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Technical Guidance for

CHILD AND ADOLESCENT ROAD SAFETY

Healthy Environments
for Healthy Children

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CHILD AND ADOLESCENT ROAD SAFETY

Contents

Boxes, figures and tables

Boxes

Figures

Tables

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Acronyms

CRTIP	Child RoadTraffic Injury Prevention programme
GHE	Global Health Estimates
HICs	high-income countries
LICs	low-income countries
LMICs	low- and- middle-income countries
SDGs	Sustainable Development Goals
SR4S	Star Rating for Schools
UNEP	United Nations Environment Programme
UNICEF	United Nations Children's Fund
WHO	World Health Organization
YLD	years lived with disability

Key messages

- **Road traffic injuries are the leading cause of death for children and adolescents aged 5–19 years.** Worldwide nearly 220,000 children and adolescents aged 0–19 years die annually due to road traffic injuries. That is more than 600 preventable road deaths among children and young people each day – or a death almost every two minutes. Road traffic injuries are the tenth leading cause of years lived with a disability (YLD) among children aged 15–19 years and the thirteenth overall cause of YLDs for children aged 0–19 years. Boys are consistently more likely than girls to die from road traffic injuries in every age group from 0–19 years. By contrast, girls are at lower risk of road traffic injuries, but lack safety in urban environments due to sexual harassment, exploitation and security risks in public spaces and on public transport.

- **Ninety-seven per cent of child road traffic injury deaths occur in low- and middle-income countries.** Child road traffic deaths rates are up to 30-fold higher when comparing countries with the lowest death rates to those with the highest death rates. There is also an eight-fold difference between UNICEF regions, with the highest road traffic injury death rates in sub-Saharan Africa.

- **Globally there has been a reduction in the rate of child road traffic injury deaths over the last 20 years, but progress has varied by income groups and region. There has been a 62 per cent reduction in high-income countries but only an 11 per cent decline in low- and middle-income countries.** The rate of reduction in sub-Saharan Africa is much slower than other regions with a reduction of only 16 per cent over the last 20 years compared to 42 per cent in East Asia and the Pacific and 53 per cent in North America. In some countries, such as Afghanistan, Cameroon, the Dominican Republic and Zimbabwe, the road traffic injury death rate has actually increased between 2015 and 2019.

- **Pedestrians suffer severe injuries in the road environment that result in nearly 40 per cent of child road traffic deaths; a further 16 per cent are to motorcyclists and 4 per cent to cyclists.** The chances of these vulnerable road users surviving a crash with a vehicle is dramatically improved when vehicle speeds are 30 km/h or lower in areas where children live, learn and play, This is because the risk of death is reduced at lower speeds due to vehicles being more likely to stop in time. Separation of vulnerable road users from motorized transport, in addition to slower traffic, will also reduce deaths and severe road traffic injuries.

- **Road safety solutions with cross-cutting benefits for people, the planet and profits exist.** Transforming environments to enable children's safe mobility promotes their physical activity, active travel, independence, wellbeing and development. Wider social, economic and environmental benefits of these transformations include reduced health system costs from fewer road traffic injuries and disabilities, less traffic congestion, through lower air and and noise pollution with the use of new technologies, increased walking and bicycling to improve health and reduce non-communicable diseases and improved overall safer and child-friendly communities that contribute to economic growth.

- **Road safety actions at the global, regional and national levels should focus on evidence-based interventions that are designed and implemented in an integrated Safe Systems Approach, combining engineering, enforcement of legislation and education interventions.** The use of a safe systems approach focuses on planning roads and journeys that anticipate human error and protect vulnerable road users. All components of a safe systems approach need to be interconnected, with design and implementation across diverse sectors and actors to strengthen and multiply their impacts. Commitment to collaborative action is needed by government, civil society, funders, private sector and United Nations agencies.

- **Where effective road safety interventions exist, they should be adopted, implemented and widely enforced at the local, regional and national levels.** Implementing what works saves lives.

Effective road safety interventions

Intervention	Estimated effectiveness
30 km/h speed zones	70% reduction in fatal child pedestrian injuries
Sidewalks and walking paths	40%–60% reduction in casualties
Separated bike lanes	44% fewer bicycle deaths in cities
Bicycle helmets fitted and worn properly	60% reduction in serious head injuries
Bicycle helmet legislation	45% reduction in rates of bicycle-related head injuries
Motorcycle helmet use	69% reduction in the risk of head injury
Child passenger restraint use	71%–95% reduction of serious injuries for rear-facing restraints
Seatbelts used appropriately	40–50% reduction in the number of deaths

- **Road safety interventions can also be cost-effective when appropriately implemented.** Cost-benefit ratios for road safety solutions have shown that the savings achieved for every dollar spent on an intervention with respect to medical costