users.

In January 2022, the United States Department of Transportation adopted a National Roadway Safety Strategy, a comprehensive roadmap to significantly reduce fatalities and serious injuries on the nation's roads. The National Roadway Safety Strategy describes the major actions the United States will take to address the public health crisis of roadway fatalities and serious injuries. The Strategy adopts a vision of zero roadway fatalities - zero is the only acceptable number of deaths on US highways, roads, and streets – and the Safe System Approach as the guiding paradigm to address roadway safety. The Safe System Approach differs significantly from a conventional safety approach in that it acknowledges both human errors and human vulnerability, emphasizes shared responsibility for roadway safety and designs a redundant system to protect everyone. The Safe System Approach focuses on five key objectives: safer road users, safer roads, safer vehicles, safer speeds, and post-crash care. Work in all areas, through actions of all - Federal, State, regional and local governments; industry; advocacy organizations; research and academia; and the traveling public - is necessary to reduce road safety risk.

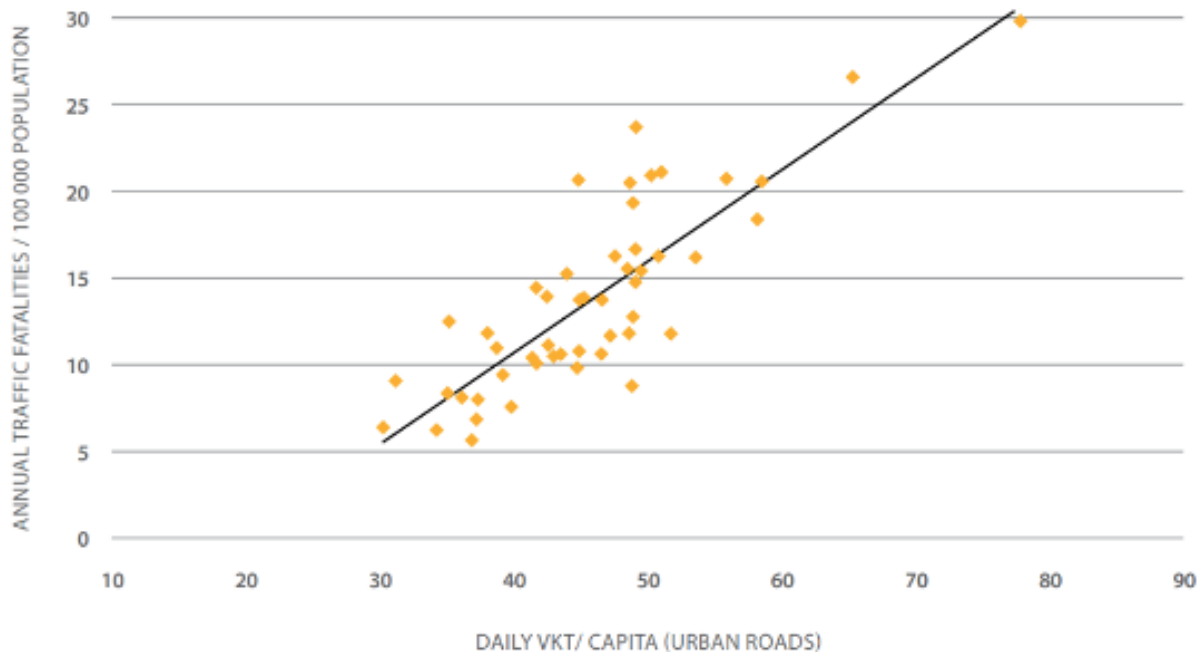
This vision of road risk reduction can be complemented effectively with policies that reduce user exposure to incidents. There is a growing body of literature suggesting the road safety benefits of reducing vehicular traffic by shifting to sustainable modes: walking, cycling and public transport (Duduta, Adriazola-Steil and Hidalgo, 2013b).

The following sections present evidence on the relationship between traffic volume and road crashes, the effect of some sustainable mobility measures on road safety in different cities, some preliminary evidence on the effect of the COVID-19 pandemic on road activity and crashes, and the relationship between the use of individual transport modes and fatality rates in LAC cities. Finally, some conclusions and recommendations are presented.

- ### Relationship between traffic volume and road crash incidents

Traffic volume, measured as VKT, is a strong predictor of traffic fatalities. Comparing road fatalities per 100,000 people and VKT for 37 global cities with data from 1990 shows a high correlation between the two variables: the higher the traffic volume, the higher the road fatality rates (Kenworthy, Laube, Newman and Barter, 1997). Likewise, an analysis of traffic data in urban areas of U.S. states in 2008 shows the same correlation (Graph 2.2). This correlation is also reported in another study of mortality in urban and rural areas of the United States, controlling for the presence of trauma units and density as well as state location (Clark and Cushing, 2004)

Graph 2. 2 VKT on urban highways and fatality rate in U.S. states, 2008



Source: Duduta et al. (2013).

A comparison of road crash incident rates in the United States and the United Kingdom, Sweden and the Netherlands concludes that the main differentiating factor between the North American and European countries is the longer travel distance per vehicle in the United States (Luoma and Sivak, 2013).

Other local analyses confirm the correlation of traffic rate and road fatalities. For example, a study of different areas of San Antonio, Texas, shows that VKT has a high correlation with the number of crashes, after controlling for income levels, number of intersections, and number of miles of freeway and arterial roadways in each area (Dumbaugh and Rae, 2009).

- **Sustainable transportation measures that have shown a reduction in road crash rates**

Most of the sustainable transport (walking, cycling and public transport) and demand management interventions (traffic restrictions, traffic jams and parking charges) are aimed at environmental improvements, reduced operating costs, and reduced travel times. However, some interventions focus on improvements in road safety. Examples are the BRT bus mass transit systems in Guadalajara and Bogota; bicycle infrastructure improvements in Copenhagen and New York; and congestion charging in Stockholm and London (Duduta et al., 2013b). Taken together these results illustrate that it is not enough to simply implement sustainable transport measures that reduce VKT, road safety improvements are also the result of safe design and control measures that reduce risk with the Safe Systems approach (PIARC, 2019).

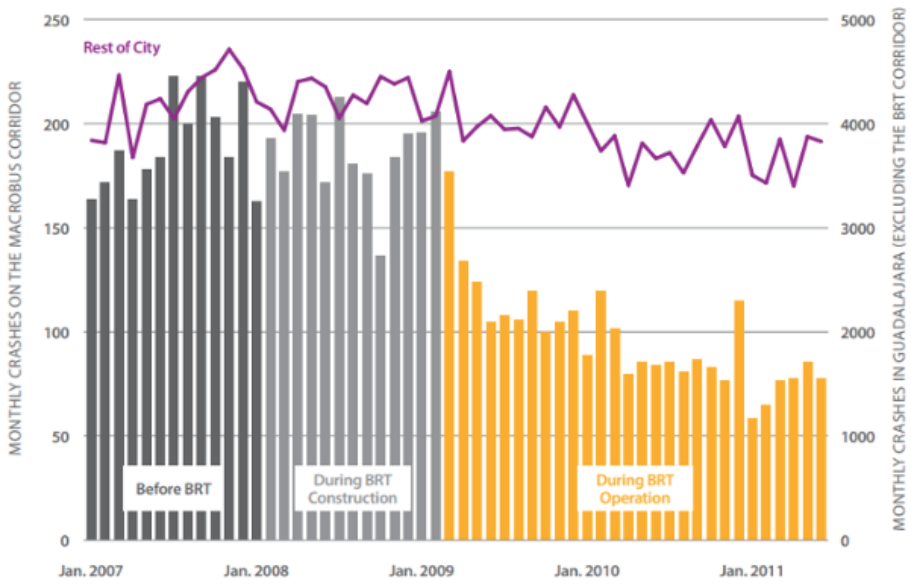
Public transport systems are generally the safest way to move around cities (ETSC, 2003). However, the operating conditions of conventional public transport in LAC, resulting from dispersed ownership and competition between units for passengers, can lead to high relative rates of traffic crash incidents (Tun et al., 2020). Public transport improvements, such as the allocation of exclusive bus lanes, can bring road safety benefits by reducing the number of units circulating, improving design conditions, facilitating safer pedestrian crossings and eliminating interactions between different road users, depending on the physical and operational design (Duduta, Adriazola, Hidalgo, Lindau and Jaffe, 2013a).

For example, in Guadalajara the introduction of the Macrobús BRT bus mass transit system in the Independencia corridor resulted in a 46% reduction in the number of monthly crashes; a much more pronounced reduction than in the rest of the city, where the number of crashes was reduced by 5% (Graph 2.3). Similarly, the implementation of the TransMilenio BRT on Bogotá's Caracas Avenue reduced the number of fatalities by 52% with respect to the city's trend line (Duduta et al., 2013a).

On the other hand, the implementation of cycling infrastructure and the promotion of this mode of transport generated increases in bicycle trips, which have been accompanied by reductions in the rates of fatalities, per user and per kilometer, on bicycles in all OECD countries, in a phenomenon called safety by numbers (Buheler and Pucher, 2017). This has also been observed in LAC cities where bicycle use has grown rapidly. In Bogotá, the rate of collisions per cyclist decreased by 55 % and by 70 % per kilometer cycled. In turn, the fatality rate was reduced by 46% per cyclist

and 64% per kilometer traveled (Carvajal et al., 2020).

Graph 2. 3 Monthly crashes in Independencia corridor, Guadalajara, 2007-2011



Source: Duduta et al. (2013).

Finally, demand management measures can also have positive effects on road safety. For example, the introduction of traffic congestion charging in the City of London reduced traffic fatalities citywide between 2001 and 2006, but the reduction was greatest in the traffic charging zone (-31% inside the zone versus -19% outside the zone and -28% on the charging zone perimeter road) (Transport for London, 2008). The London transport agency Transport for London (TfL) attributes this improvement to reduced traffic volumes; the effects were also felt outside the charging zone ring road. It should be noted that the reduction in traffic does not imply that fewer people are traveling, but rather that there is a higher occupancy of vehicles (cabs, buses and paying cars).

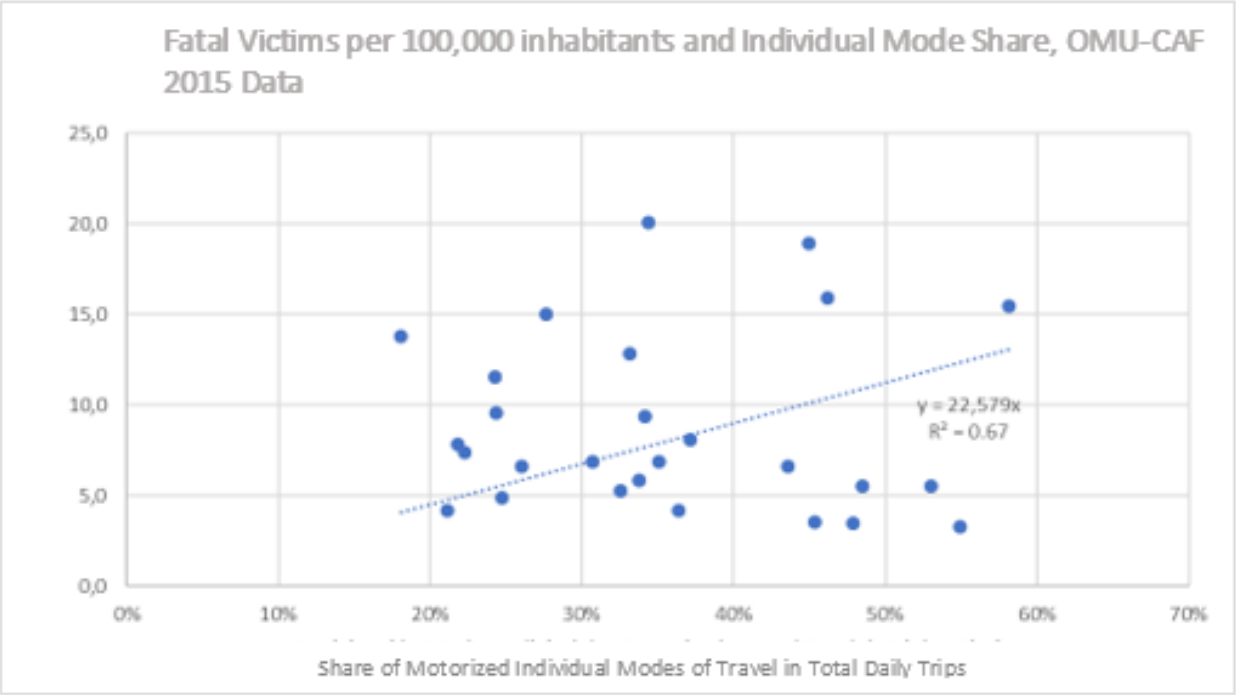
The effect of demand management measures on road safety has a dedicated chapter in the Manual of Road Safety Measures, which indicates that different road charging measures from tolls to fuel taxes have traffic reduction impacts ranging from 3% to 10%, and that this corresponds to reductions in casualty crashes by about 5% on average (Elvik and Vaa, 2004).

The relationship between road safety and personal vehicle use in LAC cities

Road crash rates are multi-causal, and it is difficult to attribute them to a single factor. However, an analysis of data from 28 Latin American cities in 2015, compiled by the Development Bank of Latin America (CAF 2018), indicates a correlation between the percentage of travel by individual modes (car and motorcycle) and the fatality rate (see Graph 2.4). The 67% variation in this rate is explained by the variation in the use of automobile and motorcycle as a percentage of all trips. The coefficient 22.57 is significantly different from 0 ($t=8.0$; $p<0.001$).

While there are significant regional variations, there is a trend towards higher fatality rates with increasing use of individual modes in Latin American cities. To the extent that the motorization rate is increasing, the fatality rate can be expected to rise as well; reversing this trend requires improving safe access for walking, cycling and quality public transport and implementing cost-effective demand management measures.

Graph 2. 4 Fatalities and individual mode share in 28 LAC cities



Source: Own elaboration with data from CAF (2018).

Among the socioeconomic and mobility variables available in the database, only density has some influence on fatalities. All other variables (GDP, GDP per capita, vehicle ownership of motorcycles and cars, bicycle and public transport infrastructure, area, average travel distance) have coefficients that are not statistically significant.

Unlike European cities, where the density coefficient is negative, giving an indication of safe short trips by foot, bicycle and public transport, in Latin American cities the density coefficient is positive. (Figure 2.18), This indicates that congestion is a significant source of growing risk for road users.

Figure 2. 18 Multiple regression results, independent variable fatality rate per 100,000 population.

INDEPENDENT VARIABLES	CO-EFFICIENTS	ERROR TÍPICO	STATISTIC T	PROBABILITY	LOWER 95%	SUPERIOR 95%
INTERCEPTION	0	n. d.	n. d.	n. d.	n. d..	n. d.
PARTICIPATION IN INDIVIDUAL MODES (%)	13,72849	4,7863792	2,868	0,0081	3,88995	23,567
DENSITY (INHAB./KM2)	0,000373	0,0001681	2,216	0,0357	0,00026	0,0007

*R=0²,7024

Source: Own elaboration with data from CAF (2018).

The evidence presented in this section indicates that sustainable transport projects and policies can play a significant role in improving road safety. The cases examined in this analysis refer to walking and cycling infrastructure, public transport improvements with dedicated infrastructure, and demand management measures that reduce the use of private vehicles.

The development of these types of programs and projects require, however, designs that consider Safe System principles. It is not just a matter of developing infrastructure; it must be designed and operated to protect vulnerable road users. Only when infrastructure is developed in this manner will the reduction in exposure from reduced VKT lead to a reduction in traffic fatalities and serious injuries. Unsafe designs can negatively offset exposure reduction measures via modal shift.

Reducing vehicles per kilometer does not necessarily imply reducing activity and access to mobility. The idea is to achieve access levels equal to or better than those offered by individual motor vehicles, but through sustainable modes: walking, cycling or quality public transport.

While there have been drastic reductions in mobility during the COVID-19 pandemic, which in many cases resulted in reductions in road crashes, this is not necessarily correlated. In some cases, increases in speed due to reduced traffic congestion and other risk conditions have increased the overall number of traffic fatalities and injuries. The medium-term impact of the pandemic is uncertain; reductions in total trips can be expected because of increased telecommuting activities (telecommunicating for work and study), increased cycling and walking as perceived safer modes and policies to promote these modes, reductions in the use of public transport, and increases in the use of motorcycles and individual cars in LAC. The effects of these changes in mobility dynamics on road safety may be negative, due to greater exposure of vulnerable road users. Sustainable mobility and safe design must be reinforced.

REFLECTIONS ON SECURE INFRASTRUCTURE

The process of road safety inspections and audits has been more common than the past in LAC countries. However, most authorities do not seem convinced of the cost-benefit advantage of applying audits. Although there have been many roadside audits and inspections of VS in the region, few countries have created a public policy of the systematic enforcement of these procedures. Less common has been the application of RSAs and RSIs in urban environments, mainly at points where interurban roads cross cities. In general, the design of roads in these crossings remains constant and measures such as speed management are not adopted, resulting in a high number of crashes and fatalities.

Some tools, which provide a unified methodology and calculate the cost-benefit of implementing road safety countermeasures, have gained wider adoption in the last ten years, such as iRAP. On the other hand, novel tools, such as artificial intelligence, have been tested to reduce the cost and time of performing audits and inspections. However, these tools can be costly for governments in the short term, are not used as regularly as expected and depend on the initiative and financing of institutions outside governments (multilateral banks, bilateral funds, and philanthropic agencies).

Road concessions have increased considerably in the region, with positive results in terms of reducing road incidents. However, countries have not thought about how to use concessions to provide safer roads, with better standards during implementation and enforcement. The implementation of inspections and audits during concession structuring, the obligation to apply recommended countermeasures, the definition of non-traditional road safety KPIs and the design of incentive mechanisms are all pending issues in the region's concessions. The use of the iRAP tool, for example, would improve the safety of private roads in LAC.

2.3. Safer vehicles

OBJECTIVES OF PILLAR 3 OF THE DECADE OF ACTION

VEHICLE SAFETY

This pillar addresses the need to improve vehicle safety by developing, adopting and effectively enforcing science-based performance standards and by implementing relevant consumer information mechanisms (e.g., comparative vehicle rating programs) to accelerate the introduction of new and better technologies that impact safety. The cost to consumers and manufacturers of meeting that need can be minimized and international trade facilitated by seeking to harmonize the safety standards of the leading nations and regulatory organizations around the globe. A wide variety of related activities are needed to meet that need. These include, for example, collecting data at the state and local levels to determine the scope of the safety concern and potential means for ameliorating safety concerns, assessing the benefits and costs of addressing those various concerns, selecting priorities and then developing and adopting effective regulatory solutions. They also include developing and implementing comparative performance rating programs based on objective test procedures and scientific evidence to make consumers aware of differences in vehicle safety performance. The objective of these activities should be to ensure that all new motor vehicles are equipped with effective crash protection devices, such as seat belts and air bags. Another objective is to ensure that vehicles are equipped with proven collision avoidance technologies, such as electronic stability control and anti-lock braking systems, as well as newer technologies such as advanced emergency braking. Fleet managers should also be encouraged to purchase, operate and maintain vehicles that offer high levels of occupant protection and crash avoidance performance.

Source: WHO (2011).

LAC countries sell and consume vehicles with low levels of safety, mainly due to the lack of adoption and enforcement of a comprehensive set of safety standards as well as the lack of robust, data-driven consumer information systems to advise consumers on differences in the safety performance of competing vehicle models and on the additional safety protection afforded by optional safety equipment. While following widely accepted recommendations (e.g., the OECD's 2012 Recommendation of the Council on Regulatory Policy and Governance) regarding "good regulatory practices" necessitates that additional time and care be taken in the developing and adopting of new standards and updating of existing standards as vehicle technology improves, adherence to those recommendations results in standards that are more cost effective, provide greater flexibility to adopt improved safety technologies and receive greater degrees of acceptance from the business community and general public.

Table 14. Sound Regulatory Processes and the OECD's 2012 Recommendation of the Council on Regulatory Policy and Governance

Recognizing "that democracy and the rule of law depend upon and reinforce sound regulatory frameworks" and "that well-designed regulations can generate significant social and economic benefits which outweigh the costs of regulation, and contribute to social well-being," the OECD Council recommended, inter alia, that members

1. Commit at the highest political level to an explicit whole-of-government policy for regulatory quality. The policy should have clear objectives and frameworks for implementation to ensure that, if regulation is used, the economic, social and environmental benefits justify the costs, the distributional effects are considered, and the net benefits are maximized.

2. Adhere to principles of open government, including transparency and participation in the regulatory process to ensure that regulation serves the public interest and is informed by the legitimate needs of those interested in and affected by regulation. This includes providing meaningful opportunities (including online) for the public to contribute to the process of preparing draft regulatory proposals and to the quality of the supporting analysis.

…

4. Integrate Regulatory Impact Assessment (RIA) into the early stages of the policy process for the formulation of new regulatory proposals. Clearly identify policy goals and evaluate if regulation is necessary and how it can be most effective and efficient in achieving those goals. Consider means other than regulation and identify the tradeoffs of the different approaches analyzed to identify the best approach.

…

7. Ensure the effectiveness of systems for the review of the legality and procedural fairness of regulations and of decisions made by bodies empowered to issue regulatory sanctions. Ensure that citizens and businesses have access to these systems of review at reasonable cost and receive decisions in a timely manner.

…

12. In developing regulatory measures, give consideration to all relevant international standards and frameworks for co-operation in the same field and, where appropriate, their likely effects on parties outside the jurisdiction.

Note: Chile, Costa Rica, Colombia and Mexico are OECD member countries, and on 25 January 2022 the OECD Council decided to open accession discussions with Argentina, Brazil and Peru. https://www.oecd.org/latin-america/countries/

Among the vehicle safety regulatory programs in the Western Hemisphere, those in the United States and Canada are the ones that are most mature and that most closely adhere to OECD's 2012 recommendations. Both programs rely on the collection and analysis of extensive road crash data to identify which safety problems to prioritize and to assess which regulatory approaches and technologies would most cost effectively address those problems in the near term and in the years ahead. Both programs also carefully develop and validate performance criteria and test procedures that will cause manufacturers to make the needed improvements in performance without stifling safety innovation or imposing unnecessary costs. Lastly, both carefully assess whether existing safety standards should be changed in response to changing conditions, including the emergence of new technologies[10].

The U.S. standards program is supported by a robust program for detecting and requiring the correction of safety performance problems including those that do not violate existing standards, but nevertheless create unreasonable risks to safety and therefore require correction[11]. (https://www.nhtsa.gov/document/motor-vehicle-safety-defects-and-recalls).

It is also supported by the first of the New Car Assessment Programs (NCAP). For decades, U.S. NCAP has encouraged manufacturers to go above and beyond the existing safety standards requirements. With changes in safety technologies, especially advanced crash avoidance technologies, the NCAP program continues to evolve. The NHTSA published a notice on March 9, 2022, seeking public comment on potential major revisions and expansions of U.S. NCAP. NHTSA is also proposing the first of a continuing series of "roadmaps," to be updated at regular intervals (at least every four years), setting forth the Agency's plans for upgrading NCAP in future years.

The Global Plan for the New Decade of Action for Road Safety (2021-2030) recommends that countries make increased use of technologies to increase the safety of both people inside and outside the vehicle, either to avoid crashes (active safety) or to reduce the risk of injury to occupants and other road users when a crash occurs (passive safety), combined with implementing a robust safety assessment system for independent comparative performance information for consumers. Among those technologies are electronic stability control (ESC); front airbags; head and body side airbags; seat belts; side door impact bars; side protectors; head restraints; and head restraint design have been the most widely used in the automotive industry. The Plan also advocates frontal vehicle designs for pedestrian protection as well as newer technologies, such as advanced emergency braking, which are being installed in rapidly increasing numbers of vehicles.

According to relevant studies, such as the Transportation Research Laboratory (Wallbank, C, McRae-McKee, K, Durrel & D Hynd, L, 2016), over a period of fifteen years, more than 4000 deaths and 400,000 road crashes can be avoided (and more than USD 143 million saved) in LAC if vehicle safety

[10] See: https://www.nhtsa.gov/laws-regulations/fmvss

[11] See: https://www.nhtsa.gov/document/motor-vehicle-safety-defects-and-recalls

regulations were applied in only four countries (Argentina, Brazil, Chile and Mexico).

The work of the leading national and international regulatory bodies together with the United Nations road safety legal instruments provide a solid basis for countries to build national legal frameworks and systems that contribute to road safety (WHO-UNRC, 2021). Under the 1958 and 1998 UN Agreements on Road Safety, regions such as the European Union and countries such as Canada and the United States and Japan have shared with UN members their own technical regulations, the supporting science and analysis and implementing experience. Aided by this shared data and implementing experience, the UN has successfully adopted a series of regulations to ensure safer vehicles for consumers.

The following section will show the advocacy work and technical support that different organizations have provided to countries in the region, as well as Latin NCAP's work in testing, evaluating and rating vehicles for occupant and pedestrian safety.

2.3.1. REGULATORY FRAMEWORKS FOR SAFER VEHICLES

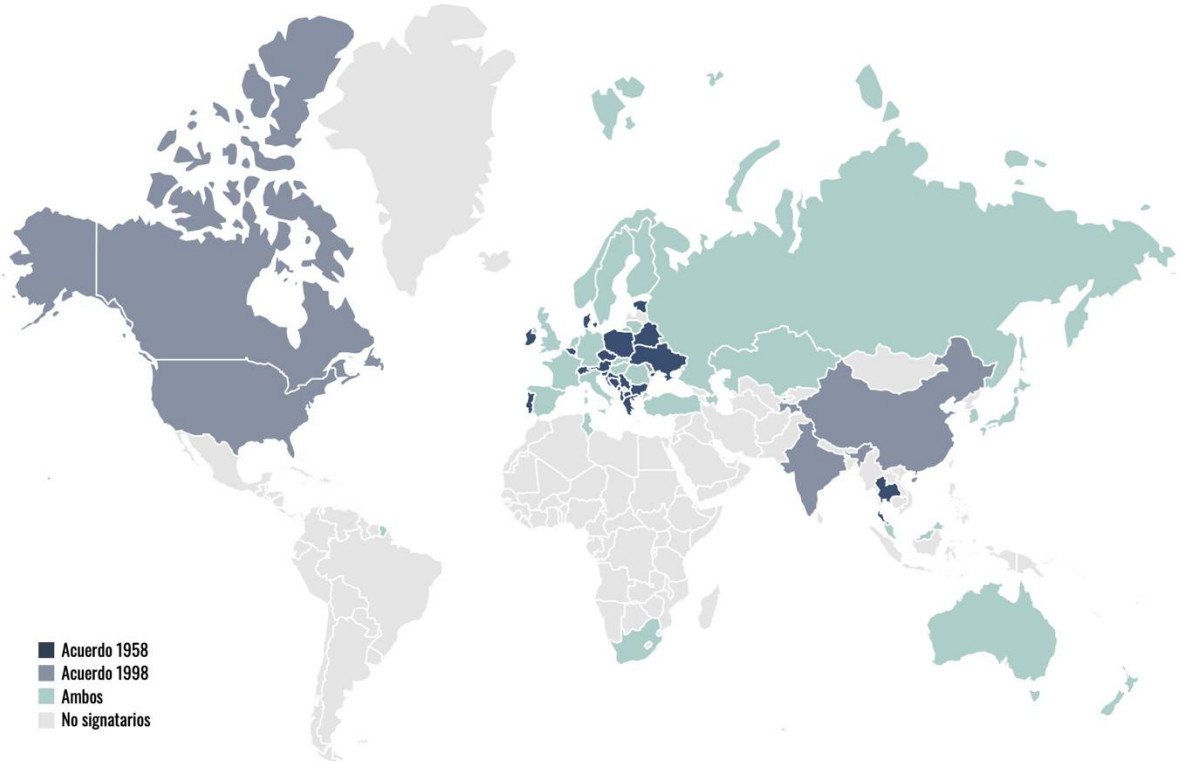
Discussions to define harmonized regulations for safer vehicles began in 1952, within the scope of the Working Party on Vehicle Construction. The purpose of the working party was to regulate the technical condition of vehicles in the countries of the Economic Commission for Europe (ECE) and to facilitate international trade by removing technical barriers. This working group, which became known as the WP.29 World Forum in 1996, extends the scope of application of the UN vehicle agreements to all member countries of the organization. In 2000, the forum was renamed the World Forum for Harmonization of Vehicle Regulations, retaining its acronym WP.29.

The 1958 Agreement sets out the procedures for establishing uniform requirements for new motor vehicles and their equipment, and for the reciprocal recognition of approvals granted in accordance with the United Nations regulations annexed to the agreement. The document establishes safety and environmental (air and noise pollution), energy and theft protection requirements, primarily for European and Asian contracting parties. Today, more than 152 regulations and amendments have already been produced under this agreement. There are currently 53 contracting parties (CPs), including the European Union, Japan, Australia, Malaysia, and Egypt, among others.

Recognizing the need for a more global approach to harmonization of vehicle regulations, the 1998 Agreement establishes global standards for vehicles to have the highest levels of safety (active and passive) and respect for the environment. In addition to many of the parties of the 1958 agreement, signatories to the 1998 Agreement include the United States, Canada China and India. In 2000, when the 1998 Agreement entered into force, Working Party 29 was accordingly renamed the World Forum for Harmonization of Vehicle Regulations, retaining its acronym WP.29.

No LAC country is a contracting party to any of these agreements.

Figure 2. 19 Map of the contracting parties to the 1958 and 1988 agreement.



Colombia recently adhered to the 1958 agreement under Law 2290. However, this is still a first step towards compliance with the agreement.

The 1998 Global Agreement allows countries to develop their own robust certification systems relying on science-based and transparent recall and enforcement programs to ensure the safety of vehicles subject to their domestic standards.

Table 15. The U.S. Experience for Safer Vehicles

A signatory to the 1998 agreement, the United States developed its science based regulations using extensive data collected at the local level to guide its efforts and adopt measures to provide safer vehicles for its consumers. To support the enforcement of its safety standards the U.S. has adopted a self-certification process. Manufacturers are required by statute to self-certify that their products meet the Federal Motor Vehicle Safety Standards (FMVSS) before they can be offered for sale. NHTSA relies on its rigorous recall and enforcement programs to ensure compliance with federal safety standards. For example, if testing by NHTSA indicates possible non-compliance by a manufacturer, and the manufacturer disputes the existence of such non-compliance, the agency may require that manufacturer to provide the testing and analysis it relied upon in making its certification. The agency then determines whether it was reasonable for the manufacturer to receive certified compliance on the basis of that testing and analysis.

In its compliance testing, NHTSA follows those test conditions and procedures specified in each safety standard to evaluate whether a vehicle or part meets the performance requirements. Some standards prescribe dynamic tests that the agency uses to determine compliance.

In addition to the initial certification, the manufacturer must also verify the continued compliance of vehicles or parts with the standards throughout the production of the entire series. To this end, each manufacturer must establish an effective quality-control program under which vehicles or parts are periodically inspected and tested to ensure that all units conform to the original certified characteristics.

NHTSA conducts regular tests to monitor and ensure compliance. Under NHTSA's annual compliance program, an average of 30 of the 44 tests required by the FMVSS (30 vehicle standards and 14 equipment standards) are conducted. The vehicles and parts are not selected and provided by the manufacturers to the agency. Instead, NHTSA randomly procures vehicles and parts in the marketplace to ensure that they are just like the vehicles and parts sold to the public and tests them for compliance with safety standards. If NHTSA's testing reveals that a vehicle or part does not meet a standard, the agency promptly notifies the manufacturer. Typically, the manufacturer would immediately proceed with a general product recall, a procedure under which the manufacturer notifies owners of the non-compliance and offers them a free remedy. If the manufacturer fails to conduct a recall, NHTSA launches an investigation to determine whether the manufacturer has failed to comply with the standard in question. At the end of the investigation, the Government may order the manufacturer to proceed with a general recall of all non-compliant vehicles and parts.

While a general recall can be a significant and costly measure for a manufacturer, its purpose is to eliminate the safety risk posed to consumers by vehicles or equipment that are defective or non-compliant. A general recall requires the manufacturer to notify all purchasers and urge them to take their vehicles or parts to their dealer to resolve the non-compliance or defect free of charge. The manufacturer has the option to repair or replace the vehicle or part in question or refund the purchase price. In most cases, the decision to conduct a general recall is made by manufacturers prior to an official decision by NHTSA that a safety noncompliance or defect exists, i.e.,

without the need for an official agency order. If a manufacturer were to refuse to comply with an NHTSA general collection order, the Government could seek enforcement of the order in federal court.

Source: Taken from the "Blue Book" outlining the basis of the 2002 Economic Commission for Europe's World Forum for Harmonization of Vehicle Regulations (WP.29).

Table 16. IDB Support for Improving Vehicle Safety Standards in LAC

The Regional Public Good (RPG) to Support the Implementation of Vehicle Regulation Standards in Latin America and the Caribbean was a project developed with technical and financial support from the IDB. The project was initiated as a response to the request of Argentina, Brazil, Colombia, Ecuador, Mexico, and Uruguay to address vehicle safety as a key component of road safety, considering the poor quality of vehicle safety evaluations of passenger cars and the high fatality rates in the region.

The purpose of the BPR was to analyze the regulatory frameworks of the countries concerned, propose adjustments, and provide the regions' governments with tools and strategies to address the problem of vehicle regulation in terms of safety and emissions.

The results were disclosed at a workshop organized by the IDB in Washington in November 2018, with the participation of representatives from 20 countries in the region, in which there was an exchange of experiences, a call for the joint adoption of minimum vehicle safety regulations and a discussion of effective measures to strengthen market mechanisms, such as the Latin NCAP star rating system.

** This flagship report incorporated information about the United States system, clarifying some issues that were not properly addressed in the workshops about vehicle standards under the RPG.*

2.3.2. THE ROLE OF NEW VEHICLE EVALUATION PROGRAMS

The main function of New Car Assessment Programs (NCAP) which are conducted by governmental or non-profit institutions is to evaluate the safety performance of automobiles and inform consumers of the results in an independent and transparent manner. The first NCAP was created in 1979 by NHTSA to encourage manufacturers to exceed the safety standards and produce even safer vehicles than required by law while also generating and providing to the public comparative safety performance information test results that measure the extent to which the standards are exceeded. In addition to NHTSA's ongoing NCAP program, there are, currently, nine NCAPs are active around the world: Australasia, Southeast Asia, China, Europe, Japan, Korea, and Latin America, with

India and Africa being covered (by Global NCAP testing). Officials of some NCAPs meet on a regular, informal basis to exchange information and ideas and discuss future plans. In addition, NCAPs participate in Global NCAP, an independent non-profit organization registered in the United Kingdom, which aims to serve as a platform for cooperation between these programs and to promote the universal adoption of the United Nations standards for safer vehicles.

In general, NCAP programs complement strong government regulatory programs by conducting crash tests and performing evaluations evaluation of vehicle active safety systems using internationally recognized methods, assigning a rating between 0 and 5 stars for vehicle occupant protection and the performance of safety assistance technologies such as ESC, autonomous emergency braking (AEB), blind spot detection and speed limiters. Vehicles are evaluated on four categories of protection: adult occupant, child occupant, pedestrians and other vulnerable road users, and safety assistance systems. These global/regional programs are strongly supported by the region's governments, while in U.S. is a federal program.

Conceptually, a 0- or 1-star vehicle is one in which injuries or situations in which there is a high probability of life-threatening injury to occupants, pedestrians or inappropriate operation of some key assistive technology is likely. 5-star vehicles are those that offer such a high level of occupant protection that the safety consequences of crashes like those evaluated by Latin NCAP are minor, and whose driving assistance technologies, for the most part, present satisfactory levels of operation and protection, verifying their effectiveness in preventing road crashes or mitigating their consequences.

Some NCAP programs also count among their members automobile clubs, road safety associations at all levels (national, regional, and global), consumer organizations or victims' associations. In the case of LAC, they are supported and funded by the IDB (in the initial stage of Latin NCAP), FIA Foundation, ICRT and Bloomberg Philanthropies.

Table 17. The Role of El Poder del Consumidor in Mexico in Promoting Safer Vehicles

According to research by El Poder del Consumidor, of the 10 best-selling cars in Mexico in 2020, only two have 5 stars in the Latin NCAP evaluation; the third best-selling, General Motors' Beat, has 0 stars.

Since 2015, El Poder del Consumidor, a Mexican civil association dedicated to the defense and promotion of consumer rights, has studied vehicle safety in Mexico and promoted a public campaign to make its message visible. As part of this work, it has analyzed the safety equipment of almost 450 models, while considering the Latin NCAP evaluation. On the *website of the campaign "How safe is your car?* consumers can check the safety of almost 350 cars, models made between 2018 and 2021, to find out if a vehicle has ESC, anti-lock brakeing systems (ABS), sufficient airbags, three-point seat belts and head restraints in each seat, anchorages for child restraint systems (ISOFIX/LATCH), brake assist (BA) and autonomous emergency braking (AEB), as well as the Latin NCAP rating (on available models). Also, consumers are provided with a free *guide to buying a safe and efficient car*, in coordination with Latin NCAP and the Mexican Red Cross, to guide them in their purchase.

In this sense, through research and media action based on technical evidence, El Poder del Consumidor provides information to potential buyers, in alliance with the Latin NCAP organization, on the comparative safety performance of the most sold vehicles in the Mexican market. This vital information captures the double standard of the automotive industry in the country, which produces safe cars for the foreign market, and markets several low-safety models for the domestic market.

In addition, El Poder del Consumidor is working in alliance with other organizations to update national vehicle safety regulations and to achieve the first general law on mobility and road safety in the country.

Sources: The Power of the Consumer (2019), How safe is your car (n. d.), Guide to a safe car (n. d.).

2.3.3 VEHICLE LABELING

The test results mentioned in the previous section are disseminated through the Latin NCAP website (www.latinncap.com), on a free mobile application, social networks and in some cases on the labels used by vehicle manufacturers.

The use of Latin NCAP labels is voluntary and Latin NCAP does not have funds like other NCAPs to assess all models on the market. Also, there are no governments in the region that require all marketplace models to be tested to inform consumers. Therefore, the use of the labels is limited to manufacturers that score well in Latin NCAP and have an obvious incentive to promote their good safety performance.

There are strong precedents for mandatory NCAP labeling. In the United States, for example, since 2006 it has been a mandatory requirement for new vehicles to display local NCAP information. This is linked to the Monroney car equipment and price sticker mandated by legislation that was introduced by Senator Mike Monroney of Oklahoma and enacted in 1958, which must be attached to the side window of the vehicle, and which now also integrates fuel economy, emissions, fuel cost and safety information. NCAP labeling requirements were updated in 2011 to include an overall score from the NHTSA star rating system.

Latin NCAP's ability to carry out its current level of autonomous testing activity depends on the generosity of its key supporters and contributors. However, to achieve the long-term sustainability of vehicle safety improvement across the LAC region, a robust and permanent system needs to be developed. A mandatory labeling scheme would help to achieve this outcome.

The proposed labeling system would simply require a rating of zero to five stars to be displayed. There would be no minimum star requirement that must be met in order for a vehicle to be sold on the market. Thus, the proposed measure is simply concerned with consumer information and would not contain requirements that might raise issues related to the application of World Trade Organization rules on technical barriers to trade. The mandatory labeling system proposed by Latin NCAP would also help to deter some manufacturers who have been found to be using false or misleading safety star labels, thus generating unfair competition among manufacturers.

Figure 2. 20 StickerVW Polo -2017, Brazil

Experience 10. Promoting Safer Vehicles in LAC: Latin NCAP

The Latin NCAP program has worked since 2010 to promote the production of safer vehicles by providing independent safety ratings of models sold throughout the LAC region. It is a non-profit organization, registered in Uruguay, comprised of automobile clubs, consumer associations, insurers and road safety NGOs, and includes support from organizations such as Bloomberg Philanthropies, FIA Foundation, the IDB and the International Consumer Research and Testing Organization (ICRT).

Latin NCAP's activity has proven to be a catalyst for the dramatic shift of the region's fleet towards safer vehicles and thus drive action by LAC governments. Between 2010 and 2020 Latin NCAP has assessed more than 134 models. Unfortunately, Latin NCAP's test results also show that some of the best-selling models on the market continue to have only 0 or 1 star ratings. This poor performance among the most commonly purchased vehicles exposes consumers to a high risk of life-threatening injuries when impacted head-on at just 40 mph (64 km/h) or sideways at just 30 mph (50 km/h). However, the number of vehicles that have achieved 4 and 5 stars has increased, and manufacturers are even requesting that their models be evaluated by Latin NCAP in order to show consumers the good safety levels they achieve in the tests. For example, of the 84 models sponsored (vehicles' donation and coverage of test costs) by the assemblers for test, 47% incorporated changes due to poor ratings of their vehicles in previous tests.

Considering the largest markets (Argentina, Brazil, Colombia and Mexico), Latin NCAP has estimated that at least 51% of the total sales volume in Latin America is rated by Latin NCAP. Of the 50 best-selling models between 2010 and 2019, at least 42 were evaluated by this institution. Regarding the ratings, taking into account the largest markets and the 50 best-selling models in the region, it is estimated that at least 20 of these are rated between 0 and 3 stars, which, in terms of sales, implies at least 36% of the total volume.

Figure 2. 21 Results since 2020.

MODEL	AIRBAGS	STARS				
VOLKSWAGEN TAOS *	✓ 6	★★★★★	90%	90%	61%	85%
PEUGEOT 208	✓ 4	★★☆☆☆	52%	55%	54%	56%
TOYOTA YARIS	✓ 2	★☆☆☆☆	41%	64%	62%	42%
FIAT ARGO / CRONOS	✓ 2	☆☆☆☆☆	24%	10%	37%	7%
FORD KA (desde 12/06/2018) VIN 9B9BFZH55U7K8206502	✓ 2	☆☆☆☆☆	34%	9%	50%	7%
GREAT WALL MOTORS WINGLE 5	✓ 2	☆☆☆☆☆	9%	0%	19%	0%
HYUNDAI ACCENT	✓ 1	☆☆☆☆☆	9%	13%	53%	7%
HYUNDAI HB20	✓ 2	☆☆☆☆☆	19%	10%	43%	14%
HYUNDAI TUCSON	✓ 2	☆☆☆☆☆	51%	4%	50%	7%
KIA PICANTO / MORNING	✓ 1	☆☆☆☆☆	0%	29%	51%	7%
KIA SPORTAGE	✓ 2	☆☆☆☆☆	48%	15%	58%	7%
RENAULT DUSTER	✓ 2	☆☆☆☆☆	29%	23%	51%	35%
SUZUKI BALENO	✓ 2	☆☆☆☆☆	20%	17%	64%	7%
SUZUKI SWIFT	✓ 2	☆☆☆☆☆	16%	0%	66%	7%

Source: Latin NCAP (n. d.).

NISSAN TSURU SEDAN: THE BEST-SELLING VEHICLE IN MEXICO

A demonstration test conducted in 2016 has compared the safety of the cheapest Nissan sedan sold in Mexico (Nissan Tsuru, rated by Latin NCAP with 0 stars in 2013) with the cheapest sedan of the same brand sold in the United States (Nissan Versa), with the relevant context that both are produced in Mexico. The collision tests of both models has shown that the cheaper Nissan sedan in Mexico, which was one of the best-selling cars in that country, has a much lower level of passenger protection than the cheapest Nissan sold in the United States. The disclosure of the results caused the brand to react immediately, ceasing production of the Nissan Tsuru in Mexico.

Figure 2. 22 Clash between Nissan sedan sold in Mexico and Nissan sedan sold in the United States.

Source: Latin NCAP **(n. d.).**

FORD KA IN BRAZIL

The Ford Ka, the third best-selling vehicle in Brazil, has been marketed in Latin America almost at the same time it was launched in Europe. With the relevant context that the Ka for Latin America was offered in a standard version with vehicle safety devices and lower occupant protection

performance (only two airbags, ABS and weak side impact structure) than its European version (which comes with six airbags, good side structure and standard ESC). Latin NCAP testing in 2017 was decisive in Ford's decision to improve the side structure, managing to raise its rating from 1 to 3 stars, but still far below the equipment and safety standard of the same model in Europe. In 2020, Latin NCAP tested the vehicle again and has proven that under higher safety standards the rating is 0 stars. The brand reacted immediately, announcing the addition of side *airbags* and standard ESC in 2021. However, with Ford's discontinuation of car production in Brazil, this safer Ka will probably not reach the market.

Figure 2. 23 Comparison of testing in 2017 and 2018.

The biggest impact of Latin NCAP has undoubtedly been on the best-selling model in the region, the Chevrolet Onix. This model was evaluated in 2017, and received a zero star safety rating due to poor side impact protection, with 0 stars in adult protection. In 2018 the brand reacted and improved the side structure, and when re-evaluated obtained 3 stars in adult safety. In 2019 Chevrolet launched the new Onix on the market, replacing the old model with a new standard edition equipped with six airbags, ESC and pedestrian protection. In the evaluation, this new model reached 5 stars for adult and child safety. The brand did not raise the price despite these significant safety improvements. The previous model of the Chevrolet Onix sold about 270,000 units annually in the LAC market, and the new model is expected to exceed these figures.

Figure 2. 24 Comparison of the Chevrolet Onix in 2017, 2018 and 2019.

Source: Latin NCAP (n. d.).

Since 2020, Latin NCAP has introduced a new assessment protocol in which the entire safety rating is summarized in a single star rating where four aspects of safety are assessed: adult safety, child safety (both of which were already assessed), pedestrian safety and driving assistance systems (the latter two were added). To achieve a good rating, the manufacturer must succeed in all four aspects simultaneously. New test parameters include: side pole test, rear impact, AEB, pedestrian hit-and-run, low speed AEB, high speed AEB, pedestrian AEB, front and rear seat belt use alarm, speed limiter and blind spot detection. In 2019, Latin NCAP launched a mobile app under the name Latin NCAP to expand the scope of data and information.

2.3.4. VEHICLE INSPECTION SYSTEMS

A good vehicle fleet is fundamental to any road safety and road transport sustainability strategy. Vehicles in poor mechanical condition emit more pollutants and are more prone to road incidents. A vehicle inspection system aims to promote that motor vehicle users maintain conditions very close to those of a new car. This is particularly important in countries where the average age of the vehicle fleet is equal to or greater than 10 years, with a rapid growth from imported used vehicles, as is the case of Guatemala, El Salvador and Honduras. In Guatemala, for example, the vehicle fleet has grown steadily by 5% per year between 2005 and 2020, and for every new vehicle imported, four to eight used vehicles are imported, with the majority of imported vehicles being two-wheelers (motorcycles). Two-wheelers already represent 40% of the country's vehicle fleet (CITA, 2020, study not yet published).

Inspections perform the following functions (Technical Support Unit, 2018):

- They verify the safety components of the vehicles.
- They verify gas and particulate emission levels.
- Identify alterations in the original condition of the vehicles.
- Control excessive vehicle noise.
- Prevent a low-quality maintenance services of vehicle and spares parts maintenance.
- They allow traffic and environmental managers to monitor statistics on the mechanical condition of the vehicle fleet, by vehicle model and category, providing information for public policies.

HOW TO MANAGE VEHICLE INSPECTION SYSTEMS?

Governments have the power to ensure the effectiveness of the inspection framework for vehicles by considering certain fundamental principles.

- The complete life of the vehicle: new vehicles, used vehicles, vehicles for export, imported vehicles, vehicles modified for other uses, breakdowns in crashes, maintenance and end of life.
- Inspection compliance is a governmental function: regardless of the management model deemed most appropriate, vehicle fleet control is a governmental activity.
- Realism: any proposed solution must consider the reality of the country in which it is implemented from the point of view of the state and accounting for the nature of the vehicle fleet, governmental structure, social reaction, users in the transportation sector, geography, and others.
- Precise definition of responsibilities: all users involved in vehicle inspection processes

must have a clear definition of their responsibilities. For example, the government as the controller of the activity, the operators in the management of the system and the vehicle drivers as the end user.

- Working at three levels: institutional, considering the existing governmental structure; organizational, aiming at maximum efficiency in the control of operations; and operational, precisely defining the attributions of all parties involved.

- The implementation of vehicle inspection schemes is not usually popular: the population in general, and the professional sectors involved, may feel threatened by an activity that, while having important benefits for society as a whole, produces additional obligations at the individual level. All stakeholders involved , users, government institutions, vehicle vendors, insurers, must be involved from the design phase to ensure the positive perception of vehicle fleet regulation.

WHAT ARE SUCCESSFUL MODELS?

A study by the Technical Support Unit (2018) of Costa Rica, three models of implementation of technical vehicle inspections in the world are identified.

- Government operation: the public authority invests in the construction of the network of stations and training of personnel, and directly operates, supervises and audits the inspections.

- Centralized privatized operation: specialized private companies, of medium or large size, are contracted through bidding processes to make the investments and operate inspection station networks with multiple lines under concession in a specific geographic lot.

- Decentralized privatized operation: based on the direct accreditation by the government of a large number of mechanical workshops or micro-enterprises that perform inspection services for their clients. In the case of workshops, they may also perform repair services, which gives rise to conflicts of interest with the inspection activity.

Although the advantages and disadvantages of these three models presented can be defined in general terms, the analysis of the appropriate model must take into consideration the principles mentioned above, mainly the adaptation to the country under study. Experience 11 includes the success story of Costa Rica

Experience 11. The vehicle inspection system in Costa Rica

In 2003, Costa Rica implemented an annual vehicle inspection system, which was mandatory for all vehicles in circulation. The centralized privatized concession model was adopted through a competitive bidding process, won by the private company Riteve S y C, S. A. won the bid. The company operates seven fixed stations and four mobile stations that reach even the most remote areas of the country.

At Riteve, a vehicle goes through seven stages of inspection: exterior (lights, tires, glass, etc.), interior (seat belts), vehicle response to crashes, brakes, tire side impact testing, oil leakage, and emissions. Although the first round of inspections resulted in high rejection rates, which produced social tensions in the country, the system has become a mechanism for improving the conditions of vehicles circulating in Costa Rica. For example, in 2017, only 46.6 % passed the first inspection, while in the second inspection passage rates rose to 76.4 %. That means that between the two inspections, 94.6 % of the vehicles were deemed legal for circulation.

One of the main reasons for the success of the Costa Rican case was that a competitive model of privatization of the operation led to the selection of an operator with sufficient experience and expertise and a management model that allowed for rigorous and effective control by the government. Riteve is part of the Applus+ group, which operates vehicle inspections, testing and certification in more than seventy countries around the world.

Schulz and Scheler (2019), through an impact study, found a 40% attributable reduction in vehicle crashes (per 100 vehicles) in the country between 2001 and 2015, saving more than 1500 lives and avoiding more than 115,000 injuries. In addition, the same study points to a cost-benefit ratio of an average of 10 to 1 for the new vehicle inspection system, demonstrating that the social benefits far outweigh the costs.

AND WHAT IS THE BENEFIT FOR ROAD SAFETY?

According to the CAF study (2014) on vehicle inspections, at least 3% of road incidents are caused exclusively by mechanical failures. However, the percentage appears to be much higher when considering Incidents where other risk factors are involved such as human error or road conditions, in addition to negligence in vehicle maintenance. In addition, identifying technical deficiencies is costly and requires precise knowledge, while other causes, such as blood alcohol or seat belt use, are more easily and cheaply detectable.

Studies conducted by the International Committee for Technical Vehicle Inspection (CITA), the Spanish Association of Entities Collaborating with the Administration in the Technical Inspection of Vehicles, the European Commission and the Institute of Economic Research and Consultancy have found that the implementation of an efficient vehicle inspection system has resulted in a 15% reduction in fatalities in Turkey and an 18% reduction in Spain.

Table 18. The role of the International Vehicle Technical Inspection Committee

CITA is the worldwide non-profit organization that brings together authorities and authorized companies involved in meeting the technical requirements of vehicles, both new and in use. It is the forum for the exchange of knowledge and experience of professionals in the sector.

The main activities carried out by the organization are:

- Organization of annual conferences for its regional advisory group in LAC;
- Implementation of vehicle inspection programs in countries around the world;
- Collaboration with institutions for the development of international automotive Standards, such as UNECE-WP.29, ISO and the European Union;
- Collaboration with multilateral development banks in government training programs.

With IDB support, CITA has initiated three AVIS (Assessment of the Vehicle Inspection Systems) projects in El Salvador, Guatemala and Honduras, to provide the respective governments with a definition of activities to be carried out for the regulatory management of the vehicle fleet, ensuring clean and safe vehicles throughout their useful life.

REFLECTIONS ON SAFE VEHICLES

After the Decade of Action, countries have not yet adopted motor vehicle safety regulations, and vehicles meeting with low safety standards are still sold on a massive scale in the region in relation to other countries in the world. This is due in part to the complexity of the process, where the manufacturers, the consumer, the legislative powers and the different national road agencies all play a role. These processes often rests on the political will of those in power, which varies from government to government. Often the agenda has not been changed, as the complexity of the issue has required work for which the duration ofa single presidential and legislative mandate was not enough. Further the adoption of regulations must be followed by training, homologation systems and vehicle enforcement.

In addition, there are countries where used vehicles make up a large part of the vehicle fleet and where there is no effective inspection system (such as El Salvador, Guatemala, Dominican Republic and Honduras). No work has been done to strengthen these systems throughout the

decade. It is recommended that an effective vehicle inspection system be implemented in LAC countries in the decade ahead.

International organizations were very ambitious in pushing a complex agenda, and this resulted in unexpected developments. Gradual changes must be sought, allowing for the adaptation of all those involved, while countries work on the adoption of vehicle standards' regulations.

It is recommended to take advantage of initiatives such as the mandatory vehicle labeling system, having Latin NCAP as a strategic partner in this implementation, which would shorten the learning curve. The advantage of labeling is that its implementation is gradual (first voluntary and then mandatory), and once tested, labels play a role in consumer behavior.

It is also advisable that the countries of the region encourage this vehicle labeling system by applying it to the purchase of the public vehicle fleet (e.g., police cars) that follow the best international standards, are already tested and well classified by Latin NCAP.

2.4 Safer road users

DECADE OF ACTION PILLAR 4

OBJECTIVES,

ROAD SAFETY AND ROAD USERS

This pillar focuses on developing comprehensive programs to improve road user behavior. It includes activities to encourage the development and adoption of model road safety legislation, as well as to maintain or increase compliance with road safety laws and regulations. These measures should be combined with public awareness and education to increase seat belt and helmet use rates, and to reduce speeding, drunk driving and other risk factors. Activities are also urged to reduce work-related traffic crashes and to encourage the establishment of graduated driver licensing programs for novice drivers.

Source: WHO (2011).

Countries have implemented activities and programs aimed at improving road user behavior. These strategies have three elements: the approval of appropriate legislation and regulations that, through control and a system of sanctions (called *enforcement*), guide the change in user behavior; the adaptation of infrastructure, if required, to generate positive interaction among the various users of the network; and campaigns to encourage compliance with the approved rules and regulations. This section will describe the experiences of LAC countries in four major areas of this pillar: speed management (regulations, traffic calming measures and measures that encourage active mobility), child road safety (child restraint systems and safe routes to school), motorcycle users, and driver's licenses as a tool for road safety.

2.4.2. SPEED MANAGEMENT

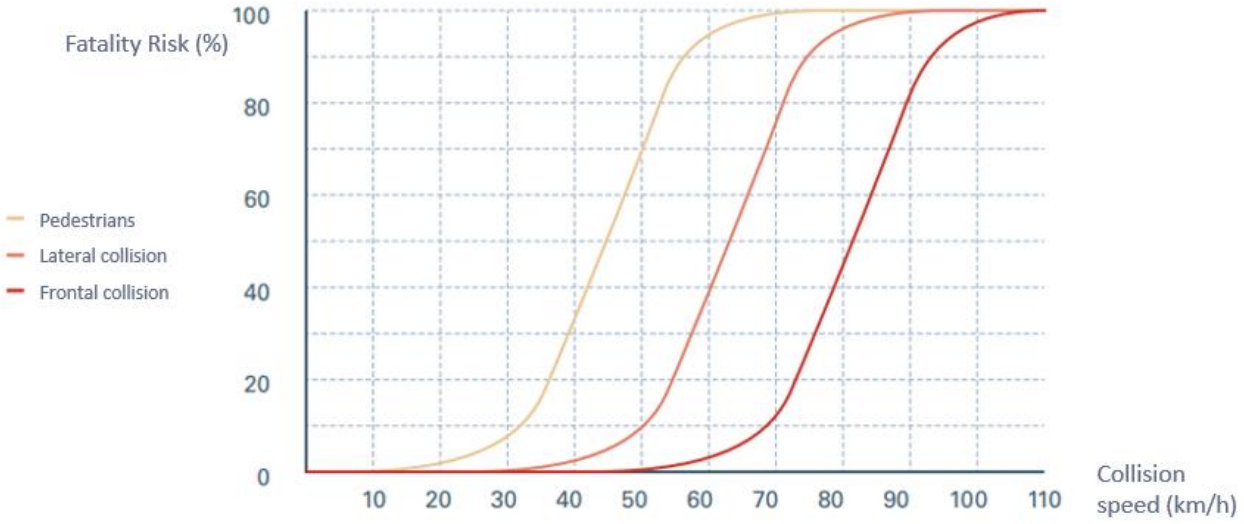
Speed management encompasses a range of measures aimed at balancing the safety and efficiency of vehicle speeds on a road network (OECD/ECMT Transport Research Centre, 2006) and aims to reduce the incidence of unsafe speeding, and to maximize compliance with speed limits (Global Road Safety Partnership, 2008).

Excessive speed is the main risk factor in road crash incidents: the higher the speed, the greater the probability of a collision and the greater the distance required to bring a vehicle to a complete stop. A vehicle traveling at a speed of 80 km/h needs approximately 155 m (the distance it travels during the reaction and the distance it travels before braking the vehicle) to come to a complete stop. If the vehicle were traveling at 30 km/h, the

distance traveled to come to a complete stop would be 14 m, and at 50 km/h, 42 m (WRI, 2015).

Likewise, the higher the speed, the greater the force of impact and, consequently, the greater the severity of injuries to the human body increasing the likelihood of permanent injury and death. A crash occurring at more than 50 km/h is especially harmful to vulnerable road users (pedestrians, cyclists and motorcyclists), who take the energy of the impact directly into their bodies. When motor vehicle drivers travel at 50 km/h, the risk of death for pedestrians is twice as high as if they were traveling at 40 km/h, and five times higher than if they were traveling at 30 km/h (WRI, 2015). It is estimated that a 15% reduction in average speed on a road improves road safety conditions, reducing crashes where injuries are caused by 20% and fatal crashes by 45% (Greibe, 2005).

Graph 2. 5 Risk curves of collision fatalities



Source: Swedish Transport Authority, 2008.

The maximum speed limit recommended for urban areas by the WHO is 50 km/h. However, in places with high volumes of pedestrians and cyclists, the recommended speed limit is 30 km/h. In addition, the Stockholm Declaration of the Third Global Ministerial Conference on Road Safety recommends 30 km/h as the default speed and to only set higher limits if design conditions limit the risks to vulnerable road users. The conference also

emphasized that a focus on speed management is fundamental to reducing carbon emissions, improving air quality and creating more sustainable and safer cities where pedestrians and cyclists have the safe space they need to move around. In addition, designs that require drivers to maintain a constant low speed, such as in a traffic calming zone, rather than having to constantly and rapidly accelerate and decelerate, is not only better for road safety, but also reduces fuel consumption and the emission of harmful gases (Ahn and Rakha, 2009).

In LAC, maximum speed limits in urban areas range from 40 km/h to 80 km/h. The countries that have already adopted a maximum limit of 50 km/h are Argentina, Chile, El Salvador, Mexico, Paraguay, Trinidad and Tobago, and Jamaica. Countries with limits above 50 km/h include Brazil, Colombia, Dominican Republic, Ecuador, Guatemala, and Guyana. Peru is in the process of lowering its speed limit from 60 km/hr to 50 km/hr.

However, speed management must employ a range of measures that include, in addition to setting regulatory speed limits, enforcement, infrastructure design (engineering), and communication and education strategies. In particular, the greater the enforcement, severity and implementation of sanctions against speeding, the greater the compliance with the speed limits. In other words, speed limits must be appropriate and recognized as such by the public (Global Road Safety Partnership, 2008).

It is important to highlight that the evaluation of speed limits becomes necessary when, for example, there are changes in urban dynamics, the land adjacent to the roads has densified, there is presence of vulnerable users such as pedestrians or cyclists, or vulnerable populations such as children, people with disabilities and older adults (Alcaldía de Bogotá, 2019b). This type of information will be useful to compare, along with the limits established by law, the design speed, current travel speeds and road crash rates. The ultimate purpose of such evaluation is to identify the scale of change in travel speed required for safe operation and to establish the measures needed to achieve it (Global Road Safety Partnership, 2008).

In the case of Bogota, speed management programs allow prioritizing roads to be evaluated according to the potential for reducing casualties, re-evaluating the maximum limit for main roads in urban areas, establishing low speed zones (school, residential, commercial), to move towards speeds that allow safe interaction between different modes of transportation. Likewise, these programs establish that changes should not only be implemented in infrastructure but should also include informative campaigns on speed as a risk factor, with technology and control, to ensure that drivers do not exceed the established speed limit.

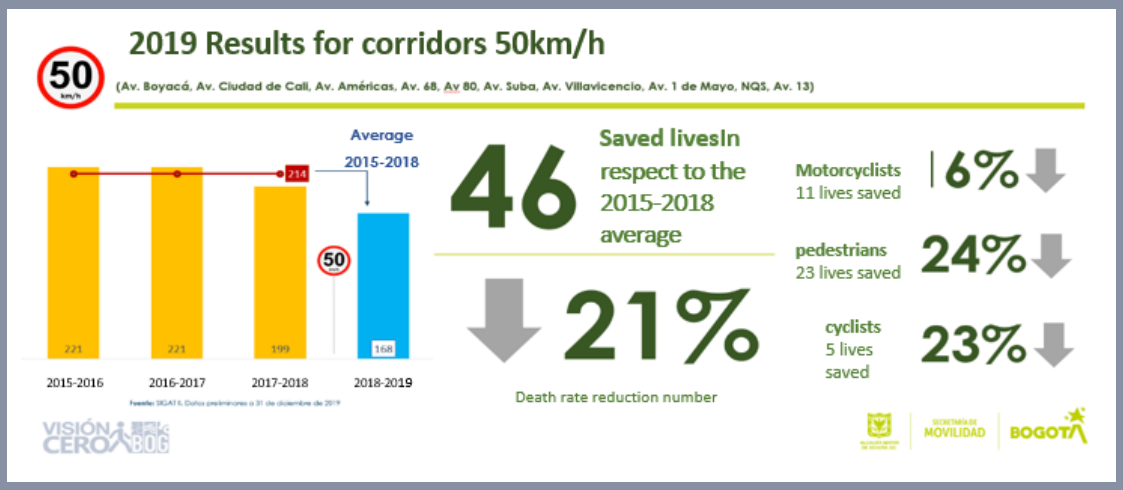
Experience 12. Case study Bogota from 60 km/h to 50 km/h

Bogota began work on managing safe speed limits with the creation of the Speed Management Program, which saught to progressively reduce the speed limit on main roads to 50 km/h.

The District Secretariat of Mobility (SDM) began in 2018, by identifying the five corridors with the greatest potential for reducing fatalities in traffic crashes through a reduction of the speed limit to 50 km/h. These are: Calle 80 Avenue, Boyacá Avenue, Carrera 68 Avenue, Ciudad de Cali Avenue and Américas Avenue.

These five prioritized corridors represent 15 % of the city's main network (82 km) and recorded 1 out of 4 fatalities in the city each year, where 85 % of the fatalities were vulnerable users. During the first month of implementation, fatalities decreased by 83 %, from 12 fatalities recorded in October 2017 to 2 in 2018. Based on the monitoring of these corridors and initiating the technical analysis of other major corridors in the city, the SDM announced the gradual entry of new corridors, completing 10 (160 km) in October 2019. This project is in addition to Suba Avenue, Villavicencio Avenue, Primero de Mayo Avenue, NQS and Calle 13 Avenue. As of December 2019, the overall result was a 21% reduction in fatalities, equivalent to 46 lives saved compared to the 2015-2018 average in the corridors where the 50 km/h maximum speed limit had been implemented.

Figure 2. 25 Reduction of fatalities in corridors with 50 km/h limit.



Source: SDM (2020).

Additionally, data from BitCarrier and Waze (which measure the speed of vehicles in the city) show that in these corridors a maximum of 29 seconds is lost during the city's busiest hours (from 6 a.m. to 9 p.m.) in a 10-kilometer trip, and during nighttime hours of low traffic flow (from 9 p.m. to 6 a.m.), for the same distance, a maximum of 34 seconds is lost. This illustrates that the lower speed limit does not have a substantial impact on the travel times of Bogota citizens. It does, however, improve safety conditions, especially for pedestrians, cyclists, and motorcyclists, who experienced the greatest reduction in deaths.

Considering the economic valuation of fatalities carried out by SDM, the city managed to save approximately USD 11.5 million by avoiding 46 deaths on these roads over a 14 month period. To achieve this number of lives saved, the city invested close to USD 2 million in infrastructure, control and communications actions between 2017 and 2019. This means the cost-benefit ratio of the intervention was 5.81 to 1.

Finally, on May 10, 2020, during the COVID-19 pandemic, the Mayor's Office of Bogota declared the maximum speed limit for the city to be 50 km/h. During this period, there were a total of 377 deaths from road traffic crashes. This represents a 25% reduction compared to 2019. This measure thus constitutes one of the main strategies of the district government, within the framework of its District Road Safety Plan, to drastically reduce the number of traffic fatalities.

The city's actions, focused on reducing the impacts of speeding on road safety, and utilized technical support from the Bloomberg Philanthropies Global Initiative for Road Safety (BIGRS) and its partners.

Experience 13. Behavioral science for speeding

Human rationality is limited. People often do not act in their own self-interest and have problems with the realization of goals. In many cases, individuals struggle to estimate risk or commit to behaviors that will protect them in the long-term. It is very common for individuals to take mental shortcuts, to draw conclusions from limited events and identify patterns that may or may not exist. In short, people often make unwarranted judgments and solve problems in ways that are detrimental to their own long-term well-being.

These decision-making *failures*, or cognitive biases, impact road safety. There is a tendency to rely too much on personal skills when driving or crossing the road, underestimating the likelihood of a road crash incident, and overestimating good luck. People often prioritize a short-term benefit, such as the thrill of driving fast, over a long-term commitment to safety.

Driving any vehicle should be a slow, controlled, and deliberate activity, as it involves mental effort and complex calculations. However, drivers often use the mostly autonomous parts of their brain for driving, assigning less mental effort to the task than is required. Among other reasons, this is because the cognitive load (the amount of mental effort and memory used at any given time) is overtaxed, which partially explains why drivers are easily distracted by cell phones or lose sight of posted speed limits.

Behavioral economics has proven to be an effective and efficient tool for reducing incoherent and self-destructive behaviors in many contexts, including road safety. Various approaches have been adopted to find solutions. Richard Thaler, a Nobel Laureate in Economics, provides one of the most famous examples of the problem of speeding. In his book *Nudge*, the author describes how in Chicago, city officials painted horizontal stripes on the road just before the sharp curves on Lake Shore Road to create the sensation of high speed in drivers and thus encourage them to slow down.

In Philadelphia, Phoenix and Peoria, the U.S. National Highway Traffic Safety Administration painted 3-D speed bumps on roads to encourage drivers to take their foot off the accelerator. In the city of Norfolk, UK, 200 trees were planted along the roadside at increasingly shorter distances, encouraging drivers to slow down as they approached the city. In the same vein, safety cameras, traffic information and Platewire (a platform that publishes the license plates of those who break traffic laws and drive aggressively) have been used in different parts of the world as part of behaviorally informed interventions to improve road safety.

In the United Kingdom, the West Midlands police have implemented reforms to reduce the rates of repeat offending by reckless drivers. This intervention consisted of explaining why speed limits exist and the dangerous consequences of not respecting them, the prosecution notice sent to offenders whose fault had been speeding:

> The reason you are receiving this letter is to make sure that the next time we are called upon to investigate a serious traffic crash, you are not involved.

This intervention increased the probability of speeders paying their fines (13.7%) and reduced

the probability of legal claims against the fines (41.3%).

Similar interventions have been implemented in some developing countries. In 2018, an experiment aimed at improving road safety in South Africa reduced the number of casualties by 42% compared to trends recorded during the same period of the previous year. In this intervention, drivers who had not committed traffic violations during the December and January holiday period received lottery tickets with which they could win cash prizes. In Kenya, stickers affixed to minibuses with suggestive messages encouraging passengers to report reckless driving, combined with a lottery that rewarded minibus drivers for leaving the stickers on their units, reduced injury or fatality road crashes for insurance companies by 60% (Thaler and Sunstein, 2009).

Improving pedestrian decisions

Behaviorally inspired interventions aimed at preventing pedestrians from putting themselves at risk when crossing the street at a red light, or while writing or reading messages on a cell phone, have been little applied, so their effects have hardly been evaluated. However, some of these stand out for their creativity. In 2014, for example, the German company Smart installed a "dancing traffic light" at an intersection in Lisbon, Portugal, which projected animated images of pedestrians dancing to music on a specially designed booth at the same traffic light. The images and music proved so effective against the boredom of waiting for the light to change that the company reported an 81% reduction in red crossings.

Applications in LAC

In 1997, the Bogotá mayor's office, believing in the power of theater to change behavior, hired 420 mimes, who were placed on street corners to mock traffic violators. According to Mockus, Colombians are more afraid of making fools of themselves than of being fined, so perhaps subjecting them to public shame would be a more effective measure than fining them or enactingother punishments (Garzón-Medina and Sánchez-Arismendi, 2019).

Today, the city of Bogotá still relies on behavioral science to improve road safety. Together with the IDB, the city is in the process of designing and implementing an intervention to reduce the downhill speed of cyclists in the surrounding mountains in order to reduce road crash incidents and fatalities. Sports cycling became popular in Colombia during the last decade as many professional cyclists achieved great success at the international level. The result has been a large number of cyclists on Colombian roads, with beginners pursuing goals that exceed their knowledge and skill. Figure 2.26 presents the results of a diagnostic and design exercise with transport and road safety experts together with cyclists; the exercise of defining causes of user behavior (mostly behavioral, some technical), and the consequent proposal of possible solutions for speeding downhill.

Figure 2. 26 Behavioral diagnostics and potential tools for downhill cyclist speed reduction

Causes for cyclist downhill speeding	Behavioral Toolkit	Taking concepts to the field
1. Technical gaps / Lack of practical knowledge and experience	- Increase training - Certification to trigger peer effects of signaling	- Cyclist training programs - Online rider downhill guide - Mobile training schools
2. Lack of knowledge of dangerous places and level of difficulty of the descent	- Make dangerous places **salient**	- Reminders at high-risk points - Speed signage and regulators - Campaign with information about the difficulty of descent and anchors with expected descent time
3. Overconfidence in one's skills	- Skill's **feedback** Make speed and dangerous places **salient** - **Descriptive norms** on accidents	- Speed boards, signage, and regulators - Campaign with descriptive norms (information) about accidents
4. Speed perception failure	- Make own and expected speed **salient** - Prescriptive norms on expected behavior	- Speed boards, signage, and regulators - Visual illusions - Campaign with prescriptive rules about expected/appropriate behavior
5. Downhill speed inertia	- Make own and expected speed **salient** - Tactical urban planning	- Campaign with prescriptive norms on expected/appropriate behavior by cyclist role models
6. Risk/speed-seeking	- **Prescriptive norms** on expected/appropriate behavior - Role models and trendsetters	- Campaña con normas prescriptivas sobre comportamiento esperado y adecuado
7. "Speeding" Identity: feeling free	- **Prescriptive norms** on expected/appropriate behavior - Role models and trendsetters	- - Campaign with prescriptive norms on expected/appropriate behavior by cyclist role models
8. Optimism bias: it doesn't happen to me; it happens to others	**- Descriptive norms on accidents**	- Campaign with descriptive norms (information) about accidents

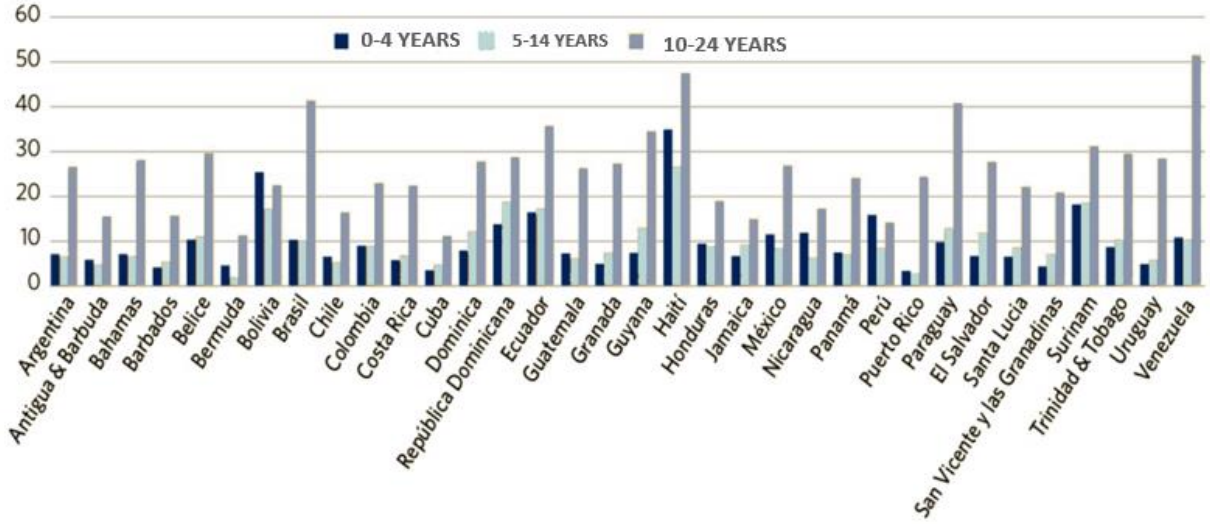
Source: own elaboration.

2.4.3. CHILD ROAD SAFETY

Although the problem of road safety is global and impacts all age groups, it is also true that children and adolescents are among the most affected group and have a higher probability of dying if they are involved in a traffic crash, particularly if they live in low- and middle-income countries, where 95% of road traffic deaths occur. In these countries, children are forced to walk along streets and roads where there is a mix of modes of transport (different weights and dimensions), some of them moving at high speeds, in addition to the lack of appropriate infrastructure, such as sidewalks, bus stops, adequate lighting, pedestrian crosswalks and other elements that offer accessibility, inclusiveness and safety.

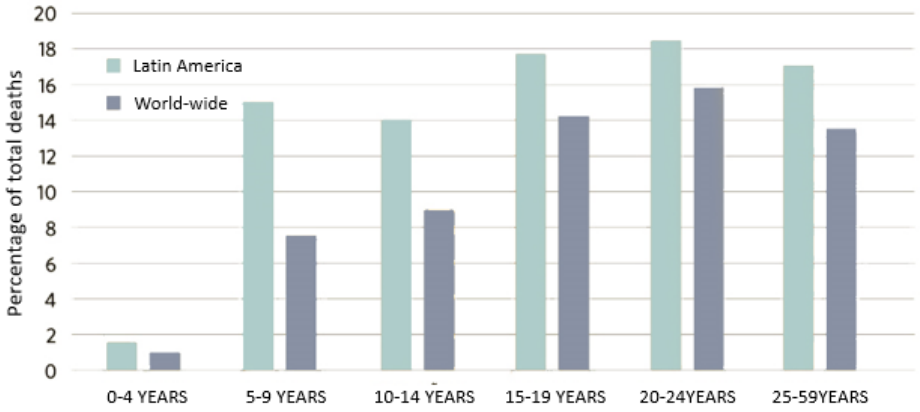
Each year globally, more than 183,000 children under 14 years of age, more than 500 per day, die in road crashes. This makes road crashes the leading cause of death for youths 5 to 29 years of age (WHO, 2018b). Ninety-five percent of these victims are from low- and middle-income countries, and 85% of the LAC region is made up of countries in this income level (WHO, 2017). In addition, 44 % of children injured by road traffic events are pedestrians or cyclists. Children living in the most vulnerable environments (economically poor) are at the highest risk of dying or having difficulty recovering from the consequences of a traffic crash.

Graph 2. 6 Infant mortality rate in LAC countries, by age group, 2019



Source: Own elaboration with data from the Global Road Safety Facility and the Institute for Health Metrics and Evaluation (2014).

Graph 2. 7 Death rate in road crashes by age group.



Source: Own elaboration with data from the Global Road Safety Facility and the Institute for Health Metrics and Evaluation (2014).

Although children and adolescents of all ages are at risk for being involved in a traffic crash, boys account for almost twice as many traffic deaths as girls.

According to the *2020 Agenda for Action*, launched in 2015 as part of Global Road Safety Week, leaders at all levels of government are asked to publicly announce how they plan to achieve the targets established in the global agenda, including cutting road deaths in half. To save the lives of thousands of children, five actionable steps are required.

- Safe travel to school for all children, including safe roads and speed control at every school.
- Safe school transportation, including seat belts on all school buses.
- Motorcycle helmets for all children where two-wheeled vehicles are the primary mode of family transportation.
- Child-safe vehicles and measures to promote child restraint.
- Measures against driving under the influence of alcohol, and their application.

All children and young people have the right to receive free, quality education; however, it is not enough to guarantee the right to education. It is necessary to provide safe transportation so that everyone can enjoy equal access to the educational system and, thus, play an important role in reducing poverty, segregation and inequality. To learn more, read the chapter "Looking Ahead: Achieving Equitable Access to Safe, Reliable, and Affordable Transportation Services", in the Flagship Report "Transport for

Inclusive Development: Defining a Path for Latin America and the Caribbean"[12]

Child restraint systems: an effective measure to ensure safe travel for both boys and girls

Due to the physical constitution of children, seat belts, which adequately protect an adult person, can cause cervical and abdominal injuries to children and are not effective in preventing their ejection from the vehicle or other injuries (PAHO, 2017). When a crash occurs, the most effective measure to protect child passengers is the use of restraint systems appropriate for their size and weight. Thus, it is possible to achieve a 60% reduction in fatalities, with greater benefits the smaller the child is, when appropriate restraints are used (WHO, 2018b). In addition, the use of booster seats or boosters reduces the risk of serious injury by 45 % for children aged 4 to 8, compared to seat belt use alone, and car seat use reduces the risk of crash injury by 71 % to 82 % for children, compared to seat belt use alone (CDC, 2021).

When CRSs are installed rearward-facing, they reduce serious or fatal injuries by almost 90%, and when they are forward-facing, by 75%, provided they are suitable for the child's size and are installed correctly. Therefore, the best recommendation is for children to ride rearward-facing for as long as possible.

CRSs keep the child in her seat and, in the event of sudden braking or collision, absorb the kinetic energy without injuring the child, as well as preventing the child from being thrown against the interior or outside the vehicle (Elvik, 2013). To function properly, the CRS must not have been involved in a crash -even if not occupied by a child-, must not have visible damage or missing parts, and must not have reached its expiration date. If any of these factors are present, or if the CRS is no longer suitable for the child's weight and height, it must be replaced by a new one.

In addition to complying with technical regulations, CRSs must be installed and used correctly. In this sense, Fundación Gonzalo Rodríguez has implemented check points run by specialized technicians where responsible adults are advised on the correct use of CRSs.

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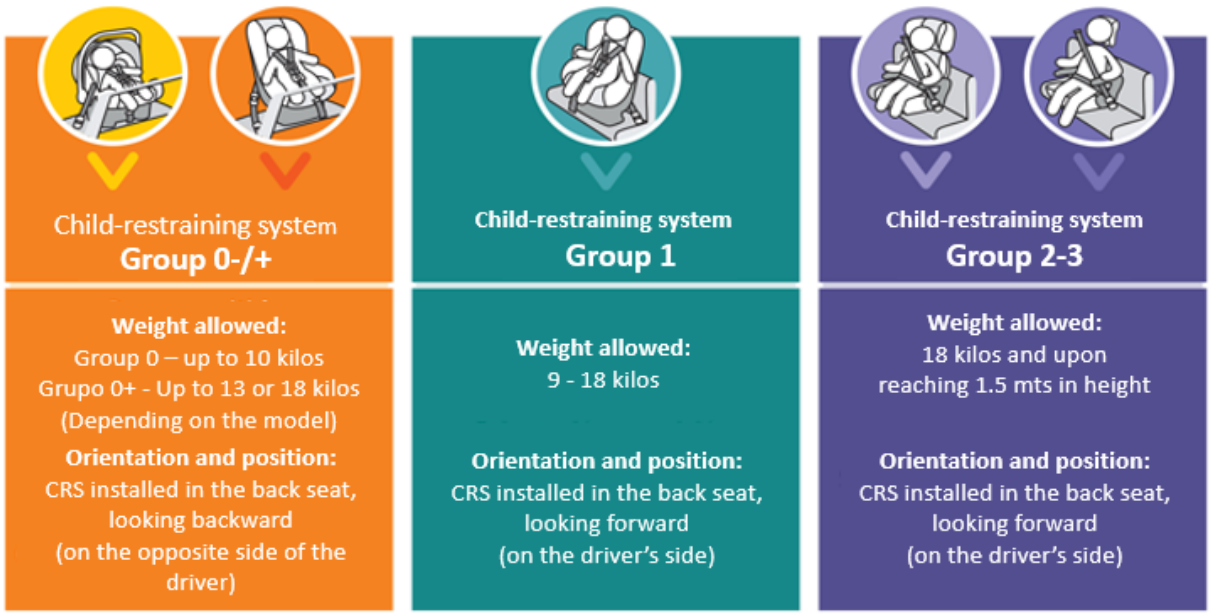
[12] https://publications.iadb.org/publications/english/viewer/Transport-for-Inclusive-Development-Defining-a-Path-for-Latin-America-and-the-Caribbean.pdf

Figure 2. 27 Recommended CRS by group, according to weight and height.



Source: Prepared by the Fundación Gonzalo Rodríguez.

Between 2009 and 2018, there was an increase in the number of countries that legislate the mandatory use of CRS, and an improvement in the quality of the standards, in accordance with the criteria established by the WHO (2018b). However, the prevalence of these systems is still low, even in cities where seat belt use is high. For example, in São Paulo, 53% of drivers use CRSs, while in Mexico the average across three cities reaches only 17% (Hyder and Lunnen, 2012).

Figure 2. 28 Status of CRS legislation in LAC.

	Sub-region			
CRS Legislation	Caribbean	Mesoamerica	Southern Cone	Andean
YES	Barbados Guyana Jamaica Dominican Republic Suriname Trinidad and Tobago	Costa Rica El Salvador	Argentina Brasil Chile Paraguay Uruguay	Ecuador Perú Venezuela
NO	Cuba Dominica Granada	Guatemala Honduras México Panamá		Bolivia Colombia

Source: Prepared by the Fundación Gonzalo Rodríguez.

Latin American countries have recently incorporated the use of the ISOFIX anchorage system in vehicles and CRS. This system defines standard anchorage points to be manufactured in vehicles, allowing CRSs to be installed quickly and safely. The rigid anchorage points are bolted or welded to the car body with their corresponding attachments for the child seat, thus reducing the possibility of mistakes in the installation of the seat (Fundación Mapfre, 2021; Fundación Gonzalo Rodríguez, 2014).

The ISOFIX system can reduce serious injuries to young children in traffic crashes by up to 22%. Unlike the traditional method (fastening the CRS with the seat belt), the ISOFIX system facilitates installation and limits the margin of error. Among its advantages, the ISOFIX can reduce the forward travel of the head in a frontal impact, avoiding the whiplash effect, which causes cervical injuries. This system also improves the stability of the seat in the event of a side impact (Fundación Mapfre, 2021; Fundación Gonzalo Rodríguez, 2014).

Although there is no single measure to address all the risk factors to which children are exposed on the road, crashes are preventable when appropriately designed packages of interventions are implemented. These measures should comply with the Safe System paradigm, the adoption of which is a progressive process that encompasses several key elements, including the sustained involvement and commitment of multiple stakeholders.

Among the strategies to promote the use of CRS are legislation and enforcement, technical regulations on the characteristics of child restraint seats or systems and specific campaigns on CRS for vehicles (Bustamante, Café, Gallego, Ramón and Taddia, 2015). The main advances of the decade related to such strategies in Uruguay, Argentina and Chile, were leveraged mainly by civil society organizations (CSOs), and are described below.

Table 19. CSO involvement in children's safety and security

The advocacy of CSOs in relation to the revision of laws, public awareness and implementation of specific activities, as well as the technical and logistical support they provide, are essential for strengthening the use of CRS. In the LAC context, the presence of regional organizations, such as the Fundación Gonzalo Rodríguez (FGR), contributes to reducing the number of children seriously injured and killed in traffic crashes through research, training, advocacy and the consolidation of networks.

Throughout the first decade of action, thanks to the technical and financial support of the FIA Foundation as one of its main partners for work in Latin America, the FGR developed multiple inputs to enrich knowledge on CRS; collaborated in the transmission of relevant information, in the development of skills and in the application of tools needed by those officials and institutions responsible for promoting the protection of children and adolescents as road users; in addition to generating networks with multiple users, which laid the foundations for significant political commitments for child road safety. In this sense, the International Forum on Child Road Safety (Fisevi) was one of the greatest achievements of the period in relation to the creation and consolidation of intersectoral networks for road safety.

Fisevi is a biannual itinerant forum, organized by the FGR, which brings together government officials, international agencies, inspectors, civil and road engineers, health workers, teachers, civil society organizations, professional carriers, the media, private institutions related to the subject and others. The first forum was held in Uruguay (2014), the second in Chile (2016), the third in Argentina (2018) and the fourth edition will take place in Colombia. The general objective of Fisevi is to generate a space for the exchange of experiences, best practices, and ideas for the better development of child road safety management, bringing together the knowledge and capacities of governments, civil society organizations and private institutions. This space promotes transformations that transcend the two days of conference meetings. From the moment the applicant country for the next edition is selected, the Government assumes the commitment to carry out concrete actions for the safe mobility of the country's children from the perspective of safe systems. For this, the FGR works in coordination with the Government of the country where Fisevi is developed and collaborates from the technical point of view using the experience accumulated in the last thirteen years of work. This work continues through training and advisory support after the forum. In this way, Fisevi is the meeting most referenced by experts regarding child mobility in the LAC.

Experience 14. Integral support for child safety in Argentina

In 2016, the new government administration in Argentina committed to receive Fisevi in 2018 and to incorporate addressing safe child mobility into its strategic plan.

One year later, through the National Road Safety Agency (ANSV)[13], Argentina joined the research phase of the Latin American Children Safe in Traffic program, carried out by the FGR with the support of the FIA Foundation. This program seeks to contribute to the reduction of risk of users associated with child road crash incidents, taking school environments as a starting point, by deepening knowledge on their current situation and expanding the regional work network to cooperate in the creation of safe systems for children.

That same year, the ANSV developed the National Child Road Safety Program, which placed children at the center of its public policies. A few months later, in January 2018, an important achievement materialized with regulatory decree 32/2018, which modified the Traffic Law 24449 and extended the use of CRS from 4-years old to 10 years old. In this context, the ANSV prepared the document *Guía de políticas en seguridad vial infantil para Argentina*.

Since 2019, the FGR has been promoting three main lines of work in the country. First, FGR implements the Safe Latin American Children in Traffic program in five cities (Junín, Guaymallén, Neuquén, Jujuy and Corrientes), which addresses child road safety from the perspective of school environments. Second, there is a program to train trainers for the safe driving of motorcycles, which aims to contribute to the safety of users of these vehicles through the training of leaders in each driver's license issuing center in the areas of Northeastern Argentina (NEA) and Northwest Argentina (NOA), the areas most affected by road crashes involving motorcycles. At the same time, work continues with the authorities on the safe mobility of Argentine children through the National Plan for Child Road Safety, promoted by the ANSV since its new administration, assumed in 2019 and which has the technical support and articulation of the FGR. This program is present in the 23 provinces and in the Autonomous City of Buenos Aires, and promotes safe and healthy mobility for all children in the country through a joint effort with provincial referents that promotes the generation of a strategic plan for child road safety for each province, developed by the provincial users themselves, supervised and endorsed by the ANSV.

[13] This agency depends on the National Ministry of Transportation and oversees coordinating, promoting and supervising the implementation and strategic measures for the development of a safe transit, which was crystallized in several trainings and advice on children's mobility.

Experience 15. The EDU-CAR Road Safety Plan for Children in Uruguay

With the general objective of reducing child road crashes in Uruguay, the EDU-CAR plan was implemented in 2007, focused on raising public awareness and advising the authorities on the transport of schoolchildren and the mandatory use of CRS. After an exhaustive situation analysis, the FGR provided technical advice to national authorities to promote legislative changes that would effectively protect children. As part of the implementation and consolidation process of EDU-CAR, agreements were established, and institutional agreements were signed with several national agencies. In addition, support was received from the Presidency of the Republic and various ministries (Public Health[14], Interior, Education and Culture, Economy and Finance, among others), and in July 2009 the work of the FGR was recognized by the national government with the Declaration of National Interest by the Presidency of the Republic.

At the same time, the FGR's work with and through the media to encourage public participation in activities to promote awareness and commitment on the part of the population and the authorities led to a cultural change, which was confirmed by the measurements taken after the public interventions were completed. According to data collected by the FGR, the percentage of children traveling without CRS in Montevideo decreased by 6.4 percentage points (from 73.3% to 66.9%), while the use of CRS increased by 4.8 points (from 9.5% to 14.3%).

Finally, in 2014, the mandatory use of CRS in private vehicles was regulated for all children between 0 and 12 years old, and for adolescents who are less than 1.50 m tall, up to 18 years old. This regulation was used as a reference and example for other regulatory advances at the regional and global level.

[14] Joint work with the Uruguayan Society of Pediatrics led to the preparation of the Manual of Good Practices: How to address the safety of children as passengers in vehicles.

Experience 16. Legislation, enforcement, and cultural change to strengthen the use of CRS in Chile.

The joint work of the National Traffic Safety Commission (Conaset), FGR, Region IV of the FIA[15] and the Automobile Club of Chile began in 2012 with a series of training sessions on child passenger safety aimed at the Carabineros and the creation of checkpoints[16] for CRSs. This work was institutionalized in 2014. In that year, with the signing of technical cooperation agreements, child passenger safety training was extended to civil society organizations, public and private institutions, and CRS importers. Likewise, the development and exchange of research on child road safety was promoted and new CRS checkpoints were created. Since then, the FGR and Conaset have pursued a sustained strategy to promote the training of knowledgeable personnel with technical expertise to act in all regions of the country. In 2016, during the II International Road Safety Forum (Fisevi), Chilean authorities committed to implementing a regulatory change on the mandatory use of CRS in the country. This was implemented the following year.

The new law considered an increase in the age of use of CRS (up to 9 years of age or with a height of 1.35 meters and weight of 33 kg), and a comprehensive training, communication, and control plan. For the regulatory change, the FGR collaborated with Conaset in the technical aspects of the law, with recommendations based on evidence, in order to consider the child from all morphological and medical dimensions, as well as the technical regulations of CRSs. The enactment of the law was accompanied by communication actions aimed at the population to promote and facilitate the correct use of CRSs and regulatory compliance throughout the country.

During this period, there was a marked decrease (32%) in the total number of children under 11 years old killed in road crashes. It is important to note that 54 % of children in this age range were involved in crashes as passengers. According to a 2016 study, the legislation was effective in the short term. The same study points out that to support this type of reform in the long term, it is necessary to consider other measures in line with those implemented since the enactment of the law that remain in place today, such as police enforcement, public information campaigns, and the involvement of public health professionals in educating parents about the benefits of CRS use (Nazif-Muñoz, Gariepy, Falconer, Gong, & Mcpherson, 2016).

[15] In FIA Region IV, automobile clubs from the following countries participate: Argentina, Brazil, Bolivia, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Nicaragua, Panama, Paraguay, Peru, Uruguay, Honduras, Mexico and Venezuela.

[16] The check point is a space where certified technicians from the Fundación Gonzalo Rodríguez verify the correct installation of CRSs and advise families on their correct use.

Safe Routes to School

Simultaneously, it is important to ensure the safety of children on their way to school. Countries in the region have implemented, with the support of multilateral agencies and CSOs, safe roads to school programs to ensure the safety of children on their way to school. The IDB, with the support of the United Nations Environment Programme (UNEP), designed *the Toolkit for the Implementation of Safe Routes to School in Latin America and the Caribbean and its latest edition,* which brings together a variety of strategies that can be used to respond to the problems of high road incident rates among children and adolescents by promoting safe networks for children's routes to and from school. This toolkit aims to be a resource to guide the planning, design, implementation and monitoring of school roads. This not only contributes to improving children's safety, but also to environmental sustainability by reducing the number of vehicles on the road, as well as allowing children to become familiar with the roads in a safe and educational way.

This approach is organized in three parts:

- Where to start? This section introduces the basic elements for planning and defining goals for project implementation.

- Tools: tools that may be useful for the development of the project are described here. They are divided into diagnostic, community, road design, regulation, education, communication and sustainability sections. The tools described here are practical examples that can be adjusted to each individual project.

- Case studies: this section documents the planning and implementation process of Safe Routes to School in four case studies with different levels of performance. The objective is to identify the range of solutions appropriate to the problems and conditions of each site.

Within the strategy proposed by this Safe Routes to School initiative, a diagnosis of the situation and the environment of the schools is included, in order to study the variables and define the most convenient lines of action, with a localized approach. This is a task of urban or territorial scale, involving different users including: local governments, schools, parents, teachers, neighbors and every citizen that is part of that community.

The kit also includes a series of space design measures that, depending on the previous analysis, may be necessary and are arranged in five groups:

1. Traffic calming measures, including lane narrowing, speed bumps, pedestrian streets or chicanes.
2. Measures for crossings, such as intersections and overpasses, mini-culverts, medians and pedestrian refuges.

3. Sidewalks, including curb extensions, ramps, bus stops.
4. Bicycle facilities, such as bicycle paths, shared-use paths or bicycle nets.
5. Signage and other elements, such as stencils, stop lines and lighting.

Some countries, such as Chile (experience 17), the Dominican Republic (experience 18), Argentina, and Colombia (experience 20), have advanced in their policies for child safety on their way to school, while other countries, such as Nicaragua (experience 19) and Costa Rica (experience 21), already have road safety education programs in schools and on the sides of rehabilitated roads.

Experience 17. Chile: schools on rural roads

The Ministry of Public Works (MOP) began receiving a series of letters from the community complaining about the unsafe situation in school environments. The main concern identified was that "Drivers driving through school environments on rural roads did not realize that there was a school". The MOP then carried out a road crash incident study that analyzed the deaths of school children on national roads. At that time, there was no data available to determine whether the events occurred during school hours. However, it was observed that a total of approximately 700 school children died as a result of road crash incident on public roads (urban and rural) and that the average speed on rural roads was 100 km/h, a speed that results in a high level of danger. As a result of the identification of the problem, the MOP promoted, from its attribution and responsibility in road infrastructure, a project generated to improve the conditions of traffic of interurban roads.

As part of the actions carried out during the planning and implementation stages of the project, the MOP signed an agreement with the Ministry of Education and Conaset. This alliance allowed the elaboration of more specific studies on schools, supported by the Ministry of Education. Since the creation of this alliance, the following actions were key to the implementation of the program.

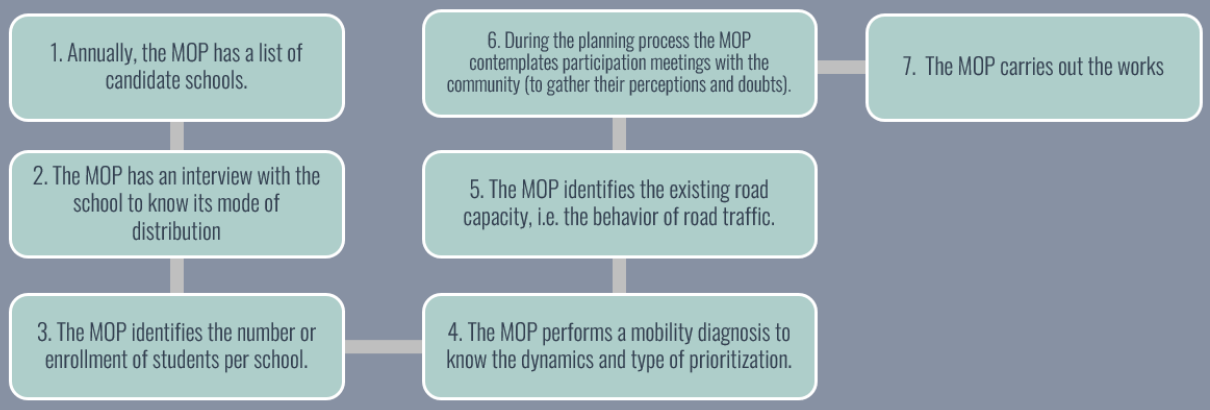
1. Seeking funding. The program currently receives between USD 4 million and USD 5 million for 50 to 60 schools per year.

2. Generation of a prioritization process for schools with high road risk, based on data from the Ministry of Education. The main finding was that 95% of the rural schools analyzed were public and low-income.

3. Development of a training and capacity building strategy in the 15 regions of the country.

4. Performing diagnostics and road infrastructure solutions appropriate to the specific context.

Currently, the identification of needs and problems in the different school contexts is carried out with the help of data from the Ministry of Education according to the following process:



The road maintenance fund has been used to tangibly improve school environments through the implementation of road infrastructure elements including:

1. Sidewalks: provide a space for pedestrian traffic in a safe and accessible manner.

2. Pedestrian grids or guardrails: guide the pedestrian through a pathway to the safe crossing.

3. Adaptation of standard design waiting areas: to provide shelter for all children (considering the demand in the capacity offered, as well as climate factors such as rain, etc.).

4. Reducing the width of the roadway: a measure to make drivers aware that they are entering a school zone, thus reducing speed.

5. Vertical signage: indication of speed limits and road markings before the location of speed bumps.

Currently, the sites that were served at the beginning of the project continue to receive improvements and are under evaluation for the implementation of technological solutions.

Experience 18. Dominican Republic: from the guide to its regulations and implementation

The Dominican Republic has worked intensively on public policies to solve some of its main mobility challenges. Of particular note is the implementation of the Safe School Environments Program, an effort carried out by the National Institute of Traffic and Land Transportation (Intrant) in collaboration with the country's Ministry of Education (Minerd) and the Ministry of Public Works and Communications (MOPC), and coordinated with other users, such as the School Police, the General Directorate of Traffic and Land Transportation Safety (Digesett) and the National School of Road Education (Enevial).

Although pedestrian deaths due to road traffic injuries decreased by 11% in 2019, there is still much room for improvement in the safety of school children and adolescents. Road traffic fatalities in young people under 19 years of age accounted for 13 % of the total in 2019 (417).

This new program has been the result of a multisectoral effort and has achieved results in record time thanks to a team committed to road safety, based on a regulation (Regulatory Resolution 006-2020, "Regulating School Roads or Safe Routes in the National Territory") derived from the Regulations for Training, Formation and Road Education, and the Regulations for School Transportation. The program obliges the competent authorities to harmonize road safety aspects in school environments. It also establishes a maximum speed of 20 km/h in study areas (schools, colleges, universities and other educational centers).

The regulation is accompanied by its corresponding *Methodological Guide for the evaluation of road safety in schools*. This manual applies to existing schools as well as to those in the design phase, the construction process, their surroundings, and also as a complement for the implementation of the road safety education program within the Dominican educational system.

The authorities are convinced that road safety education is a vital part of the project. For this reason, a training plan was developed for all levels of the educational community. It is not enough to make the necessary adjustments if people are not aware of the road safety regulations in their surroundings.

This comprehensive, easy-to-scale program promises to save lives and improve the mobility of thousands of children, parents and educators in school environments. The program seeks continuity over time through the linkage of the responsible institutions, as well as the achievement of a practical scheme that integrates conclusive actions for its successful development.

The Dominican Republic's objective is to ensure that the population can access their schools safely. In this way, the government expresses its commitment to the fundamental right to education, improving transportation and the safety of school environments.

Three centers were selected for the start of this initiative, based on the diagnosis carried out: the Cruz Grande center in the municipality of Santo Domingo Norte, the Francisco del Rosario Sánchez elementary school in Santo Domingo Este, and the Norma Elena Poueriet center in the town of Higüey.

Experience 19. Road safety education in Nicaraguan schools

The IDB has supported the design and implementation of the Rural Road Education Program in Nicaragua since 2013. This program focuses on the direct area of influence of the roads intervened with IDB resources, contributing to expand it to a public policy measure of implementation in all road works in the country.

The Rural Road Education Program originated as a social mitigation measure in response to the impact of the increase in speed on rural roads improved or rehabilitated with IDB resources, coordinated by the Nicaraguan Ministry of Transportation and Infrastructure (MTI) in rural schools identified in the road engineering studies. With the participation of the Traffic Police, the road safety office and social specialists of the MTI, a training and equipment program is developed, which includes primary and secondary school students, teachers, community leaders, collective and cargo transportation companies, and rural road users, through periodic visits to rural schools. The following are the basic activities carried out:

- Preparation of content, design and printing of teaching primers, educational aids and teaching materials for primary and secondary school teachers.
- Inter-administrative agreement between MTI and the Traffic Police with schools in each region.
- Prior training of teachers in road safety education and delivery of graphic materials, cyclists' and pedestrians' manuals, motorcyclists' manuals and methodological guides for the road safety education program.
- Training courses for primary and secondary school students and teachers, community leaders, collective and cargo transportation companies, and users in general, on safety measures for using the new roads on their way to school, which promote reflective attitudes towards risky behavior by road users.
- Delivery of materials with examples of signage for students.
- Creation and organization of groups of Student Traffic Regulation Brigades (BRET) in each of the classrooms, made up of students and teacher leaders, responsible for providing ongoing training, developing recreational activities at school and in the community around road safety, supporting traffic control on the road during the students' entrance and exit from classes, and organizing focus groups with caregivers and community leaders to replicate the program in other contexts.

Since its conception, the Rural Road Education Program, financed by the IDB, has reached 287 rural schools in 17 municipalities throughout the country. A total of 45,112 students from primary and secondary schools in the regions and 9108 teachers have been trained, for a total of 47,020 people. For the next phases of the program, the primers and teaching materials will be updated to incorporate new content and relevant approaches, and to consider improving the school environment with good road safety practices, as well as evaluating the impacts of the program on road safety indicators on the roads involved.

Experience 20. Safe environments around the school: the case of Bogota.

The School Zones initiative is part of the Children First Program of the city of Bogotá, which includes various measures that seek to provide safer and more efficient spaces for the daily commute of children in the city.

In Bogota, children and adolescents of school age travel mainly for the purpose of going to school. From the 2015 Mobility Survey, it is estimated that population of children between 7 and 15 years old takes an average of fifty minutes to reach their educational institution. This means that in a single day the average student spends approximately one hour and forty minutes traveling. The longest travel times correspond to trips made on school routes and public transportation. However, children primarily travel to their educational institution on foot (49%), by school transport (23%) and by public transport (12%). In turn, walking is the predominant means of transportation for children from families belonging to low and middle socioeconomic strata, while school transportation is the most used in high socioeconomic strata (Alcaldía de Bogotá, 2019).

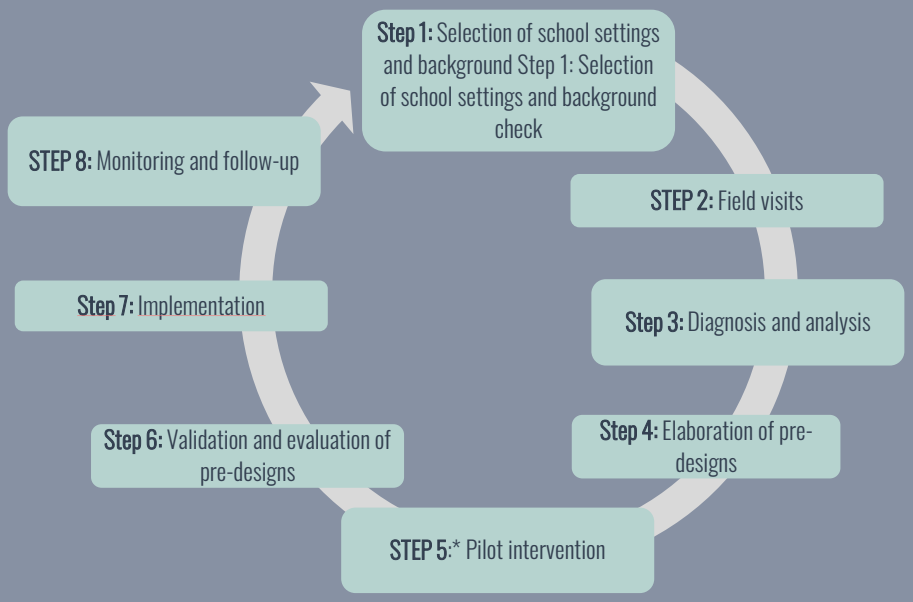
SAFE ENVIRONMENTS

Reducing and maintaining speeds below 30 km/h in school zones is the main approach to provide a safe environment. The District Mobility Secretariat (SDM) proposed to adjust the design of the roads according to the context and the vulnerability of the users who use them.

This has been achieved through the improvement of road conditions adjacent to the educational institutions: horizontal and vertical signage, segregation elements and speed reduction devices for motor vehicles traveling in the area. These measures not only provide a safe environment for children, but also support the mobility of their companions, the elderly and other people who use these roads.

To determine areas where interventions are required, the SDM conducted an evaluation based on geographic and statistical analyses that identified areas with frequent road crashes to be addressed as a priority. By law, school environments must be feature proper signage with the established speed limit. Therefore, all the measures implemented have a common objective: to regulate the maximum speed of vehicles to 30 km/h in school zones, without requiring police intervention. Speed management not only contributes to creating safer environments, but also promotes other modes of transportation: girls, boys, their companions and neighbors feel more confident to make their journeys walking or cycling when drivers are traveling at lower speeds (Alcaldía de Bogotá, 2019a).

The following is a step-by-step outline of how to conduct an intervention in a school setting.



Source: Own elaboration based on data from the Office of the Mayor of Bogota (2019b).

Not all interventions are necessarily accompanied by a demonstration pilot before implementation. Some of the schemes developed are field-tested with provisional elements, either to test the design that would be implemented definitively or because the potential impact of these measures requires a process that includes community participation regarding the solutions to be implemented. This type of testing seeks to involve the community in order to discover the problems and risks that they themselves have identified in the sector due to their own participation.

Between 2016 and 2019 the city of Bogota through signage and demarcation measures, improved the environment of 3500 educational centers.

LESSONS LEARNED

- Commitment from the highest level to design and implement a school road program is essential to define goals and make the necessary resources available.
- Identifying and prioritizing areas of the city that group together several educational institutions not only allows for a greater impact of interventions, but also for an efficient use of resources.
- Taking into account the community's perception of its environment and knowing the routes taken by the students is key to support the definition of the points to be analyzed and intervened, and to define the type of solutions that address the risks faced by the community.

One of the tools available for the evaluation of school environments is SR4S from iRAP. In the case of Bogota SR4S allowed the inclusion of new forms of analysis through the use of technology and produced greater knowledge in the human team when analyzing school environments and offering proposals to make them safer.

Some of the efforts focused on improving the city's school environments were technically supported by the Bloomberg Philanthropies Global Initiative for Road Safety (BIGRS) and its partners.

Experience 21. Educating children for road safety

Between 2014 and 2015, the Government of Costa Rica, with the support of IDB, Sesame Street, FIA, Road Safety Fund and the Road Safety Council (Cosevi) developed the program Vamos Seguros a la Escuela, which consists of road safety education for children through the tools of Sesame Street. The southern area of the city of San José (Paso Ancho, San Sebastián and Hatillo) was chosen, in the vicinity of the Paso Ancho overpass road project built by the Ministry of Public Works and Transportation with IDB financing.

This program has educated more than 4,500 children, in addition to teachers and families; as a tool it has an educational material kit starring Sesame Street characters. The topics developed were modes of transportation (pedestrian, car, bus, bicycle or skates), safety elements, information on traffic signals, safe behaviors at intersections, and elements of the road infrastructure that provide safety and warn of danger.

Source: First lesson in road safety education: green, yellow and red, IDB, 2015.

2.4.4. "CURRENT AND RECOMMENDED BEST PRACTICES FOR THE PROTECTION OF ITS USERS"

High mortality due to road crashes are much more visible in so-called "low- and middle-income" countries (WHO, 2018). This group of nations - in which 85% of the world's population is concentrated and which possess 60% of the world's vehicle fleet - account for 93% of the victims who die as a result of a road crash.

Vulnerable road users (a group that includes motorcyclists, cyclists and pedestrians) account for 54% of all fatalities worldwide. In particular, motorcycles[17] and mopeds account for 28%, translating to approximately 378,000 fatalities per year.

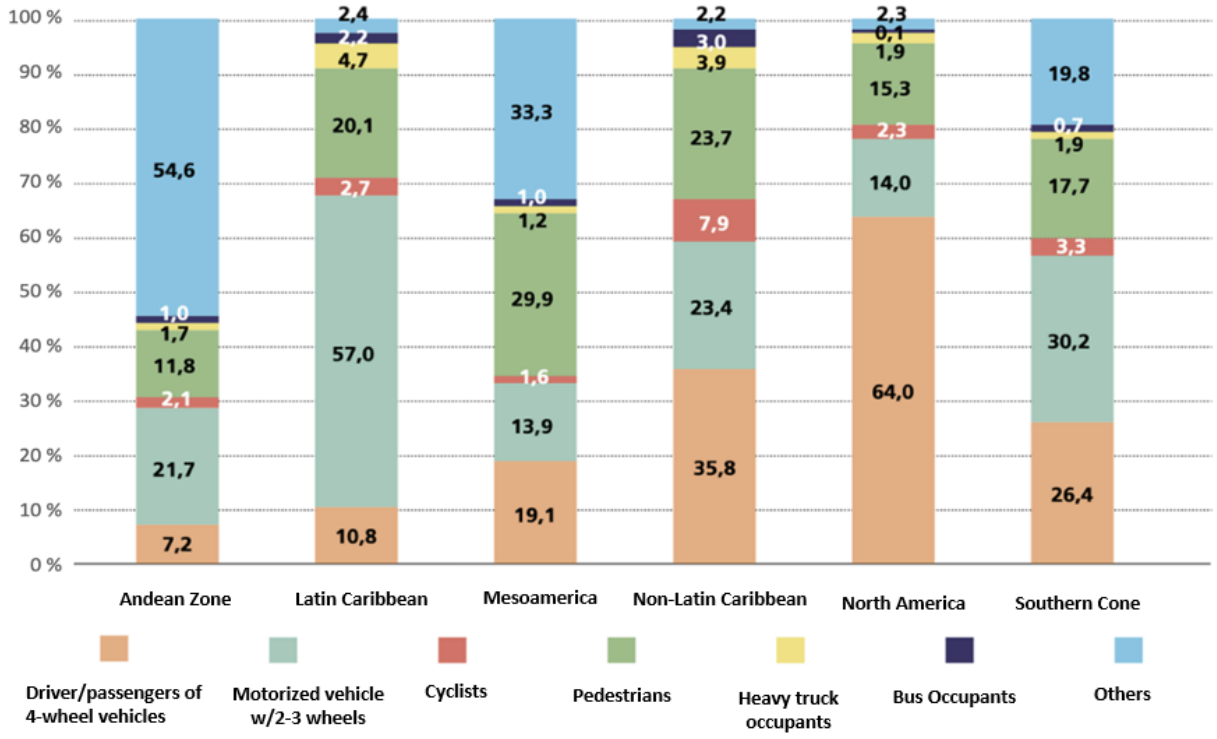
The statistics cited above mean that almost 3 out of every 10 people who die in road traffic crashes worldwide were riding motorcycles. This represents an increase compared to 2013, when the percentage of motorcycle users killed worldwide was 23% of the total (WHO, 2013).

Historically, the LAC region has faced a significant number of road crashes related deaths relative o the other parts of the world[18] (PAHO, 2019). This region is heterogeneous in many ways, including the socioeconomic characteristics of its inhabitants. Socioeconomics influence the composition of the vehicle fleet in the different regions and, therefore, the crash incident rate of the different road users, which can be seen in the graph 2.8. This graph illustrates that, depending on the subregion, the representation of motorcycle users in the number of deaths due to traffic crash incidents varies significantly, doubling the global average in the Caribbean countries.

This section is a summary of the IDB publication "Motorcycles in Latin America: current events and best practices for the care of users", which not only details the technical and regulatory aspects of helmets, but also addresses motorcycle infrastructure issues and the training and licensing of drivers in Latin America and the Caribbean.

17 The term user does not distinguish between driver and passenger.
18 The countries that contributed data to PAHO to obtain the aforementioned indicators are: North America (Canada and the United States), Latin Caribbean (Cuba and the Dominican Republic), non-Latin Caribbean (Antigua and Barbuda, Barbados, Dominica, Grenada, Guyana, Jamaica, Saint Lucia, Suriname, and Trinidad and Tobago), Southern Cone (Argentina, Brazil, Chile, Paraguay and Uruguay), Mesoamerica (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico and Panama) and Andean Zone (Bolivia, Colombia, Ecuador, Peru and Venezuela).

Graph 2. 8 Representation of the different road users in mortality in each of the regions that make up the Americas region.[1]



[1] The high percentage of the "other" category, especially in the Andean Zone and Mesoamerica, may be due to a lack of data, or because of different reporting procedures, which suggests that the number of vulnerable users may be higher than reported.

Source: PAHO (2019)

Recommended interventions to reduce the high fatality rate in motorcycle crashes

The motorcycle, by conception and design, is a vehicle that will continue to lack a structure capable of absorbing energy in a road crash to protect its users. However, it is important to consider that there are interventions that contribute to the reduction of mortality due to motorcycle crashes.

Below are some of the best practices that are recommended, which can be seen in the Figure 2.30.

Figure 2. 29 Aspects addressed by the good practices

Focus	Subject of work
Driver and passenger	- Minimum age to ride a motorcycle, depending on engine power and riding ability. - Mandatory training for the granting of motorcycle licenses, starting with a basic category and then increasing according to years of experience. - Personal safety elements for driver and passenger.
Vehicle	- Allow only the sale of approved vehicles. - ABS braking device. - Day and night light. - Mandatory technical vehicle inspection (ITV). - Mandatory insurance.
Infrastructure	-Surface condition. -Demarcation and visibility. -Speed management.

Source: Tripodi et al. (2020).

-Anti-lock brakes (ABS):

One of the risk factors that explain the high motorcycle crash rate is the error in the braking technique of motorcyclists. These errors cause the loss of stability and control of the vehicle, putting the driver (and passenger when present) at risk (WHO, 2017). ABS systems constitute an assistance to motorcycle braking, allowing maximum maneuverability while executing braking and, at the same time, stopping the vehicle in a shorter distance. These improvements are achieved by varying the braking force to prevent the tires from locking (Elvik, 2009).

It should be noted that the use of this technology has an established record of mitigating the cost of road crashes; it is estimated that 25-35% of serious crashes could be avoided if motorcycles equipped with this braking technology were used properly (WHO, 2017).

These systems have been mandatory in the European market since January 2016 for motorcycles with a cylinder capacity greater than or equal to 125 cm^3. In LAC, however, such standards are only enforced in the Brazilian market (for motorcycles of 300 cm^3 or more), as can be seen below, in Figure 2.31.

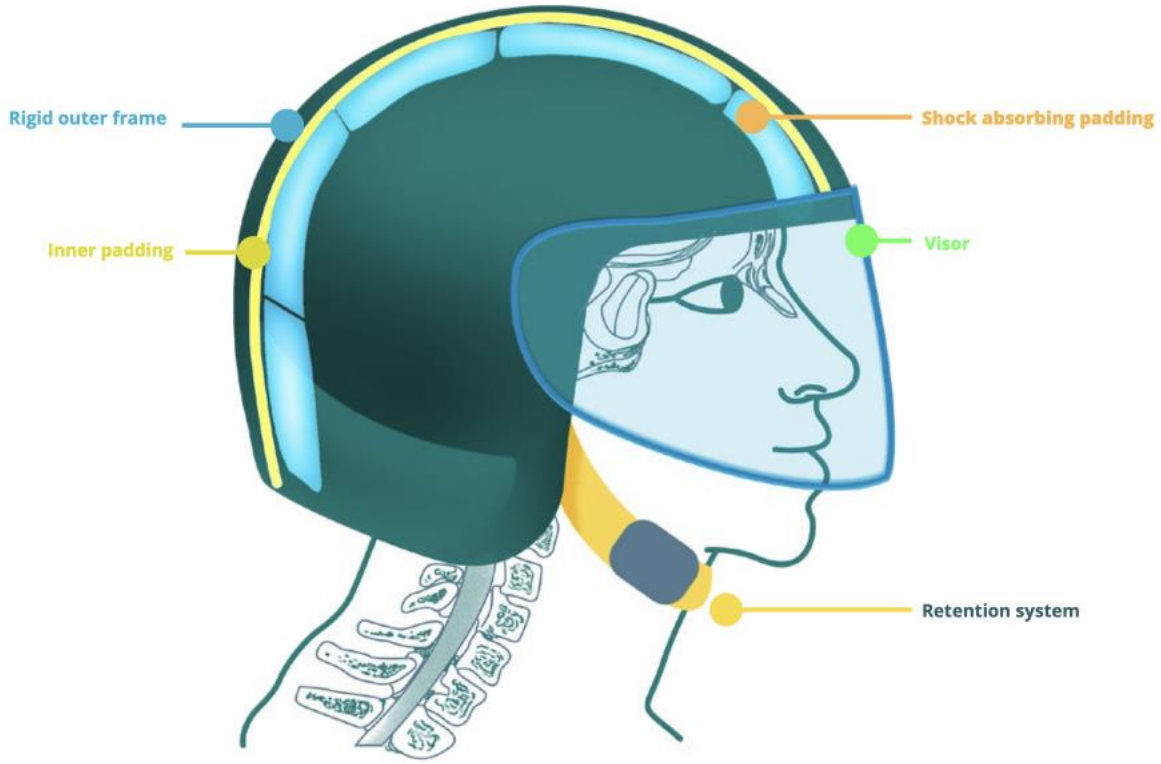
-Safety helmets

Taking into account that motorcyclists are more than twice as likely to die in a road crash than other motorists, and since they do not have automatically activated passive safety elements,

there is a need for the use of additional safety equipment. Head and neck injuries are the leading cause of death and serious injuries among motorcycle users (between 75% and 88% of deaths occur for this reason). The social costs of these injuries are high, both for the survivors and their families as well as for the communities in general. These injuries require specialized or long-term care, generating much higher medical costs than those caused by any other type of injury.

The use of safety helmets is therefore a crucial measure. The correct use of a helmet increases the chances of surviving a crash by 42%, while it also increases the ability to avoid serious injuries by 69%. It is estimated that 1.4 million traffic fatalities could have been avoided between 2008 and 2020 if properly approved safety helmets had been used globally.

Figure 2. 30 Components of the safety helmet



Source: IDB (2022)

Operating principle of the safety helmet

According to PAHO data (2008), the correct functioning of the safety helmet aims to:

- Reduce the deceleration of the skull and, therefore, of the brain, due to the action of its cushioning padding.

- Disperse the impact force, enlarging its surface of action, reducing localized stresses.

- Physically separate the skull from the impacted objects.

In the LAC region, except for specific cases (as can be seen in Figure 2.33, there are national laws that make helmet use mandatory. It is necessary that, in addition to being in force, these laws prescribe the use of helmets for all motorcycle passengers on all roads and those helmets are fully fastened. This last aspect is of great importance, as around 12% of helmets tend to come off the user's head on impact because they were not properly fastened. (United Nations 2016).

It is also necessary to make a mandatory requirement **that helmets are approved** according to international (or national) **standards.** Among the most recognized standards worldwide are UNECE R22 (United Nations) and FMVSS 218 DOT (United States), and many of the national standards of Latin American countries are based on these international standards (NZI Helmets contribution).

The fact that the helmet is approved according to a technical standard provides the certainty that the helmet meets the minimum safety standards, which will protect the head in the event of a crash. The use of safety helmets that are not tested and approved under these technical standards should be strongly discouraged.

Figure 2. 31 a.Protection area in open helmets approved to UNECE R22 standard.

Figure 2.30b. Protection area in full-face helmets approved to UNECE R22 standard.

Figure 2.30c. Area of protection in helmets approved to FMVSS 218 standard.

Source: BID (2022)

Incorrect use of safety helmets must be addressed by the relevant institution, with the aim of ensuring that the general public uses helmets correctly, in accordance with the requirements of the regulation. It is estimated that the introduction of a helmet law (with corresponding enforcement) decreases fatal injuries by 26%, while the repeal of an existing law increases them by 30% (In turn, the law on the Elvik, Hoye, Vaa and Sorensen, 2009).

Figure 2. 32 Legislation on helmets and ABS brakes

Country	Helmet Law					ABS mandatory
	Does it exist?	Does it apply to driver and passenger?	All roadlanes?	Helmet fastened?	Specific standard?	
Argentina	Yes	Yes	Yes	Yes	Yes	**No**
Barbados	Yes	Yes	Yes	**No**	Yes	**No**
Belize	Yes	Yes	**No**	Yes	**No**	**No**
Bolivia	Yes	Yes	Yes	No	Yes	**No**
Brasil	Yes	Yes	Yes	Yes	Yes	Yes*
Chile	Yes	Yes	Yes	Yes	Yes	**No**
Colombia	Yes	Yes	Yes	No	Yes	**No**
Costa Rica	Yes	Yes	Yes	No	Yes	**No**
Ecuador	Yes	Yes	Yes	Yes	Yes	**No**
El Salvador	Yes	Yes	Yes	Yes	**No**	**No**
Dominican Republic	Yes	Yes	Yes	Yes	**No**	**Yes**
Guatemala	Yes	Yes	Yes	No	**No**	**No**
Guyana	**No**	-	-	-	-	**No**
Honduras	Yes	Yes	Yes	Yes	Yes	**No**
Jamaica	Yes	Yes	Yes	Yes	Yes	**No**
México	**No**	-	-	-	-	**No**
Panamá	Yes	Yes	Yes	**No**	**No**	**No**
Paraguay	Yes	Yes	Yes	Yes	Yes	**No**
Perú	Yes	Yes	Yes	**No**	**No**	**No**
Suriname	Yes	Yes	Yes	Yes	Yes	**No**
Trinidad and Tobago	Yes	Yes	Yes	**No**	Yes	**No**
Uruguay	Yes	Yes	Yes	Yes	Yes	**No**

* For motorcycles of 300 cm 3or more.

Source: Own elaboration with data from WHO (2018a).

Experience 22. Campaign of the National Road Safety Agency of the Argentine Republic (2021)

In Argentina, according to data from the National Road Safety Agency (ANSV) in 2019, only 64.2% of motorcycles in circulation had both driver and passengers wearing helmets. Following information provided by ANSV studies, the lack of knowledge of the risk involved is not the main cause of the non-use of helmets, but this phenomenon occurs due to deeply rooted customs in society. Certain beliefs, such as that if the route is short or the speed is low, helmets are not necessary, or the feeling of discomfort when using them, are part of the reasons for the low rate of use.

In order to encourage the use of safety helmets, the ANSV is currently carrying out an incentive program for motorcyclists from vulnerable populations: a helmet is given to each young person who obtains his or her first motorcycle license. This campaign has some novel elements to consider. For example, before receiving the safety helmet (approved by the IRAM AITA 3621 standard), the beneficiary has the the option to choose the color, thus taking into account the emotional aspects that can lead people to choose their safety equipment. The only color not available is black, as this color reduces the ability of drivers to be seen on the road. In addition, the helmet does not have any type of logo or identification of the delivery program in order to avoid stigmatizing the recipient by the fact that he/she has been assisted by the State.

The project will be considered successful in the event that the next ANSV observational survey on helmet use yields better results for the population in question.

Source: National Road Safety Agency of Argentina.

Experience 23. Approved and affordable helmets for Latin America. FIA Foundation

The FIA has set itself the goal of creating a safety helmet, homologated to the UNECE R22 standard, with the following characteristics:

-The helmet must be SAFE. With the objective of protecting motorcyclists by means of an internationally recognized homologation.

-The helmet must be ECONOMICAL. The aim is to make helmets accessible to all motorcyclists in low- and middle-income countries, discouraging the use of unsafe helmets for economic reasons.

-The helmet must be COMFORTABLE. Discomfort should not be a barrier to using a safety helmet; in this sense, the design of the helmet has been adjusted so that factors such as heat or humidity do not negatively affect the user of the helmet in question.

In coordination with national road safety agencies, car clubs and the IDB, the FIA Foundation carries out helmet donation campaigns, with the aim of raising awareness of the importance of helmets with the characteristics in the Latin American market. So far, the countries reached have been Costa Rica, Uruguay and the Dominican Republic, with plans to extend this project to at least three countries in the region during the year 2021.

2.4.5. CONTROL OF ALCOHOL AND OTHER DRUGS

As we have already seen, road users are one of the pillars of the Decade, in order to encourage safe behavior and thus prevent risks and the possibility of suffering road traffic injuries. However, the behavior of users is also linked to the last pillar: post-synthetic care, since the care of an injured person with the presence of alcohol or drugs is not the same as that required by one without the presence of such substances. Recovery is also different for a user of these substances. For this and other reasons, PAHO and IDB undertook the task of implementing a Multisite Collaborative Study on Alcohol, Drug Use and Traffic Injuries in Emergency Departments in the Dominican Republic and Peru. This study was conducted in emergency rooms and aimed to analyze the relationship between alcohol and other drugs in traffic injuries. The study was carried out in two hospitals; one in Santo Domingo, Dominican Republic, and the other in Lima, Peru. The trainings were held in Santo Domingo on September 11 and 12, 2018 and in Lima, on October 4 and 5, 2018.

According to this study, the risk of suffering a traffic-caused injury (TBI) is significant when alcohol consumption is present and even more significant when alcohol is combined with cannabis. The risk wasnot as significant in the presence of cannabis alone. This risk was mainly evident among drivers. Interestingly, passengers had a higher risk of TBI from alcohol use than drivers, but this was not the case when alcohol was considered alone, suggesting that many of these passengers may also have used cannabis or other drugs along with alcohol prior to injury, whereas drivers may be less likely to combine drugs. **These data corroborate the risk posed by multiple drug use in relation to the likelihood of TBI.**

Large variations in injury characteristics and substance use were found between the two sites. The vast majority of patients from the Dominican Republic were injured in an event involving a motorcycle or moped, of which only 20% reported wearing a helmet, while just over half of the patients from Peru who were injured used those vehicles as well as bicycles, but 40% reported wearing a helmet. Just over 10% of patients in the Dominican Republic were injured in automobile-related events and less than half reported wearing a seat belt, while one-third of patients in Peru were injured in automobile-related events and only 10% reported wearing a seat belt. **These data suggest the need for public policies on helmet and seat belt use and enforcement.**

Similar percentages of patients in the Dominican Republic and Peru tested positive for alcohol, but those in Peru were half as likely to report drinking in the six hours prior to injury as those in the Dominican Republic. However, patients from the Dominican Republic were almost twice as likely to test positive for drugs as those from Peru, and were also more than twice as likely to test positive for cannabis; small percentages from both sites reported that they had used drugs in the six hours prior to injury. It is possible that the saliva screening test covered a much longer time period than the

six-hour period prior to injury. **These data suggest the need to confirm whether saliva screening for substance use is applied as a surveillance tool in countries in the region.**

Among those who reported pre-injury drug use, three-quarters of those in the Dominican Republic said they were at least somewhat under the influence of drugs, while in Peru it was one-quarter of patients. Almost all of those in this situation reported a causal association of drug use with TBI in Peru but were less likely to do so in the Dominican Republic. **The differences between the two countries highlight the need for similar data from other countries in the LAC region to determine, at the regional level, the risk of TBI from alcohol and other drug use.**

2.4.6. DRIVER'S LICENSE SYSTEM IN LATIN AMERICA AND THE CARIBBEAN

A driver's license is a privilege that requires an adequate training process and the verification of aptitudes, theoretical knowledge, and skills. The purpose of a license is to limit driving to competent people, capable of recognizing and following traffic signals and maneuvering the vehicle.

Licensing practice in the region is varied. Critical issues related to motor vehicle licensing include age, physical fitness, competencies (traffic signs and driving), license validity time, and age. Data for various countries are shown in Figure2.32

Figure 2. 33 Minimum driver's license requirements for motor vehicles.

	Recommendation	Observations LAC countries
Age	Age of majority	15 years (El Salvador), 16 years (Colombia, Costa Rica, Dominican Republic, Guatemala, Venezuela) 17 years old (Argentina) 18 years (Brazil, Bolivia, Chile, Mexico, Nicaragua, Panama, Paraguay, Uruguay)
Medical examination	In particular, visual test	No (Guatemala, Mexico City) Yes (Other countries; additionally psychological test in Brazil, Bolivia, Chile, Ecuador, El Salvador, Paraguay)
Theoretical test	Traffic signs	No (Mexico City, Bolivia, Ecuador, Guatemala) Yes (In other countries, in some cases the theoretical test includes basic mechanics, as in Argentina and Venezuela.)
Practical test	Driving and parking skills	No (Bolivia, Colombia, Ecuador, Guatemala, Mexico City) Yes (Other countries)
Driving course certificate	Minimum hours of supervised driving	Yes (Bolivia, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala) No (other countries)
Validity	5-6 years old to senior	From 1 year (Guatemala) 3 years (Mexico City) 4 years (Dominican Republic) 5 years (Argentina, Colombia, Ecuador, El Salvador, Nicaragua, Panama, Paraguay) 6 years (Chile, Costa Rica) 10 years (Brazil,* Bolivia, Uruguay)
Rookie license	Opportunity to drive with companion	Yes (Argentina, Costa Rica, Dominican Republic, El Salvador, Venezuela) No (other countries)
Age for commercial vehicle drivers	20 years or more	25 años (Panamá) 22-25 años (Paraguay) 21 años (Argentina, Brasil, El Salvador, Uruguay) 20 años (Costa Rica 18.5 años (Ecuador) 18 años (otros países)

*12 years during the pandemic

Sources: Websites of institutions in each country.

These conditions make it possible to establish a classification of the countries (Figure 2.33).

Figure 2. 34 Licensing conditions of selected countries in LAC.

Best practices	Chile Panama Paraguay	High age requirements, with physical fitness, knowledge and skill tests. Only adults.
Good practices	Brasil Uruguay Costa Rica El Salvador Nicaragua Venezuela Dominican Republic	In Brazil and Uruguay the validity of the license is very long (10 years). Argentina, El Salvador, Costa Rica and Venezuela allow minors to drive. Validity 4 years in Dominican Republic
Intermediate Practices	Bolivia Colombia Ecuador	Theoretical tests and medical examinations are required. No practical tests are required, although supervised driving hours at a driving academy are required.
Deficient systems	Mexico City Guatemala	They do not have theoretical or practical tests (in Guatemala this is replaced by a driving school certificate).

Source: Own elaboration based on minimum requirements according to transit and transportation agency websites.

The road safety literature on licensing shows that age (cognitive maturity) and experience are key factors in reducing the risk of involvement in traffic crashes. According toWilliams (1997); Hartling, Russell and Vandermeer (2004), and Chapman, Masten and Browning (2014), lack of maturity may be associated with impulsive behavior, poor decision making and overconfidence, which is reflected in adolescents and young adults having riskier driving styles. These risky behaviors include driving above speed limits, tailgating, passing in prohibited zones, use of mobile devices, drunk driving, and not wearing seat belts or motorcycle helmets. Lack of experience, on the other hand, may be associated with inappropriate reactions to risky situations or difficulty in driving at night or on inter-municipal roads.

For these reasons, in many countries with low relative road crash incident rates, novice licensing has been introduced (see, for example, Barua, Sidawi and Hoque, 2014 or Bates et al. , 2014). In these cases, the license involves restrictions, such as driving accompanied by an adult, not driving at night or on interurban roads, or being accompanied by other young people. In the LAC region, there are novice licenses in Argentina, Costa Rica, El Salvador, the Dominican Republic and Venezuela, aimed at minors and with the general requirement of driving accompanied by an adult (Figure 2.32).

Regarding commercial vehicles (buses, trucks), all countries in the region require age of majority, with some setting the minimum age for these licenses at 25 (Figure 2.34). The higher cognitive maturity of drivers and their previous experience in light vehicles (cars, SUVs, vans) may contribute to higher safety (see, for example, Crizzle et al., 2017).

Regarding the temporary or permanent suspension of the driver's license, several countries with low crash incident rates have adopted point systems, in which the accumulation of infractions committed leads to penalties (see, for example, Klipp et al., 2011). In the region, the point system has been implemented by Brazil and Trinidad and Tobago[19].

In Brazil, the accumulation of 40 points requires the driver to attend a retraining course in order to continue driving, although there are infractions that generate license suspension (such as driving under the influence of alcohol or racing on public roads). These penalties can initiate at 30 points if a serious offense is committed within one year and at 20 points when there are two very serious offenses.

Figure 2. 35 Brazilian point system

Infringement	Points	Examples
Slight	3	Handling a cell phone while driving
Medium	4	Parking in a prohibited place, stopping at a pedestrian crosswalk, blocking an intersection, etc
Serious	5	Not wearing seat belts while driving, not using turn signals when crossing or changing lanes, driving over the speed limit, etc.
Very serious	7	Disobeying a red light, driving a vehicle without the proper license, driving well over the speed limit, etc.

Source: Olhar Digital (2021).

The impact of point systems is positive, although this depends on the characteristics of the system and the control effort. For example, in Spain, the implementation of the point system resulted in a 14.5% reduction in the number of fatalities after 18 months of implementation (Pulido, Lardelli, De la Fuente, Flores, Vallejo and Regidor, 2010).

Recommendations on licensing, in countries that do not require it:

19 https://rgd.legalaffairs.gov.tt/laws2/alphabetical_list/lawspdfs/48.50.pdf

1. Increase the minimum licensing age to at least 18 years old.
2. Establish a minimum of 20 years for commercial vehicle (buses and trucks) and individual public service (cab) licenses.
3. Require a medical examination, at least for visual acuity. It does not seem necessary to require hearing tests[20].

4. Require a driving test, especially for motorcyclists[21].

5. Establish license renewal every 5 or 6 years until the age of 65, as sensory and motor skills are reduced, while the risk of dementia increases[22]. The license can be valid for two years for people between 65 and 75 years of age, and annually for those over 75 years of age.

6. Implement licensing systems for novices, with restrictions for drivers, such as: being accompanied by a licensed driver; not driving between 8 p.m. and 6 a.m.; not driving on rural roads (intermunicipal); not carrying underage passengers; having consumed zero alcohol while driving.

7. Evaluate the implementation of point-based systems (demerit for infractions) to temporarily or permanently suspend driver's licenses.

20There does not appear to be a significant relationship between hearing ability and accident rate. See, for example, https://one.nhtsa.gov/people/injury/research/medical_condition_driving/pages/Sec3-Hearing.htm.

21 See examples at https://scioteca.caf.com/handle/123456789/1149.

22 See at https://one.nhtsa.gov/people/injury/research/medical_condition_driving/pages/Sec14-AgingDr.htm.

REFLECTIONS ON SAFE USERS

This pillar features many interventions because they are low cost and easier to experiment with, in addition to the greater likelihood of finding private sector organizations to finance them as part of their corporate social responsibility.

However, the sustainability of actions under this pillar depends on three strategies, which require a multisectoral approach by States and international organizations: a) approval of regulations and operational guidelines for implementation, under the responsibility of governmental organizations and legislative powers in agreement with stakeholders; b) constant monitoring by national, state and municipal traffic authorities; c) campaigns aimed at changing user behavior.

Regarding child restraint systems and safety helmets, most countries have their corresponding regulations; however, their use is still not widespread and enforcement is weak. For both CRS and head protection, it is important that national regulations follow international standards, that police and traffic agents are trained for effective enforcement and, above all, that child restraint systems and helmets are available on the market and are offered at affordable prices. It is known, for example, that motorcyclists in the region are part of a more disadvantaged economic class, therefore, the price elasticity of demand for helmets or restraint seats is higher. It becomes even more difficult to incorporate the use of helmets when motorcycle passengers are also obliged to wear them, since this may require the purchase of helmets for an entire family.

Regarding school road policies, in most countries these have not yet been applied in a comprehensive and sustainable manner e. In more centralized countries, such as Chile and the Dominican Republic, their road safety agencies were successful in designing and implementing a long-lasting policy, involving different government agencies - such as ministries of education, traffic agencies - and the schools themselves. However, in countries with different federal entities, such as Brazil, Argentina or Colombia, it is a challenge to implement a centralized policy by a national road safety agency. Most schools are provincial or municipal, and the road infrastructure is managed by the entity where the school is located. It is a challenge is to convince these entities to design their own programs and think in a multi-sectoral way to implement the necessary infrastructure reforms and change the behavior of children in the school environment.

In terms of speed management policies, LAC countries have good laws that define appropriate speeds in all environments, mainly in urban areas. However, it is necessary to work with local governments to implement traffic calming measures in the main corridors and in school and health center environments, and to improve the enforcement of traffic laws. This effort has been pursued by different international institutions, such as Bloomberg Philanthropies, the WB, the IDB and the World Resources Institute.

It is important to highlight that, although presented under the Safer Users pillar, speed management and school road policies relate to more than one of the UN pillars. For these efforts to be successful, it is essential that an integrated strategy be adopted with a strong infrastructure component (pillar 2), as well as communication, education and enforcement actions.

Finally, although all countries already have mature driver's license systems, countries such as Bolivia, Colombia, Ecuador, Guatemala, and cities such as Mexico City, need to improve their systems to transform them into a more effective tool for road safety. In addition, there is still a need to increase enforcement and improve integrated information systems in order to avoid fraud and non-compliance with the requirements of the law.

2.5. Post-crash care

OBJECTIVES OF THE 5 DECADE OF ACTION PILLARS,

POST-CRASH CARE

This pillar seeks to promote the improvement of the capacity of health and other systems to provide appropriate emergency, pre-hospital, hospital and rehabilitation treatment to those injured in road traffic crashes. Activities include the creation of pre-hospital care systems and the implementation of a single national emergency telephone number; the provision of early rehabilitation and support services for injured patients and the bereaved; the establishment of insurance systems to finance these initiatives; and the promotion of a thorough accident investigation and the implementation of an appropriate legal response.

Source: WHO (2011).

This pillar aims to improve the capacity to respond to road traffic emergencies and to increase the capacity of health and other systems to provide victims with appropriate emergency treatment and long-term rehabilitation. In addition, this care should be affordable to all road traffic victims, while not putting placing undue stress on countries' budgets. The establishment of appropriate and compulsory insurance schemes for road users is encouraged in order to finance rehabilitation services for crash victims. This section will describe the two main areas of victim care: the comprehensive victim care system and vehicle insurance.

2.5.1. COMPREHENSIVE CARE FOR VICTIMS OF ROAD TRAFFIC CRASHES

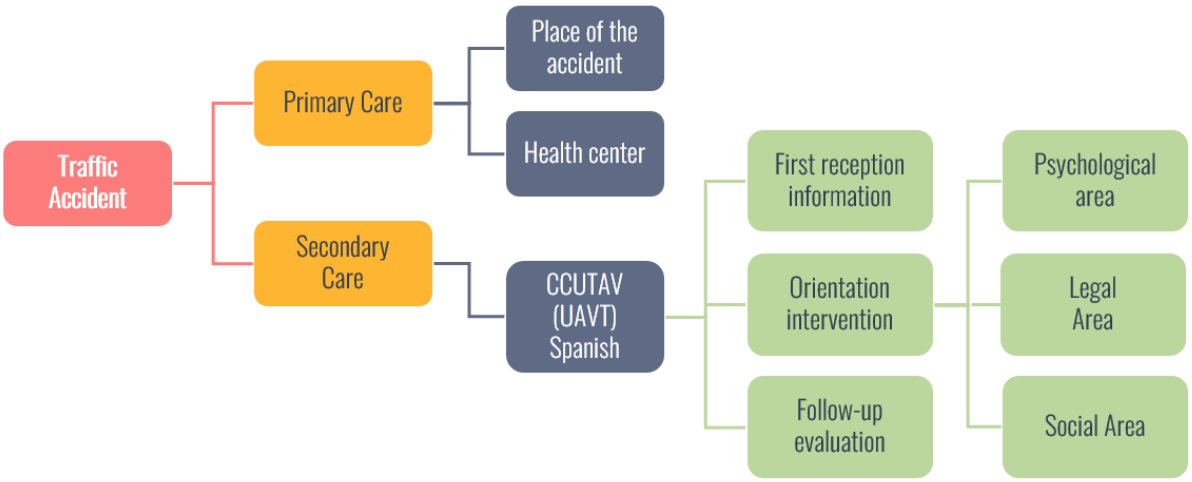
The desire to promote and implement comprehensive care to support the direct and indirect victims of road crashes, as part of the UN commitment, has mobilized civil society organizations in LAC countries. However, this has not necessarily translated into action by regional governments.

One of the greatest challenges has been to counteract the negligence suffered by the surviving victims and the families of those who have lost their lives in a traffic crashes due to the lack of institutional support from the States. Therefore, it is essential, in these tragic circumstances, to offer comprehensive care with

close support to inform, guide and advise, helping as much as possible to mitigate the pain and overcome the various losses (life, health, economic, etc.).

Figure 2.35 illustrates the care pathway proposed by victims' associations for those affected by a traffic crash. It is an attempt to provide answers to questions and allay doubts, to heal wounds, and to face the challenges that arise from these events.

Figure 2. 36 Scheme of victim care



* Comprehensive Care Units for Traffic Accident Victims (UAVT)

Source: Prepared by the Ibero-American Association of Victims against Road Violence (FICVI).

Once the report of a road crash has been received, it is expected that the authorized units will be in charge of collecting the data and activating a response that guarantee assistance to the victims in the shortest possible time. Communications often come from toll-free emergency numbers, which should be widely publicized. In this primary care phase, professionals must apply the established protocols and provide specialized transport to ensure the stabilization of the patient, reducing risks during transfer to the nearest hospital.

Emergency toll free numbers in LAC

Although most countries had, a telephone number for access to prehospital care by 2009, five countries had regional-type telephone numbers and two had no number at all. By 2018, that situation had improved appreciably, with 12 countries having an identified national number for emergencies, although one of those countries (Guatemala) has multiple numbers.

It is of utmost importance that all countries in the LAC region have a common number -for example, 911 to make sure this number is well-known by the public (Fundación Mapfre and FICVI, 2015).

At the same time, the Police must ensure the security of the area and collect information that will be processed in a centralized data system (Mapfre Foundation and FICVI, 2015). This data collection system should contain unified information from all sources (Police, forensic and hospital) to avoid the duplication of data. It is important to emphasize that the unified system also makes it possible to know the actual number of deaths within 30 days after the road crash incident. In many LAC countries, the absence of this unified system has led to underreporting cases, since hospitalized patients who died within 30 days of the incident are not recorded in this system.

For secondary care, there should be a protocol and guidelines incidents of death at the scene of a crash. In this case, the person in charge is usually a member of the Police (in its different denominations throughout LAC), who must be trained not only in these protocols, but also in techniques to convey bad news, as it is necessary to go to the home of the affected person to communicate the event (Mapfre Foundation and FICVI, 2015). But care for those affected does not end with informing them of the news; it must continue with a psychological, legal and social support structure and guidance service for those impacted and their families, with special attention to families in vulnerable situations.

For this purpose, the Integral Attention Units for Traffic Accident Victims (UAVT) have been developed as a model. The UAVTs should be the meeting point (physical, telephonic or virtual) for those affected after suffering a road crash incident, where all information is centralized for victims and their immediate family members, and where attention is provided, within the scope of their competencies, to all victims and those affected by traffic crash incidents.

With the creation of the UAVT, the State seeks to provide a concrete response beyond an initial emergency, because only by recognizing that the problem exists at the individual and personal level for each person affected, will it be possible to move forward and find solutions. During this process, the following factors must be taken into account:

- Welcome with general, specific and clear information and guidance.
- Individualized legal information for the exercise of rights.
- Psychological intervention for emotional care and support.

- Social assistance that allows reintegration into community life.
- Follow-up for each person or family.

Table 20. Case Study: Federal Network of Assistance to Victims and Relatives of Road Accidents, Argentina.

Argentina formally presented, on behalf of the National Road Safety Agency (ANSV), *the Federal Network of Assistance to Victims and Family Members of Road Accidents* in October 2019. This agency accompanies and advises victims of road crashes and their families free of charge in post-emergency situations. The network works as a nexus that organizes and manages the existing resources of the nation, provinces, municipalities and private agencies = to achieve a quick and effective response to help mitigate the damage caused by the road accident. It offers legal orientation (not sponsorship), psychological, post-hospital health and social services, with the aim of eliminating repeated bureaucratic interventions, which only increase the pain and provoke a second victimization. The main challenge is the compliance with the network of each one of the provinces of Argentina, which requires significant coordination with the different entities of the federation.

In two other LAC countries there are initiatives linked to victim assistance, but these operate only if the case is brought before the courts.

In Costa Rica, the Office of Attention and Protection of Victims (OAPVD) is an entity of the Public Prosecutor's Office responsible for assisting and protecting all nationals and foreigners who are victims, witnesses or other participants in criminal proceedings. It attends to any person who has been a victim of a crime without distinction for ethnicity, age, sex, gender, nationality, sexual preference, politics, or religion. The objective of the office is to protect the rights of those involved in criminal proceedings, as well as to regulate extra-procedural protection measures and their procedures. The OAPVD seeks to minimize re-victimization through interdisciplinary work involving social work, psychology, law, criminology and sociology. In addition, its purpose is to ensure that during the criminal process the victim exercises effective participation in the protection of his or her rights. Te OAPVD promotes a comprehensive approach that takes into account the specific needs of each person. The limitation of this initiative lies in

the fact that only victims and family members who are part of a criminal process have access to these services.

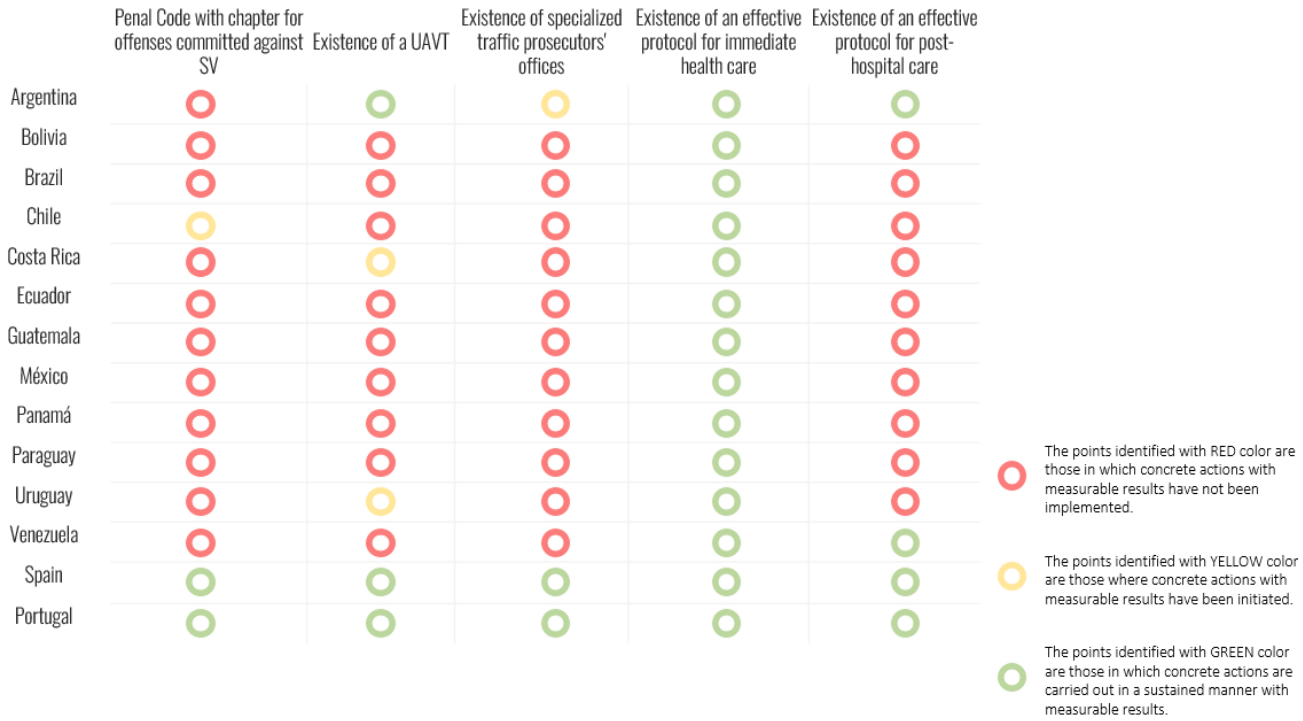
Finally, Uruguay's Victims and Witnesses Unit aims to protect victims and witnesses in the framework of criminal proceedings, recognizing a series of rights that the new Code of Criminal Procedure grants them. These rights include the right to be heard, to be able to meet with a legal team investigating the case, as well as to receive care and support in the initial stages. To this end, the unit has the task of working from the first moment together with the legal teams and the police in the creation of a network of containment and support, so that both the victim and the witness can exercise their rights during the criminal proceedings. These services can be accessed by all victims of any crime who are undergoing criminal proceedings. The unit provides attention, guidance, support and accompaniment from the moment the existence of a presumed victim is known and throughout the criminal process. It also provides support to strengthen assistance and protection networks for victims and witnesses, based on inter-institutional work with State and civil society members in each territory. This unit only assists those involved in criminal proceedings as of the entry into force of the new Criminal Procedure Code (February 1, 2017) and does not provide service to road victims who do not go through such a process.

It is essential to recognize, protect and support the victim not only in material ways like economic repair, but also in the moral dimension. To this end, it is essential to offer the victim facilities for the exercise and protection of his or her rights, avoiding unnecessary procedures that could lead to a second victimization, providing effective information and guidance on the rights and services to which he or she is entitled, and referral by the competent authority.

According to road victims' associations, justice must be *restorative for the victim, preventive for society and re-educative for the guilty party*, and it is therefore necessary for countries to have specialized traffic prosecutors' offices. All that is needed is the political will to create this role within the prosecutors' offices in order to promote, implement and follow up permanent public policies specifically aimed at preventing traffic crashes and protecting the rights of the victims of these crimes.

Figure 2.37 summarizes the diagnosis of the countries in the region in terms of the progress made in post-stress care in the framework of the objectives proposed by the Decade of Action for Road Safety 201-20201, based on the analysis by FICVI, up to 2019.

Figure 2. 37 Status of compliance with FICVI demands as of 2019.



Source: Prepared by FICVI.

Note: this table is based on the opinion and experience of the victims' associations that are part of FICVI.

In LAC, victims' associations have promoted an agenda for the protection of victims through conferences, training, awareness campaigns and technical support to governments. The main civil society initiatives are described in experience 24.

Experience 24. The role of victims' associations against road traffic violence

In 2010, 15 civil society associations, mostly formed by victims of traffic crashes in Ibero-America, met at the First Ibero-American Meeting of Associations of Victims of Traffic Accidents in Medellin, Colombia, and founded the Ibero-American Federation of Associations of Victims against Road Violence (FICVI). Within this framework, they issued the so-called *Medellin Declaration.*

Since 2014 and on an annual basis, FICVI brings together its member associations in an Ibero-American Road Safety Meeting, focusing on one or more topics of importance in the host country. These meetings feature the participation of a group of national and international experts who discuss proposals and provide concrete solutions to the problems of road safety in that country. FICVI has raised awareness of the human tragedy caused by road crashes, as well as of the reality faced by civil society associations in carrying out their work. The main lines of action are to promote a) the creation of integrated road victim care units; b) changes in the laws that vindicate the rights of victims and their families; and c) the creation of specialized prosecutors' offices for road safety crimes, to harmonize the criteria for effective responses to criminal offenses against road safety, as well as to guarantee the unity of criteria and responses in this area.

Since its foundation, FICVI and its associations have achieved the following results:

- Organization of itinerant forums on road justice, with the aim of promoting the creation of traffic prosecutors' offices.
- Participation in numerous meetings, forums, conferences and seminars, both at regional and international level, as organizers, speakers or panelists, with the aim of raising the visibility of victims of road violence.

Publications:

- *Faces of Ibero-America,* presents first-person testimonies about the impact of traffic crashes on victims, their families and communities.
- The *Ibero-American Guide to Comprehensive Care for Victims of Traffic Accidents,* a document that sets out the guidelines to be followed in the post-crash area and sets out some of the most important challenges for FICVI in the LAC region. It has been published in three languages (Spanish, English and Portuguese), printed and distributed in all FICVI member countries (3,000 copies) and delivered to the authorities working on the problem.

- The *Training Manual for Professionals of the Comprehensive Care Units for Victims of Traffic Accidents and the Protocol of Action for Comprehensive Care Units for Victims of Traffic Accidents.* These documents promote and assist in the creation of comprehensive care units for victims of traffic accidents (UAVT). Both provide public authorities with a working methodology to be used when training professionals and users involved in road crashes who will operate directly and indirectly in the development of the UAVTs.

- *Characterization of NGOs focused on road safety: challenges and opportunities in Ibero-America,* This document makes an

introspective and critical analysis of each of the associations, with the aim of determining the strengths and weaknesses of current road safety policy

- **Awareness-raising and training** workshops on road victim care units, on how to communicate the bad news to families and how to communicate by educating the authorities and those involved in countries such as Argentina, Costa Rica, Ecuador, Guatemala, Panama and Uruguay. More countries and cities continue to be added.

AT THE LEGISLATIVE LEVEL:

- **In Argentina,** the association Conduciendo a Conciencia contributed to the creation of the National Road Safety Agency (ANSV) in 2008.

- **In Brazil,** the Thiago de Moraes Gonzaga Foundation, through the Vida Urgente program, promoted the Lei dos Postinhos, which prohibits the consumption of alcoholic beverages at gas stations, parking lots and other similar locations.

- **In Chile,** the Emilia Silva Figueroa Foundation was the driving force behind the enactment of the law criminalizing drunk driving (2007-2014).

- **In Costa Rica,** the association Aconvivir promoted Law 19548, on Cycling Mobility and Safety (2018).

- **In Mexico,** in the state of Nuevo León, the NACE association modified the law to integrate the Citizen Observatory for Road Safety into the Vehicle Control Institute, which it currently chairs (2018). In the state of Jalisco, thanks to the participation of VIVIAC's citizen movement, along with many other organizations has been promoting the creation of a federal road safety law since 2019.

- **In Panama,** the Monica Licona Foundation supported and achieved, together with a broad group of NGOs, the signing of the Pact for Road Safety and Education (2019).

- **In Uruguay,** the Fundación Gonzalo Rodríguez achieved the approval of National Decree 206 and the modification of Law 19061, on Traffic and Road Safety in the National Territory, which allows for the protection of children in school transportation and private vehicles (2010-2014).

2.5.2. VEHICLE INSURANCE AS A ROAD SAFETY PREVENTION TOOL

Compulsory motor insurance (CMI) can have a positive impact on the five pillars of road safety in the global plan of the Decade of Action for Road Safety. For example, insurance can strengthen the institutional framework through shared databases between the public and private sectors, encouraging safe behavior through bonus-malus products[23], updating the safety level of the vehicle fleet through the analysis and distribution of information on the vehicles most frequently involved in road crash incidents, improving infrastructure based on data on critical points and, of course, providing comprehensive and efficient care for victims of road traffic injuries.

Thus, the aim is for vehicle insurance to play an active role in road safety, with greater emphasis prevention, which contemplates the implementation of improvements with a multisectoral vision, so that the actions of this instrument support the reduction of the incidence of road crashes and the severity of the injuries they cause.

Brief historical review of road crashes

The appearance of vehicles[24] meant an important change in the development dynamics of cities and the interaction of people at different levels: productive, economic, social, political, anthropological, and legal to mention only a few (Gaviria Fajardo, 2011). However, at the same time, since the very appearance of vehicles, countries experienced conflict, exposure to risk and road crashes. Along with these incidents came injuries and deaths. For this reason, it was necessary to develop the concept of damage compensation for this type of incident.

The first countries to introduce vehicle liability legislation were Australia, New Zealand and Finland, which in 1925 opened a public debate on the obligations that should fall on vehicle owners, as a consequence of the material and personal damages they may cause while driving.

Thus, the way was paved for the structuring of legislation related to the incorporation of elements to prevent the occurrence of traffic crashes, to attend to the victims involved in them and to compensate the damages caused by this type of event. Scholars of the subject have identified four key aspects of such legislation.

23 Reward and punishment system. The price of the insurance takes into account the behavior of each policyholder.

24 It does not refer exclusively to one type of vehicle, but, in general, to devices equipped with an engine: motorcycles, automobiles or off-road vehicles, to name a few.

- Primacy of the victim over the vehicle.
- Imposition of a surety bond on the owner in order to obtain a driver's license.
- Liability insurance.
- Solidarity fund for victims of a hit-and-run driver or belonging to non-wealthy owners.

Since then, countries have been incorporating, among others, the aforementioned measures, with vehicle insurance being one of the most important instruments. There is still a long way to go to take full advantage of the potential of insurance to promote safer mobility.

The role of the insurance contract and the compulsory nature of vehicle insurance

In its simplest expression, the insurance contract is a legal bond between an insurance company and the policyholder. The purpose of an insurance policy is to transfer risk from the holder to the company, so that the latter indemnifies the victim and/or policyholder in case of loss, provided that the conditions set forth in the contract have been met and, in particular, that the events occur without intent, i.e., that they are unforeseen events.

This type of contract must contain some essential elements that make them valid, such as the insurable risk, the insurable interest, the insurance premium, the insurer's conditional promise and the nature of the indemnity. Some experts also consider the principles of mutuality, the doctrine of the utmost good faith or uberrima fides and the doctrine of adequate cause important elements of insurance policies. (Nuñez del Prado Simmons, 2011; Martín Menjívar, 2013; Ossa Gómez, 1991).

To the extent that the conditions of the insurance contract are met upon the occurrence of a loss, the insurance company must pay an indemnity to compensate the damages, losses or costs incurred by the insured to return the victim to his or her state before the loss. It should be reiterated that the insurance contract does not seek the enrichment of the insured, but rather to compensate them for damages he may cause to another, or to guarantee the necessary resources for the care that the insured or other beneficiaries may require.

From the point of view of road safety and its five pillars, the basic role given to the compulsory vehicle insurance contract is the repair of damage resulting from traffic crash incidents, i.e., the care of victims. The most developed countries have included compulsory civil liability insurance in their legislative frameworks for the comprehensive repair of damage, i.e., coverage to cover both personal injuries and property damage caused to third parties, depending on the determination of fault. Other countries have adopted personal accident type insurance, in

which the activation of the coverage is prioritized without the need to establish fault. In general, this form of insurance provides personal injury coverages only.

It is ideal that a country have all vehicle owners have the capacity to respond for damages they may cause to third parties. However, in today's free market environment, only some owners have insurance to back them up in the event of a traffic crash. In this way, the victims of those road crash incidents not covered by insurance will be left to rely on a guilty verdict that obliges the causer to repair the damage, depends on the economic capacity of the person responsible for the incident or of a third party to face the situation and, or ultimately the government, to take care of the costs. This is known as market failure, which is why road crash incidents are referred to as a negative externality: a failure of the system insofar as the actions of one person impact the welfare of another. In the absence of insurance to meet a victim's needs, there is a process of re-victimization of the individual, since the possibility of returning the person to the situation s/he was in before the incidence of the crash is undermined.

Hence the need to intervene in the market and remedy such failure. The state introduces the obligation for all vehicle owners to have insurance that can compensate a victim due to the damages caused because of a road crash. Among other consequences, this produces an important form of fiscal relief, since the existence of an insurance policy delegates the financing of the victims' care to the insurance contract and not as part of budget items financed by general taxes to be paid by the population. Insurance also guarantees the health centers the possibility of billing the services provided to the victims, without the need to resort to the currently available budget

As illustrated above, compulsory vehicle insurance has the potential to have a positive impact on the five pillars of road safety. The figure below summarizes this potential.

Figure 2. 38 Contribution of compulsory vehicle insurance to road safety

Vehicle insurance situation in LAC

Previously, reference was made to the importance of having vehicle insurance schemes that guarantee the reparation of damages to victims in the event of a road crash and the benefits that this has for victims, governments, policyholders or health centers and others. Even so, the IDB and FIA *diagnostic study Movernos Seguros* found that, to date, there are a large number of countries in which vehicle insurance is not mandatory or its coverage is limited to compensation for personal injury, permanent disability or death. In order to introduce public policy recommendations appropriate to each country's situation, Movernos Seguros analyzed the insurance coverage offered and the indemnity process used. Subsequently, it formed three groups of countries under the following criteria.

Group 1: those countries that do not have compulsory motor insurance (CMI).

Group 2: those countries in which the CMI has coverage for personal injury, disability or death only.

Group 3: those countries in which the CMI has coverage for personal injury and property damage

Source: Gaviria Fajardo et al. (2019)

Note: México has mandatory insurance for federal highways, roads, and bridges as described in Agreement 07 of 2014. However, for the purpose of the diagnostic analysis, it is understood that Mexico does not have national coverage CMI.

The Movernos Seguros diagnostic presents the main figures in the thematic areas analyzed:

Figure 2. 39 Motorization rate, share of motorcycles, insurance sector penetration in GDP and mortality rate (Group 1 countries).

	Motorization Rate	Motorcycle participation	Sector Penetration	Mortality rate X 100,000 inhabitants
Ecuador	131,7	23,4 %	1,6 %	20,1
Guatemala	208,9	39,0 %	1,2 %	19,0
Honduras	188,2	38,6 %	1,9 %	17,4
México	370,7	7,6 %	2,3 %	12,3
Paraguay	296,6	35,2 %	1,4 %	20,7
El Salvador	182,9	21,3 %	2,1 %	21,1

Source: Gaviria Fajardo, Cruz Moreno and Ponce de León (2019).

Figure 2. 40 Motorization rate, motorcycle share, CMI compliance level, penetration, and mortality rate (Group 2 countries).

	Motorization Rate	Motorcycle participation	CMI vs fleet	Penetration	Mortality rate X 100,000 inhabitants	Percentage of motorcycle fatalities
Argentina	617,9	26,9 %	41,8 %	2,4 %	13,6	25,0 %
Bolivia	160,0	21,9 %	75,9 %	1,4 %	23,2	ND
Brasil	467,6	26,9 %	65,2 %	1,5 %	23,4	48,0 %
Chile	297,7	3,5 %	85,4 %	5,0 %	12,4	8,7 %
Colombia	275,2	57,3 %	58,6 %	2,8 %	16,8	51,5 %
Costa Rica	292,4	20,9 %	104,9 %	2,1 %	13,9	19,0 %
Perú	183,9	53,3 %	48,4 %	1,7 %	13,9	ND
Uruguay	675,3	53,7 %	47,2 %	2,4 %	16,6	46,6 %

Source: Gaviria Fajardo, Cruz Moreno and Ponce de León (2019).

Experience 25. Move Safe Program

According to the IDB and the High-Level Panel of the International Automobile Federation (FIA), urgent actions are needed to reduce the number of deaths and injuries caused by road crashes. To this end, in October 2017 these organizations launched the Move Safe program, whose purpose is to enhance the use of CMI as a prevention tool for road safety by changing the traditional approach of indemnity and compensation to which it has been relegated and take advantage of the insurance contract as an integral tool for road safety.

The first milestone of the project took place in December 2019, when the diagnosis of the current road safety status in LAC was published. The document addressed three thematic areas of analysis, on the basis of which public policy recommendations are developed: the road crash situation, the composition of the vehicle fleet and the scope of automobile insurance. The diagnosis presents a compendium of best practices and lessons learned from around the world, so that LAC countries can make legal or regulatory changes for the creation of CMI or for the improvement of current conditions for the benefit of all stakeholders: victims, insurers, governments, policyholders and others. Along the same lines, scenarios are proposed for voluntary automobile policies to also adopt additional risk analysis elements to encourage the renewal of the vehicle fleet -in order to promote an increase in the presence of vehicles that meet minimum safety standards- and to highlight the importance of driver training programs, especially for the younger generations.

The working methodology of Move Safe is based on a platform of collective construction, in which the public and private sectors actively participate, so that the solutions proposed assertively address the priorities of each country, while adjusting to its economic, political, and social reality. Technically sustainable, politically viable and socially desirable solutions are sought.

The main objective of Move Safe is to break the current and growing trend of deaths caused by road traffic injuries on streets and highways observed in the region, seeking to meet the goal of the Decade of Action for Road Safety and SDG target 3.6 to reduce the number of deaths caused by road traffic injuries by 50% and provide safe mobility for the inhabitants of the region. To implement the public policy recommendations, Move Safe chose one country from each of the groups identified in the document as a pilot country. Work is currently progressing in Paraguay, Costa Rica and the Dominican Republic to create insurance in the first country and improve operating conditions in the other two. In addition, El Salvador applied for and was approved as another country in which Move Safe is intervening, supporting the creation of an CMI. To date, significant progress has been made in the process of collective construction of the necessary modifications and in the adoption of a holistic vision of the CMI as a living tool for road safety.

Figure 2. 41 Motorization rate, motorcycle share, CMI compliance level, penetration, and mortality rate (Group 3 countries).

	Motorization Rate	Motorcycle participation	CMI vs fleet	Penetration	Mortality rate X 100,000 inhabitants	Percentage of motorcycle fatalities
Nicaragua	140,4	ND	ND	1,5 %	15,3	ND
Panamá	282,4	3,1 %	ND	2,5 %	10,0	ND
República Dominicana	405,2	54,0 %	34,0 %	1,2 %	29,3	71,1 %
Venezuela	132,8	ND	ND	0,3 %	ND	ND

Source: Gaviria Fajardo, Cruz Moreno and Ponce de León (2019).

Reflections on victim care

Little progress has been made in the region with respect to comprehensive victim care. This pillar has not received due attention, often because it requires multisectoral coordination between road safety agencies, transport ministries, road concessionaires, health centers, insurance companies, victims' associations, parliaments, and the police. The problem became even more critical during the COVID-19 pandemic, as hospitals in the region were overloaded and traffic incidents still accounted for a large number of hospitalizations.

The greatest progress has been made in the field of compensation for victims of traffic incidents, both directly and indirectly. Most countries have their own CMI systems that cover physical and material damages. While some countries need to work on their policies, others require adjustments so that insurance is not only a compensation mechanism, but also a tool for behavioral changes in road users. The effort should therefore be multisectoral, seeking to involve insurance companies as well. Other tools, such as unified vehicle registries, can help reduce fraud and evasion. In addition, the population should be made aware of the advantages of compulsory insurance, which implies creating communication campaigns to disseminate the importance of this tool for the compensation of victims and road safety.

Part 3.

A NEW DECADE OF ACTION

3.1. A new decade needs a new approach

As recognized in the Stockholm Declaration, the lessons learned from the Decade of Action for Road Safety 2011-2020 identify the need to promote an **integrated approach to road safety**, such as the Safe System approach and Vision Zero, to seek long-term and sustainable solutions, and to strengthen inter-sectoral collaboration, including the engagement of NGOs, civil society and the private sector - including industry - which can contribute to the social and economic development of countries. Road incidents impact health, poverty, equity, the environment, employment, education, gender equality and the sustainability of communities. Providing a **safe mobility system** will not only contribute to reducing mortality and morbidity rates in the region, but will also provide accessible, inclusive and safe road infrastructure for all road users. These changes will have a direct impact on quality of life, economic productivity, and access to education and health for communities.

A safe mobility system will, in turn, influence the fulfillment of the UN SDGs. Looking ahead to the new decade, instead of limiting ourselves only to the actions that fall within the pillar themes individually, we must explore their interdependencies and use their intersections to

leverage resources (political, economic, knowledge and skills, etc.) and make progress on policies and measures that contribute to improving road safety within the framework of sustainable development.

A major achievement within the Decade of Action, in a long-term perspective, is the inclusion of road safety among the SDGs, within the target 3.6: "By 2020, halve the number of deaths and injuries from road traffic crashes globally" and the target 11.2: "By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all and improve road safety, including through the expansion of public transport, with particular attention to the needs of people in vulnerable situations, women, children, persons with disabilities and older persons", as the efforts of countries and agencies assisting them in that direction will surely have remarkable and far-reaching implications.

The 2030 Agenda clearly states that the "17 Sustainable Development Goals with 169 associated targets are integrated and indivisible". This recognition places road safety on the same level of importance as other critical global sustainability needs and clearly indicates that sustainable health and well-being cannot be achieved without a substantial reduction in road deaths and serious injuries. While this integration with other strategic objectives has not yet been realized globally, today there is an opportunity for new partnerships and comprehensive, systematic efforts that will result in comprehensive and sustainable benefits.

To achieve SDG targets 3.6 and 11.2, it is necessary to use a Safe System approach that invests in solutions that offer short- and long-term results. To this end, it is advisable to design an action plan for each country in the region, with annual objectives and actions that are realistic and achievable. The plan should not start from scratch but should be based on the results of an in-depth evaluation of existing programs to identify the key aspects that should be improved to maximize efficiency and eliminate ineffectiveness. These country plans should also consider strategies to ensure an adequate budget, as well as to optimize the performance of existing resources and capacities.

Finally, the **Second Decade of Action for Road Safety (2021-2030)** sets out to reduce road deaths and injuries by 50% by 2030 and invites Member States to adopt a holistic view of road safety, in the context of the SDGs. In doing so, it connects road safety with urban planning and the promotion of environmentally friendly, safe, accessible, and affordable modes of quality transport (especially public transport and non-motorized modes). The Global Plan specifically outlines what is needed to achieve this goal and calls for the implementation of the evidence-based Safe System approach, arguing that ensuring safe and sustainable mobility plays a key role in reducing poverty and inequalities by increasing access to employment and education, as well as mitigating the impact of climate change (WHO-UNRC, 2021).

3.1.1. TOWARDS THE ADOPTION OF A SAFE SYSTEM APPROACH

The challenge - and goal - of this new decade will be to adopt and implement the principles of the Safe System approach and to integrate all sectors. The SDGs offer the opportunity to save lives by exercising the right to safe, efficient, sustainable, affordable and accessible mobility for all.

The Safe System approach goes beyond trying to persuade people to change their behavior through education or control alone. Its perspective is based on road and vehicle design - and new mobility technologies entering the system - being tolerant of human fallibility (Welle et al., 2019). It marks a shift in focus from an exclusive focus on crash reduction to the elimination of fatalities and serious injuries (PIARC, 2019). This approach is based on the following principles (Welle et al., 2019):

1. *People make mistakes that can result in traffic crash incidents.* Therefore, a transportation system capable of better accommodating human error must be developed, providing a safe operating environment.

2. *The human body has a limited ability to tolerate the forces of an impact before injury occurs.* Therefore, it is necessary to control the speed of circulation to maintain it at levels below those known to produce impact energies capable of causing serious injury and death.

3. *The people who design, build, operate and use roads and vehicles, and those who provide post-crash care, share responsibility for preventing crashes that result in serious injury or death.*

4. *In a mobility system, no death or serious injury is acceptable. Lack of road safety should not be a trade-off for faster mobility. On the contrary, the mobility system has to be both safe and efficient.*

5. *A proactive approach must be taken to achieve a safe mobility system, so that, should any part fail, road users are still protected.*

Its adoption in the urban context implies a commitment at all levels (political and technical) to develop harmonized urban development and mobility policies, which should create new infrastructure that responds to the needs and dynamics of the city and its citizens, with an emphasis on providing safe mobility to the most vulnerable: cyclists and pedestrians. Likewise, on interurban roads, having infrastructure that prevents head-on crashes or offering vehicle restraint systems that not only protect the occupants of vehicles with four or more wheels, but are also designed to protect motorcyclists in the event of an impact, are some measures that can be adopted in this context.

As WRI concludes in its publication *Sustainability and Safety: A Vision and Framework for Achieving Zero Road Deaths*, reorganizing entire systems to achieve greater safety will not be easy. Doing so requires good governance practices and comprehensive institutional control, ambitious targets, good data, economic analysis, priority setting and planning, and monitoring and evaluation of progress. Every country and every city needs to use data and stakeholder research to identify key risks and priority areas to target the quickest and most significant impacts while working holistically to make the mobility system safer (Welle et al. , 2019).

INTERVIEW:

Gloria Hutt Hesse, former Minister of Transportation and Telecommunications of Chile (2018-2022)

Gloria Hutt Hesse is a civil engineer from the Pontificia Universidad Católica de Chile, certified by the Business Administration and International Finance programs at Georgetown University, USA. Her tenure as minister has been characterized by the leadership capacity evidenced in her work towards the approval of the bill for the creation of the Automated Center for the Treatment of Infractions (CATI), through which infractions would be issued to the owners of vehicles detected driving outside the established speed limits; the principles of this initiative are to save lives in traffic, as well as transparency and efficiency.

1. Thinking back over the first decade of road safety, what have we, as a region, learned about road safety in ten years?

Over the last decade, and especially in recent years, we have worked together with many of the world's leaders in safe mobility and have come to understand that the road safety challenges we face are similar to those faced by most countries in the region, as well as those faced by countries that have been successful in this area.

In this sense, we have learned that all actions aimed at preventing road accidents require a joint and articulated work of all users, through the identification and collaboration when sharing good practices that have been implemented in different countries, in order to adopt the best experiences in road safety and strengthen public policies with a local perspective.

2. In your opinion, why are we not making progress in reducing road traffic fatalities in the region? (in a pre-pandemic scenario).

We must make visible, as a region, what road crashes mean for countries: firstly, the deep pain for families and, secondly the high cost for governments. Due to their impact and magnitude, road crashes are a public health problem and, for the most part, are preventable events that need to be addressed jointly and intersectoral by public and private entities and civil society.

Internationally, the countries that have been successful in achieving a sustained reduction in the rate of road fatalities are those that have applied the Safe System approach, a vision to which we have subscribed in the new National Traffic Safety Policy and which we also promote in our National Traffic Safety Strategy 202-20301 in Chile. All this, in order to achieve an effective reduction of serious injuries and fatalities during this decade.

In this sense, a paradigm shift is required: it is not only a matter of changing people's behavior, but also of making changes at the systemic level. This approach implements a set of interventions designed to make roads and

vehicles safer, to make users behave more prudently and responsibly when traveling, and to generate public policies that reduce speeds.

3. From your experience, what should be the priorities for the region in the next ten years that would have a positive impact on the reduction of road fatalities and would trigger a more hopeful scenario?

Speeding is one of the main causes of traffic fatalities, not only in Chile, but also in other countries in the region. According to Conaset, during the last decade 29% of fatal accidents are associated with reckless speed and loss of control of the vehicle. In addition, speed acts as an aggravating factor in all road accidents, as it increases the consequences, resulting in more severe injuries or death.

It is essential to put people at the center of public policies, especially the most vulnerable users, such as pedestrians, cyclists, and motorcyclists, who are the most affected by speeding.

In Chile, we have already made progress in reducing the urban speed limit from 60 km/h to 50 km/h and in promoting traffic calming zones that contemplate speeds of 30 km/h.

Therefore, the effective control of speeding and other risky behaviors in traffic is one of the most effective actions to reduce the number of fatalities in road accidents. In this sense, technological advances are a valuable tool and, therefore, in Chile we are promoting the implementation of a system of automatic speed controls, duly signaled, in the places with the highest risk of accidents. This is the bill that creates the Automated Center for the Treatment of Infractions, which is currently in Congress for processing, and which, we are confident, will save many lives in traffic.

3.1.2. Road Safety with a Gender and Equity Lens

The Stockholm Declaration highlights the detrimental impact of road deaths and injuries related to long-term national economic growth, uneven progress across regions and income levels, and expresses concern that no low-income country has reduced the number of road traffic deaths between 2013 and 2016, clearly highlighting the link between development and road safety. Road traffic crashes are among the top ten causes of death for people between the ages of 1-59. Injuries are among the top ten causes of death among women of childbearing age and the top four causes of death in women between the ages of 15 and 29 (Global Road Safety Facility and Institute for Health Metrics and Evaluation, 2014). In the LAC region, there is an absence of data differentiated by gender and socioeconomic characteristics of the victims that would allow for a cross-cutting understanding of road crashes, their social impact, and their determinants in terms of infrastructure and services. It is important to collect this type of information in order to develop better public policies focused on the needs and obstacles faced by men and women on the road, particularly the vulnerable population, children, the elderly and people with disabilities- as well as vulnerable road users i.e. pedestrians, cyclists and motorcyclists.

The following is the analysis carried out in the Gender and Mobility Plan developed by the city of Buenos Aires regarding gender and road safety:

Table 21. Gender and Mobility Plan. Buenos Aires, Argentina

GENDER AND ROAD SAFETY

Gender roles and stereotypes act as factors that classify and organize relationships and daily life. They associate certain attitudes and characteristics to women and men, establishing what it is like to be a man and a woman.

Thus, the attitudes and perceptions of women and men as users in transit are no exception. Codes in transit reproduce and reinforce gender stereotypes: women are considered (by men and by themselves) as fearful, prudent, not so self-confident (the feminine is considered weak, emotional and responsible); on the other hand, men are seen as reckless, aggressive, confident when driving (the masculine is associated with physical strength, virility, dominance and pragmatism).

This problem is reflected in the first instance in the possession (or not) of driver's licenses among women. According to data from the Undersecretary of Sustainable and Safe Mobility of the City of Buenos Aires, of the total number of driver's licenses issued in 2018, 70% are held by men and 30% by women. Although these percentages continue to be low, we see that the number of women's licenses has increased in the last ten years: according to Enmodo (2009-2010), 22.2% of women over 17 years of age residing in CABA have a driver's license compared to 55.8% of men.

In turn, we see, according to data from the Secretariat of Transportation (2018), that the age at which women and men obtain the license for the first time differs between one and the other: while in the group of 16-28 years there is a higher percentage of men -62% versus 37% of women-, in the age range of 29-44 this is leveled in favor of women -55% versus 44% of licenses granted to men-. In conclusion, women tend to start driving once they reach adulthood, while men start driving at a younger age.

The same trend is observed in motorcycle driving: in the city, only 10.3% of the licenses granted belong to women; however, if we compare this percentage with that obtained in 2012 (5.8%), we see that it increased substantially (Secretaría de Transporte, 2018). Despite the fact that women drive less than men, according to data from the Road Safety Observatory of the City of Buenos Aires, men participate to a greater extent in road crashes than women. This may be explained, among other factors, by the predominance of an ethic of care among women - which, in the case of traffic, implies taking care of the life of others and one's own life-, which could be associated with the gender roles socioculturally assigned to women. For their part, men were socialized in a gender system that educated them to be the "breadwinner", as opposed to a woman's "loving" care. This is clearly reflected in men's driving behaviors, in which they do not necessarily emphasize prudence and respect for traffic regulations as preventive measures to protect the lives of other traffic participants or their own. According to a study

conducted by the Road Safety Observatory of the City of Buenos Aires (2018), women seem to adopt greater caution and lower risk acceptance than men.

The analysis of road safety, driving and the attitude and perception in traffic with a gender perspective is essential to understand, for example, why there are more male drivers than female drivers (private and professional), why women adopt a more cautious and less reckless attitude, or how to eradicate gender violence in traffic. Resignifying gender roles implies starting to dismantle these notions of masculine-dominant and feminine-dominated, eliminating the asymmetrical relationships that establish behaviors associated with masculinity as a model to follow.

Women's access and accessibility to driving private cars and in the professional sector is both a right and an obligation that results in greater physical, mobility and decision-making autonomy for women. More importantly, the data show that the care and caution that characterize women drivers is a vital factor for society, as responsible driving saves lives.

Finally, addressing these issues contributes to promoting equality in the transport sector, where most public and private transport drivers are men. Understanding the barriers and limitations that women experience when driving allows the development of public policies that encourage the presence of women drivers.

Excerpt taken from Buenos Aires Ciudad (2019)

In LAC, men use more private motorized vehicles and bicycles, while women are the greatest users of public transportation and have the highest percentage of trips on foot. Therefore, it is important to incorporate a gender perspective in the development or adaptation of infrastructure. Just as women perform most of the care work within households, it is also women who perform care mobility: trips for the care of others and household maintenance - taking children to school or the elderly to the health center, shopping for household maintenance, etc. In addition, women represent less than 15% of the transport labor market in LAC, and the current gender landscape shows greater risk aversion and less involvement in road crashes by women, making them suitable for the transport industry as drivers or vehicle operators.

Moreover, road traffic crashes have a direct economic impact on individuals and families, particularly in low- and middle-income countries, perpetuating or causing poverty (Welle et al. , 2019). The effect on poverty is compounded by the fact that poor communities are at greater risk of road traffic crash injuries than their wealthier counterparts, as they often live next to poorly designed roads that expose pedestrians and cyclists to vehicles traveling at high speeds, and where people are more likely to travel on foot (Welle et al. , 2019). A Safe System approach would lessen the impact on poorer households by reducing the number of fatalities and increasing the safety of road users by addressing safety

throughout the road system rather than focusing on areas where there is greater wealth, or greater citizen pressure or existing infrastructure (Welle et al., 2019).

The COVID-19 Pandemic as an Opportunity for Change

On March 11, 2020, the WHO characterized the COVID-19 disease, caused by the novel-Coronavirus respiratory tract infecting virus or nCoV-2019, as a pandemic. To date (October 12, 2021), according to John Hopkins University, more than 238 million confirmed cases have been reported in 189 countries, resulting in more than 4.8 million deaths. The first cases in LAC were reported at the end of February 2020, and since that time case numbers have grown rapidly. PAHO announced that, according to data available as of August 27, 2021 reported by countries and territories in the Americas, more than two million people have died from SARS-CoV-2 in the region.

The crisis presents an opportunity to pay off the region's outstanding debts in the development of a sustainable road infrastructure that promotes safe, healthy, accessible, inclusive and environmentally friendly means of transportation. In the urban context, the first year of the pandemic resulted in an accelerated transformation of public space: it had to allow mobility that respected physical distance and biosecurity protocols. Thus, walking and cycling were promoted to reduce crowding on public transport, mainly by temporarily extending sidewalks and bicycle paths. This showed that the path towards more sustainable modes and a better distribution of public space is possible. However, this crisis also led to increases in speeding due to less congestion and increased other risky conditions. In some cases, these risky behaviors meant a higher total number of traffic deaths and injuries compared to 2019. The impact of the pandemic in the medium and long term is still uncertain; the possibility that many of the users who usually use public transport may see motorcycles as a safe and more economical mode of travel may aggravate the challenge faced by several cities in the region in the face of the increase in road crashes involving motorcyclists.

This pandemic has highlighted the value of life as a priority, and further consolidated the idea that loss of life from road crashes is unacceptable. This should contribute to prioritizing the development of safe infrastructure, especially for pedestrians and cyclists, where the evaluation and redefinition of speed limits and their enforcement become central.

Another noteworthy aspect is that the COVID-19 pandemic has interrupted essential health services in most LAC countries and territories, which represents a threat to the immunization of children, and the care of pregnant women and people with chronic diseases. In addition, medical care for road crash victims adds a burden to the hospital system that could be avoided.

3.2. Public policy recommendations for the LAC region

Implementation of the strategy and plan for the next decade will need to be coordinated with national and subnational governments, as well as with non-state authorities, including the private sector. Private sector involvement can contribute to improved road safety not only through corporate social responsibility, but also through its procurement, management, and sustainability practices. Effective implementation will depend on adequate allocation of financial and human resources. In addition, it will be useful to monitor the progress of the states' strategy through impact assessments to guide decision making on the continuation of actions or, if necessary, on relevant modifications. Another important component of monitoring and evaluation should be the documentation of lessons learned about local realities and contextual adaptations.

LAC countries (and organizations working in the region) in the face of the New Decade of Action for Road Safety must seek innovative ways of working, given the new context of road safety in these countries, in which a) most incidents have occurred in the urban environment, where traffic management is the responsibility of subnational entities (cities and provinces); b) a growth in the motorcycle fleet and in the percentage of fatalities in this mode of transport has been observed; c) there is an increased use of active modes of transport, such as cycling and walking, which increases the exposure to risk of this population; d) increasingly, major roads are managed by public-private partnerships, with a greater use of active modes of transport, such as cycling and walking, which increases the exposure to risk of this population; e) the use of public-private partnerships is becoming more and more common in the LAC region; f) there is greater use of active modes of transport, such as cycling and walking, which increases the risk exposure of this population; g) increasingly, the main roads are managed by public-private partnerships, and other services have been privatized, such as vehicle inspections; h) the pandemic has placed extra pressure on the health system and on the national budgets of the countries, which has affected the dynamics of emergency care for other diseases and road incidents; and j) road safety is part of the SDG targets and indicators.

New challenges

IDB Safe Mobility Strategy

As we begin a new Decade of Action for Road Safety, it is essential to reflect on the results of the last decade. In LAC, the last ten years have shown that the region has only managed to reduce the rate at which road traffic fatalities occur, and that road deaths continue to be a growing trend. Although awareness has been raised, institutions created and national plans drafted, LAC has not achieved the same results as high-income countries, which have reversed the trend and where serious traffic fatalities are decreasing.

It is important to emphasize that, in road safety, the most urgent actions do not necessarily require a massive investment of resources, but rather the commitment of political capital to adopt major reforms, as well as the will and courage of public officials and civil society to implement them. There is no room for another lost decade for the region.

Given that LAC is the most urbanized region on the planet and has a high rate of motorization, road safety challenges are likely to deepen.

As a region, we must step up and take bold and ambitious actions to not only meet the global road safety target of reducing road traffic deaths and injuries by 50% by 2030, but more importantly, to achieve zero deaths. The IDB is strongly committed to continue working with governments and civil society throughout the region to address road safety issues. To this end, a **Safe Mobility Strategy** has been developed that focuses on the following three priorities.

Safe infrastructure, whose objective is to achieve better, safer and more inclusive

roads, not only for the vehicle occupant, but for all users.

Urban mobility pursues the implementation of programs and measures to manage safe speeds that respond to urban dynamics, infrastructure programs and safer urban services for all users, especially the most vulnerable. The promotion of sustainable mobility by walking, cycling and public transport is also a priority; this would contribute to addressing other key challenges such as inequality, accessibility, traffic congestion and pollution.

Public policies and institutions, which advocate for road safety and support countries in articulating, drafting, and approving ambitious and innovative (technology-driven) legislation, implemented through government agencies, with more comprehensive rules and regulations, with effective enforcement.

The IDB promotes economic development and quality of life for the inhabitants of LAC through efficient, affordable, sustainable and safe transportation and infrastructure policies. The Safe Mobility Strategy seeks to promote and support concrete actions at the regional level and to support initiatives tailored to the needs of each of the countries in the region. The strategy intends to contribute to a) strengthening the technical and institutional capacities of regional governments; b) fostering the transfer of knowledge and best practices in SV; c) promoting the regulation of safety standards in vehicles manufactured and marketed in the region; d) fostering an attitude of road safety responsibility in society as a whole; and e) promoting the development of a responsible attitude in the region's society; e) to foster a responsible attitude towards road safety in society in general, by providing information to consumers and road users; f) to facilitate the determination of results, providing suitable tools for the evaluation of the impact of activities implemented in the field of VS; and g) to include effective VS activities in their transport infrastructure projects, following existing best practices.

The recommendations presented in the following section follow the principle that mobility should be safe and inclusive, reducing the risk exposure of all users, especially the most vulnerable (cyclists, motorcyclists, electric scooter users and pedestrians), while promoting the inclusion of users with special needs, such as people with disabilities, the elderly and children. The intention of the report is not to repeat the recommendations that were given in the UN resolutions, but to offer those based on the experiences and lessons learned presented in this document. These recommendations are divided into the three pillars of the Safe Mobility Strategy.

3.2.1. SAFE INFRASTRUCTURE PILLAR

The design of roads and their conditions is the core of a Safe System and therefore the effectiveness of other measures depends on it. Without safe infrastructure, even with safe vehicles, safe behaviors, and good management, it would be extremely difficult to achieve sustainable results in reducing risk exposure and have an impact on reducing road casualties. Ensuring that road infrastructure projects prioritize safety standards will also require strengthening local capacities to successfully conduct road safety inspections and audits. In this context, then, the following actions are proposed.

Promote and implement safety best practices in road design, construction, and maintenance

Countries and organizations in the region should implement a system that allows the construction, operation, and maintenance of a safe road infrastructure for all users. During the pre-design and design phase, it is crucial to bear in mind that road safety aspects that are not addressed at that stage are unlikely to be incorporated in later stages. The designs should take into account the dynamics and characteristics of the environment (whether rural or urban), and be consistently adapted to the recommended speeds, in order to meet the mobility needs of the area and provide safety for all road users, especially the most vulnerable. Country tasks will include:

a) Update and make mandatory their road design manuals, integrating the Safe System principles. It is highly advised that all traffic devices recommended to implement Safety countermeasures include quantitative methods for analyzing safety performance and their effectiveness

b) Adoption or creation of handbooks to guide the implementation and evaluation of new or retrofitting of existing roads in the urban context, moving from a car-centric point of view to a people-centric point of view emphasizing biking and walking as the safer modes of transport for people of all ages and abilities.

c) To establish criteria and processes for when and where road safety inspections and audits are most appropriate and create a system of road safety inspections and audits on all roads in the country, with formal requirements and processes to guarantee the independence and quality of the RSAs and RSIs. At the same time, it is not only important to implement these audits, but also to pay attention to the resulting recommendations, as this information will help ensure that the road infrastructure operates safely, so that the number of road crashes and their severity are reduced to a minimum. It is

recommended to study the inclusion of methodologies such as iRAP in the road safety inspection process[25].

d) implement a certification system for road safety auditors.

e) train road agency officials on RSA and RSI, and safe roads.

f) building local capacity in the private sector and universities for RSA and RSI implementation and,

g) include the results of RSAs and RSIs in their road asset management processes, seeking a more proactive system for identifying the necessary road safety measures on the road network.

Seek mechanisms for the participation of the private sector in the financing of road safety on higways

With the increase in road concessions in the region, countries should create incentives to promote road safety on privately managed roads. To do so, countries should:

a) study and define specific road safety KPIs, with their incentive mechanisms, for road safety contracts where the private sector has direct control over, which go beyond the traditional ones, and

b) study strategies to attract private banks to finance safe and inclusive highways through financial mechanisms such as private bonds.

Seek mechanisms to promote road safety in the rehabilitation and maintenance of roads, from the design stage in projects financed by multilateral banks or national and subnational public banks.

Project finance banks have played a leading role in the financing of roads in the countries of the region. Therefore, it is recommended that the bank:

a) update its socio-environmental policies to include road safety analyses as mandatory for the approval of new financings, including mitigation measures.

b) collaborate with countries and subnational entities in the definition of road safety investment plans, using methodologies such as iRAP.

c) support countries in having RSA and RSI studies prior to road construction and in monitoring the implementation of road

25 iRAP has estimated that having 75% of trips in LAC on 3-star or better roads by 2030 means up to 400,000 fewer deaths and serious injuries, with a benefit of USD 10 for every USD 10 spent on safe road infrastructure.

safety measures during project execution;

d) contribute to the development of tools for a road safety assessment and to include a cost-benefit analysis of the impact of road safety measures due to the financing of road programs; and

e) seek the integration of maintenance management-oriented road inventories with road safety condition inventories, such as those generated with the iRAP star rating system.

3.2.2. URBAN MOBILITY PILLAR

In 2020, 321.2 million people lived in LAC's major cities and, between 2020 and 2035, this number is expected to increase by 53 million. The region's metropolitan population will grow at an average annual rate of 1.06% between 2020-2035, a reduction of 0.7% compared to the average growth rate over the last twenty years (UN-Habitat, 2020). Most people live in cities and walk, bike, or ride public transit, but many of today's public spaces are designed for cars. This glaring imbalance is changing the way cities are planned: streets must be designed to better balance the needs of more people (National Association of City Transportation and Global Designing Cities Initiative, 2016). Regulations governing highways and roads are often inappropriately applied to urban streets, creating roadways that encourage travel at inappropriate speeds and overlooking the safety of pedestrians, bicyclists, and transit users (Welle et al., 2019).

The adoption of the Safe System approach and its principles thus allows for a paradigm shift and a transformation in planning, implementation, evaluation and monitoring to reduce deaths and injuries caused by road crashes.

INTERVIEW

Juan Pablo Bocarejo, former Secretary of Mobility of Bogota (2016-2019).

Juan Pablo Bocarejo, associate professor at the Universidad de los Andes, Colombia, served as District Secretary of Mobility during the mayoralty of Enrique Peñalosa (2016-2019). During his administration, he initiated the implementation of the Vision Zero road safety policy, achieving, in 2019, the lowest fatality rate in twenty years for the city of Bogotá. He is a civil engineer from the Universidad de los Andes, with a PhD in Transportation from the University of Paris.

1. Thinking back over the first decade of road safety, what have we as a road safety region learned in ten years?

- Road crashes were an invisible public health problem ten years ago. In this first decade, greater awareness of the issue has been generated.
- Institutions have been strengthened to address this scourge. Agencies dedicated exclusively to this issue have been created in several countries, and cities are beginning to prioritize and work more intersectoral.
- Data collection and management has been improving in certain LAC countries and cities.
- Automatic control technologies have made it possible to strengthen one of the important pillars for reducing accidents.
- The type of professionals facing the challenges has diversified, increasing the participation of the social sciences.
- Private organizations have made progress in including SV as an attribute of their operation, generating cooperation networks.
- Some good practices have been adopted, especially in the urban area: traffic calming designs, strengthening of control and institutions, prioritization in the mobility agenda.
- Vision Zero has begun to position itself as a strategy in several countries.

2. In your opinion, why are we not making progress in reducing road traffic fatalities in the region? (in a pre-pandemic scenario).

- Road safety problems in LAC are different from those of a developed country. For several years, the practices and priorities of developed countries with regard to road crashes have been tried to be implemented in LAC with few benefits.
- In some of our countries, motorcyclists are the most vulnerable road users and the most involved in road crashes. There is a need for a better understanding of the issues and more effective ways of dealing with their accidents.
- The prevailing vision of infrastructure development continues to be to provide capacity and speed, especially at the intercity level.
- We have a serious lag in the training of professionals in the design of safe public space.
- The lack of prioritization and, consequently, of resources means that neither infrastructure, nor control strategies, nor change initiatives are adequately resourced.
- The most important actions, in particular speed management, are not prioritized, as this type of measure is unpopular.

3. From your experience, what should be the priorities for the region in the next ten years that would have a positive impact on the reduction of road fatalities and would trigger a more hopeful scenario?

- Priority 1: to achieve a strong awareness in our societies about the commitment to eliminate mobility-related fatalities, including public and private organizations and its participants. It is common that even at the highest levels of those in charge of transportation and infrastructure issues, the reduction of road accidents is not considered a priority. Public opinion, in general, has values contrary to road safety; planners and designers continue to ignore or, even worse, promote unsafe spaces for the most vulnerable.

- Priority 2: to bring about a significant reduction, a strong commitment to speed management is required: reduction of speed limits, traffic calming strategies in areas with high pedestrian and other vulnerable stakeholder flows, and strong electronic enforcement.

Speed management

Speed management interventions are possible in a range of areas of SV, including road design and engineering (on existing roads, e.g. reducing lane widths and turning radii, using speed humps or cushions, at-grade crosswalks with traffic lights, roundabouts, chicanes, etc.), vehicle interventions (speed limiting, intelligent speed adaptation or ISA), and speed limit regulation and enforcement (legislation, enforcement and enforcement, and ISA), traffic circles, chicanes, etc.), vehicle interventions (speed limiting, intelligent speed adaptation or ISA), and speed limit regulation and enforcement (legislation, enforcement and promotion to achieve effective general deterrence of speeding).

Effective integration of these often-fragmented efforts will improve speed management and deliver more powerful and cost-effective outcomes. Each of these interventions is tailored to different circumstances in which they are most effective, and therefore the systematic and integrated selection of interventions from the range of available options maximizes the benefits. To this end, a policy of lowering speed limits is recommended for the effective reduction of road casualty crashes (injuries and fatalities) in urban areas, as demonstrated by empirical evidence. A speed limit policy should be implemented in a comprehensive manner, following the following five main steps:

1. Classify roads and define safe speed limits that respond to the characteristics of the environment, land use and the presence of vulnerable users.

2. Establish and regulate maximum speed limits according to their classification.

3. Implement measures to ensure compliance with the established speed limit. These measures include infrastructure, technology and control actions.

    a. Infrastructure: identify and implement necessary infrastructure changes, such as traffic calming measures (speed bumps, crosswalks, chicanes, signalized crosswalks, or parking bans in residential areas).

    b. Technology and control: implement the necessary enforcement system to control compliance with the new speed limit. At this point, it is important to take measures that show the public that there is total transparency when applying sanctions and enforcement, through the use of systems that include high-tech solutions (speed cameras, radars, control systems in police vehicles).

4. Inform road users by means of vertical and horizontal signage. The support of

technological devices, such as radars, will allow not only speed control, but also provide information on the average speed of road users.

Additionally, it is recommended that this policy have:

5. A good communication strategy to inform the public about the changes in the speed limits, the reasons for these changes and their effects over time.

6. Involvement of local stakeholders to maximize compliance and ensure enforcement.

7. Training and promotion of police professionalism and hiring of more female police officers.

8. Means to inform the road user, supported by navigation system applications for boundary updates.

9. Information and education of road users through road safety campaigns (European Safety Observatory, 2018).

Understanding that changes in the existing main road infrastructure (arterial roads or avenues) of a city entail processes that take considerable time and resources, it is recommended to progressively establish a maximum speed of 50 km/h on the roads where the highest number of crashes with casualties are historically recorded. In this case, in addition to the changes in horizontal and vertical signaling, the programming of the traffic light network should be coordinated to ensure vehicular circulation at the established speed. This can be achieved, for example, by means of green waves, so that drivers are not forced to stop at every intersection if they are traveling at the permitted speed. It is also necessary to design and implement a police control strategy supported by automated electronic detection equipment in these corridors, which will reduce the speeding of drivers and thus reduce the risk of road crash incidents with unfortunate consequences.

On the other hand, when programming projects for road rehabilitation or maintenance, or road space redistribution such as the implementation of bicycle lanes or exclusive bus lanes, the opportunity should be taken to incorporate the maximum speed limit of 50km/h or lower, depending on the conditions and dynamics of the specific environment.

INTERVIEW:

Sergio Avelleda, former Secretary of Mobility and Transportation of São Paulo, Brazil

Sergio Avelleda is a Senior Urban Mobility Advisor at WRI Ross Center for Sustainable Cities. Sergio was Secretary of Mobility and Transportation in São Paulo, responsible for managing traffic challenges and the world's largest bus system. He led the implementation of the Vision Zero program in the city, aiming to reduce traffic fatalities. He is a lawyer and holds an MBA from the Instituto de Ensino e Pesquisa de São Paulo.

1. Thinking back over the first decade of road safety, what have we as a road safety region learned in ten years?

I believe there are three major lessons. Speed management is the most effective way to reduce and eliminate traffic accidents. Large and iconic cities in Latin America (example: Bogota, Buenos Aires, São Paulo and Fortaleza) implemented measures that reduced road speeds and achieved very good results in the number of deaths and injuries. Strategic road management plans, developed and implemented with the participation of the community, legitimize decisions in favor of road safety. The support of international organizations was decisive in legitimizing tough but necessary policy decisions to reduce fatalities.

2. In your opinion, why aren't we making progress in the reduction of traffic fatalities in the region?

Few cities made progress. There is resistance from political authorities to take necessary measures. To change this reality, it is necessary to increasingly involve organized civil societies, the press and opinion makers.

3. In your experience, what should be the priorities for the region in the next ten years that would have a positive impact on the reduction of traffic fatalities and trigger a more promising scenario?

National road safety plans with clear objectives and conditioning the allocation of resources to cities through a commitment to a positive agenda.

Disseminate the experiences of Bogota, Buenos Aires and Fortaleza to other cities, while connecting with the Vision Zero methodology.

Finally, I believe that multilateral entities should condition the granting of financing or donations in urban mobility projects to the real participation of borrowers in concrete actions to reduce mortality. For example: financing of subway lines, conditioning the adoption, implementation and execution of the Vision Zero strategy in the city.

Promoting the shift to safer and more sustainable modes of transport

Linked to the concept of avoid-switch-improve (A-S-I), which seeks to reduce greenhouse gases, reduce energy consumption in the transportation sector and reduce traffic congestion, are *Safe Systems*. A well-designed Safe System provides benefits beyond saving lives in traffic crashes, it helps to solve other problems that are common in all cities around the world, reducing carbon dioxide emissions and positively impacting air quality with positive consequences for physical activity and quality of life (Welle et al. , 2019). Moreover, if cities aim to be human scale, where walking, cycling and public transport are the primary modes of transportation, promoting changes to provide safe, sustainable, and inclusive transport systems, incorporating road safety and accessibility criteria, and developing a universal design become indispensable tasks.

The following are some general recommendations:

1. Reduce the need for motorized vehicles and encourage safer traffic speeds through urban design and efficient distribution of public space.
2. Conduct assessments on the impact of new construction and urban developments on the transportation system and people's mobility dynamics.
3. Reduce the maximum speed to 30 km/h or less in areas with high volumes of pedestrians and cyclists, where there may be conflicts between motor vehicles and vulnerable road users. For example, residential areas, school zones, around health centers, etc.
4. Improve critical intersections for pedestrians and bicyclists. For bicyclists, special attention should be given to reduce conflicts when motor vehicle turns are allowed at the intersection.
5. Provide wide, well-maintained, and well-lit sidewalks.
6. Create continuous bicycle lane networks with segregated bicycle infrastructure in cases where mixed traffic conditions and speeds above 30 km/h are present.
7. Reduce crossing distances, install traffic signals that give priority to crosswalk, medians and pedestrian refuges, design safe turns, and seek balance in the number of lanes. Design uniformity should create a pleasant environment for road users, while minimizing uncertainties, especially for vulnerable road users (WRI, 2015).
8. Provide safe access to public transportation stations and stops, ensuring that bus stops are accessible and safe, have lighting, signage, protective shelter with seating, bus schedule information and route maps, adequate waiting area, access ramps and obstacle-free sidewalks connected to bus stops.
9. Also, these stops must have obstacle-free access, ensuring that the bus can deploy

its ramp so that wheelchair users and people with strollers have access.

10. Improve the design of mass transit routes and guarantee frequent services.
11. Combine incentive and disincentive strategies to promote alternatives to private vehicle transportation.

The benefits of a Safe System approach catalyze a positive feedback loop of change; as roads become safer, healthier, and more humane as a result of better design, a reduction in the number of vehicles and their speeds (with consequent improvement in air quality), more people will feel comfortable walking, cycling, or riding public transit, all of which will contribute to reduced vehicle miles traveled, resulting in even greater benefits (Welle et al. , 2019).

In addition, providing safe, sustainable and inclusive transportation systems will provide safe mobility conditions for the most vulnerable populations: early childhood, children, adults and the elderly.

The following is the Bernard van Leer Foundation's Urban95: Creating Cities for the Youngest initiative, which aims to "seek lasting change in the cityscapes and opportunities that shape the crucial first five years of children's lives. Urban95 works with city leaders, planners, designers, and managers to ask: If you could experience the city from a height of 95 cm, the height of a 3-year-old, what would you do differently?"

Table 22. Experiencing the city from a height of 95 cm: Urban95, Creating Cities for the Youngest, Bernard van Leer Foundation

Urban95 seeks to improve two critical factors in early childhood development: the quality and frequency of interactions between young children and their caregivers, and the well-being of these caregivers, through the provision of early childhood services, public space, transportation, planning, land use and data management in cities.

Urban95 emphasizes that, for healthy development, infants and young children living in cities:

- They need frequent, warm, and responsive interactions with caring adults, as well as a safe and stimulating physical environment to explore.
- They experience the world on a much smaller scale with a dependent and much shorter range of mobility than the typical city dweller.
- They are particularly vulnerable to air and noise pollution.
- They need to travel regularly to early childhood centers, such as baby wellness clinics and childcare.
- They always meet their caregivers.

For the context of mobility and urban design, this means:

- Walkable neighborhoods that meet the basic needs of a young family.
- Public spaces close to home that appeal to all generations, while allowing young children to explore safely.
- Reliable transportation that makes it easy, affordable and enjoyable for families with young children to travel where they need to go.

More information is available at www.bernardvanleer.org/urban95

Streets that are designed to provide safe and accessible mobility for children, their caregivers, pregnant women, and the elderly will undoubtedly provide safe conditions for the general public.

Implement road to school and safe environment programs as strategies to Improve children's safety while traveling for school

Public authorities should consider implementing safe routes to school programs. The following activities are recommended towards this end:

1. Characterize children's travel to and from school. Understand how they travel from home to school and vice versa, the mode(s) they use, and the travel time it takes per day.
2. Road safety inspections of the routes taken by children traveling on foot or by bicycle and the area near the school to identify the risks to which children are exposed and take corrective traffic calming measures.
3. Infrastructure design must take into account the special needs of children, especially the youngest ones - who cannot be expected to understand and comply with rules or pursue non-intuitive behaviors.
4. Streets used by children walking to school should have segregated pedestrian infrastructure to limit exposure to risk and include safe crosswalks, where children will tend to cross the street.
5. Streets should have adequate speed management and traffic calming averages so that the maximum limit at which motorized vehicle drivers can travel does not exceed 30 km/h.
6. Road safety inspections on school bus routes and vehicle inspections of buses on a regular basis.
7. Involve the community in analyzing and proposing the implementation of safe routes to schools.

Legislation to protect children on the roads needs to be strengthened and enforced.

8. Laws addressing the use of child restraint systems need to be improved in many countries.
9. Where motorcycles are the primary means of family transportation, helmet legislation focused on child passengers is required, although it should also cover adults.
10. Laws and regulations to ensure seat belts on school buses and the safety of school vehicles often do not exist and are needed.
11. Enforcement of speeding and drunk driving laws is vital.
12. Communication and social *marketing* strategies focused on the need to protect children are often an effective means of promoting public support for road safety enforcement.
13. The school route can serve as a focal point for the implementation of the Safe System, especially to bring about systemic change around the reduction of the maximum speed to 30 km/h.

3.2.3. PILLAR OF PUBLIC POLICIES AND INSTITUTIONS

Building institutional leadership, capacity, and knowledge about road safety

All LAC countries must take ambitious and bold action. In addition to meeting the target of reducing road traffic deaths and injuries by 50% by 2030, the region must emphasize the more ambitious goal of zero deaths.

The 2017 OECD and ITF road safety benchmarking report presents a series of recommendations in this regard, in terms of leadership, capacity building and sustainable investment in road safety. In addition to what is stated therein, the following lessons learned in the region stand out:

1. Seeking the support of leading international road safety organizations to provide technical assistance, support capacity building within the institutions and validate the actions to be implemented will allow not only the adoption of international best practices that have proven to have a greater impact on reducing road crashes, but also the more efficient use of resources.

2. It is essential to address road safety in a wholistic manner, involving different users, institutions and approaches, since road

safety is not an issue of a single discipline or sector, but requires the articulated effort of many. Identifying stakeholders within the public sector itself, the private sector, NGOs and others to participate in both the construction and implementation of road safety plans will help to increase acceptance of measures that are s controversial.

3. Recognize other users that can contribute to road safety. The following users are highlighted below based on experiences in the region.

   a. In order to position road safety as one of the top priorities on the public agenda, it is necessary that the team of professionals in the transportation sector, from all areas and levels, understand the principles of a safe approach, its relevance, its objective and how it is applied in their work. To achieve this goal it is necessary both to build capacity on an ongoing basis and also to maintain a constant conversation about road safety until it is recognized that saving lives is everyone's job and not just the job of one part of society or government.

   b. Journalists and the media: the way they understand road safety will define the way they will communicate the problem of road traffic injuries to the public. Incorporating them in the discussion (with workshops or roundtables, for example) so that they understand the need for a new approach to road safety and why actions are being taken by the public sector will generate greater empathy and clarity in the messages and news produced on the subject.

   c. The general public: in most countries and cities in the region we have normalized deaths due to crashes, and these incidents are generally associated only with recklessness, and are not understood as the multi-causal and preventable event that they are. It is therefore important to implement communication strategies to bring road safety into the daily conversation, constantly sharing data that make visible both the problem and the progress made in this area on a permanent basis, explaining the reason for changes in infrastructure or increased police presence to control speeding, for example.

Interview:

Claudia Franchesca de los Santos, former Executive Director of the National Institute of Transit and Land Transportation of the Dominican Republic (2017 -2020).

Claudia de los Santos was executive director of Intrant (2017-2020) and deputy minister of state of the Ministry of Public Works and Communications for two terms (1996-2000 and 2004-2017). She is a civil engineer with a postgraduate degree in Construction Administration, both degrees from the Instituto Tecnológico de Santo Domingo (INTEC).

Thinking back over the first decade of road safety, what have we as a road safety region learned in ten years?

In the Dominican Republic it is an issue that has only been prioritized for five years, and thanks to that decade of action, and to the international organizations that have promoted it, a Strategic Road Safety Plan was developed and approved, a new law on Mobility, Land Transportation, Transit and Road Safety (law 63-17), the birth of an agency with specific competencies, the National Institute of Transit and Land Transportation (Intrant), of which I had the honor to be the first director, Transit and Road Safety (Law 63-17), the birth of an agency with specific competencies, the National Institute of Transit and Land Transportation (Intrant), of which I had the honor of being the first director, and, with all this, the implementation of a whole series of measures that have been more easily undertaken.

In my experience, learning from the results obtained indicates that institutionalizing the problem, empowering ourselves, providing means and resources, as well as basing ourselves on scientific knowledge are elements that guarantee success.

In your opinion, why are we not making progress in reducing road fatalities in the region?

Because the efforts made have not been sufficient in our region, nor has all the political will been achieved for there to be continuity in the actions, and this is what marks the pace of progress towards true road safety, guaranteeing the implementation and continuity of plans and measures, the results of which, moreover, must be objectively evaluated. In addition, there is a lack of knowledge and technical capacity.

From your experience, what should be the priorities for the region in the next ten years, which would have a positive impact on the reduction of road fatalities and would trigger a more hopeful scenario?

Promote political will, prioritizing road safety in government plans through unconditional logistical and technical support to the responsible institutions, allocating better and greater resources, being aware that it is not an expense, but an investment that will bring much economic and social benefit.

Implement a true regime of consequences by making the enforcement of traffic laws and regulations more efficient through the provision of automatic supervision and control systems (provided by the so-called intelligent transportation systems, ITS), not with a collection orientation, but with an educational one.

Improve data collection systems mainly in urban areas.

Countries still must improve road safety data collection (mainly in cities) and its coordination with national governments. Some cities have successfully implemented road safety observatories, with the support of various government institutions and local universities. In turn, good data management will allow the identification of priorities to implement assertive strategies using the Safe System approach.

Currently, different platforms that offer the possibility of generating dynamic and interactive visualizations make it possible to understand how certain indicators evolve over time, and these visualizations can help optimize analysis and decision making.

Table 23. Data for the visualization, assessment and reporting of road crashes (Driver). World Bank and the Global Road Safety Facility (GRSF).

Low- and middle-income countries often lack adequate systems for collecting road traffic crash data. Eighty percent of fatalities do not appear in official statistics in low-income countries. This limits their ability to efficiently monitor, promote, manage, and improve road safety.

Responding to this challenge and offering effective solutions to support road safety, the open-source Data for Road Incident Visualization, Evaluation, and Reporting (Driver) system has been developed, implemented, and tested by the World Bank and GRSF. Driver has the following features:

- It is easy to acquire and implement for a limited cost, with its open-source license.
- It adapts to almost all countries, states and cities through the use of Open Street Map.
- It provides key tools for recording and managing road safety data, including analytical tools for predicting black spots, estimating the economic costs of crashes for a selected area, and tracking the effectiveness of road safety interventions.
- Employs a user-friendly website with tools to download anonymous anonymized data for third-party analysis.
- Adapts local claims accident data records, with customizable data entry.
- Includes the option of geocoding claim locations.

Driver offers significant opportunities for improved systematization of road safety data in many national and subnational jurisdictions, and its code is freely available on the World Bank's GitHub open source repository.

For more information, please visit their website: *https://www.roadsafetyfacility.org/programs/DRIVER.*
Source: Spanish adaptation *of https://www.roadsafetyfacility.org/programs/DRIVER.*

In most countries, data of interest for road safety are collected on a daily basis, but in order for this information to guide practice, it must be properly coded, processed and analyzed in a computerized database system (WHO, 2010). The challenges in this area, involve discussing how digital advances, the use of big data and open data policies can play a considerable role in road safety; this would not only strengthen innovation to address solutions to this problem in a comprehensive manner, but would also streamline processes of response to citizens and emergency care.

Interview:

Saúl Castelar, former Vice-Minister of Transportation of El Salvador

Saúl Castelar is a civil engineer from Universidad José Simeon Cañas, El Salvador. He holds master's degrees in Civil Engineering from the University of Texas (Austin, USA) and in Traffic, Mobility and Road Safety from the Universidad Camilo José Cela (Madrid, Spain). His administration has been characterized by important commitments in road safety, which include, among others, the National Road Safety Observatory (Onasevi) and the traffic calming zones program, as part of the measures for speed management in the metropolitan area of San Salvador.

1. Thinking back over the first decade of road safety, what have we, as a region, learned about road safety in ten years?

In the specific case of El Salvador, we saw how, at first, the decade feels like an enormous period, but it is really a short time that can be wasted if the political will and the joint efforts of various users are not properly articulated. It is easy to see this period go by and at the end look back and realize that very little progress has been made, and this is something that we must not let happen in this new period we are starting. I also believe that it may be important to *decomplicate* strategies in order to achieve different results from those of the first decade.

2. Why are we not making progress in reducing road fatalities in the region?

In our case, I do not perceive that there was a real will to change the reality related to road accidents, a reality in which the number of deaths caused by other forms of violence was five times higher than that caused by accidents, maintaining the attention of citizens and obtaining the necessary support was, moreover, difficult.

Long treaties with dozens of objectives and lines of action were drawn up; focusing on simple strategies by identifying the points of greatest impact can help to achieve greater focus and generate better results.

3. What should be the priorities for the region in the next ten years that, in your opinion, would have a positive impact on the reduction of road fatalities and would trigger a more hopeful scenario?

Without hesitation, seek more effective control of traffic speed.

Improving legislation and enforcement of laws to Improve road safety for children

Three lines of action are key to implementing improvements, consolidating progress and guaranteeing road safety for children from a rights-based perspective.

1. **Strengthen the available regulatory framework.** This involves drafting laws that make the use of CRS mandatory where no legislation has been enacted, and where legislation exists to improve its quality in accordance with best practices, as per international recommendations. The regulatory framework should also include make explicit the technical standards required to ensure that the CRS used are effective.

2. **Laws must be accompanied by a set of elements that contribute to their effectiveness**. In this sense, the availability of an enforcement and implementation framework that includes police surveillance and sanctions is essential.

3. **It is necessary to deploy medium and long-term communication strategies aimed at cultural change.** The joint work of the transportation and health sectpors of the countries will be very important in communicating risks to the public.

Improving motorcyclist safety

1. **The development of national and local strategic plans** to address the road safety of motorcycle users.

2. **Urban Mobility policies should analyze the motorcycle user separately from the 4-wheeled private vehicle user**, study the impact of motorcycle drivers on the overall transportation system, and include socioeconomic characteristics of the drivers themselves.

3. **Implementation of a complete regulatory framework for helmets**, making their use mandatory on all roads and following the best international technical standards.

4. **Produce legislation on anti-lock braking systems (ABS)** for new motorcyclists and on automatic headlight ignition (AHO) technology, both of which improve safety.

5. **Study of the implementation of regulations** for the mandatory use of other protective devices, such as protective clothing, airbags, and reflective clothing.

6. **Implementation of licensing criteria for motorcyclists.** A gradual licensing system is ideal.

7. **Promotion of mandatory motor insurance for the immediate and comprehensive health care of this group of users:** to study the implementation of

regulations for mandatory vehicle insurance that includes motorcyclists, and mechanisms to reduce evasion.

Improve the safety of vehicles sold in the region and strengthen vehicle Inspection mechanisms

LAC countries must still improve the safety of vehicles sold in the region. The recommendations to achieve this goal are:

1. **Incorporation of better technologies and safety standards both passive and active for motor vehicles.** Understanding, in turn, that each country will have to carry out the corresponding analysis for the adoption of these standards and their regulation, as well as to understand their commercial implications or the benefits and administrative and operational burdens they entail.

2. **Likewise, each country should establish dialogues and discussion roundtables or consultative processes with the participation of the industry (local and international), organizations related to the subject and the general public.** If new regulations are implemented, it is recommended that prudent time periods be established between the adoption of the final standard and its entry into force, especially in cases of this type, with standards that regulate technologies or products.

3. **Implement a safe vehicle labeling system**, which is intended to provide consumers with information on vehicle safety and study the options of a vehicle testing laboratory for the region.

4. **Promote the purchase of safe vehicles by government entities,** by means of decrees, regulations, and guidelines.

5. **Implement an effective system of periodic inspection of motor vehicles.**

Transforming compulsory insurance as a tool for Improving road safety

LAC countries should introduce modifications to the compulsory motor insurance (CMI) policies, so as to achieve a comprehensive coverage scheme for the benefit of victims, guaranteeing long-term financial sustainability, within the framework of the economic reality of each country and the capacity of its inhabitants to assume this obligation. Specifically, the following actions are recommended.

1. **Improving the quality and timeliness of road safety information,** by means of the information available from insurance companies.

2. **Centralization of CMI resources in a single entity responsible for road safety programs,** to ensure the sustainability of road safety actions aimed at crash prevention.

3. **Creation of specific courts to resolve traffic matters.** This reduces the burden that these types of events represent for the traditional justice system, since it creates specialized instances in the matter, and also reduces the time required for the resolution of the case. The implementation of specific courts makes it possible to have a uniform jurisprudential line, which guarantees that in similar situations the rulings will be equally similar, a fundamental principle of justice.

4. **Create a single vehicle information center.** To the extent that there is a single centralized vehicle information center, the authorities will have greater control capacity, which will benefit road safety and other aspects of national interest (taxes, property, among others). The case of Colombia's RUNT is a valuable example of a fundamental tool for providing the necessary traceability in terms of safe mobility.

5. **Review of permanent disability coverage.** The system of scales could offer adequate elements for the ex-ante determination of the recognition of the indemnity based on objective criteria, in addition to contributing to the prompt solution of the case in dispute.

6. **Financial education and support after road crash incidents.** It is important to carry out or strengthen financial education programs in which the benefits of insurance and of the CMI in each country, or the way in which a claim should be processed before the insurer, is explained so that victims have access to the defined coverage.

7. **Early termination of the CMI coverage.** Traditionally, the CMI is structured to have a defined period of time (one year, in most cases), during which the different traffic incidents occurring with the insured vehicle are covered. However, the recurrence of traffic crashes or the involvement in a traffic case considered serious should imply the early termination of the CMI, which causes the vehicle to acquire a new insurance policy. Thus, the recidivist driver or the one who causes serious damage must contribute more than the one who generates less risk.

To prepare the countries of the region for the safe adoption of emerging technologies

The development of new modes of transportation due to technological evolution, and their massification, has advanced faster than public policies. Therefore, regulatory agencies must be prepared to:

1. **Study the impact of the mass use of electric scooters and electric bicycles** on road incidents and develop the necessary measures to ensure the safety of these users.

2. **Study the impact of autonomous vehicles on road safety** and develop the necessary regulatory framework for the safe use of this technology.

3. **To constantly review new technologies** aimed at improving the safety of motor vehicles, considering the elaboration of mandatory regulations for the inclusion of these safety devices.

Including the gender perspective in road safety

Improving road safety and the personal safety of women and girls are key to achieving the goals of more inclusive and accessible mobility. Only a gender-inclusive transportation system can truly provide sustainable mobility, which efficiently and affordably connects people to the employment, health, education and recreational opportunities offered by the territories. Therefore, the following points should be considered as part of the implementation of the Safe System.

1. **A deeper understanding of road safety that considers differences in the mobility patterns of men and women is essential in future planning**, especially for the second Decade of Action for Road Safety. Countries need valid and official information resources, with data disaggregated by gender and age. Improving data collection systems and gender-differentiated mobility statistics is an essential pillar for progress in this area. Gathering this type of information is very important to develop better public policies focused on the needs and obstacles faced by men and women on the road, particularly the most vulnerable users. This data should not be limited to the recording of deaths in road crashes, but should also include information on non-fatal injuries, the mode of transport involved and the people involved, disaggregated by gender and type (pedestrians, cyclists, motorcyclists, drivers, passengers). It is also recommended to collect information disaggregated by gender on the use of safety elements (helmet, seat belt) and who was driving the vehicle; it is important to record whether any risky behavior was involved (alcohol or other drug use, speeding, etc.).

2. **Increasing the number of women in the transport sector workforce and processes can generate road safety benefits.** More women as operators in transport systems, as decision-makers in the development of regulatory and policy systems, as engineers and designers, and at all points in between, will contribute to more effectively incorporating the specific needs of women with respect to the challenges they face in everyday mobility.

3. **More attention needs to be paid to gender differences in the design of motorized and non-motorized vehicles and safety features.** For example, vehicle design should be modified to account for differences in ergonomics for different sexes. In addition, it is recommended that social stereotypes be considered in the design of safety elements; in the case of helmets,

for example, women mentioned not riding bicycles to work because they were uncomfortable or worried about their appearance. (Garrard et al., 2012). These preferences could be considered in helmet design to provide comfort and reduce aesthetic concerns.

4. **The construction of infrastructure that protects people while exercising active mobility should be encouraged.** All road users, but particularly women, fear for their safety when sharing the road with other users. International evidence shows that many women prefer physical segregation in different modes of transport. (Aldred et al., 2016; Garrard et al., 2008). At the same time, according to the Asian Development Bank, measures should be implemented to reduce traffic speed and improve crosswalks, differentiate lanes for pedestrians and active mobility users, and adequately light streets. (Asian Development Bank, 2013).

5. **Recognizing gender gaps as a cross-cutting factor that affects both the ability to respond effectively to road traffic crashes and the appropriate measures for crash prevention is also essential.** This can be made visible, for example, through publicity campaigns that reflect the different approaches of women and men to risky behaviors. Individual or small group trainings, as well as the use of virtual or simulated road environments, are effective in improving children's safety in pedestrian spaces. These trainings can also be offered to boys and girls in schools. (Asian Development Bank, 2013). Considering that women represent a higher proportion of pedestrians than men, these education plans would benefit them directly. In addition, women should become community mobilizers for road safety. (Asian Development Bank, 2013). Campaigns to report risky behavior by public transport drivers could also protect users on their journeys, especially women, who are the main users. Incorporating a gender perspective in the design of awareness campaigns and education programs would make it possible to select the most appropriate media and language according to the different groups and their risks.

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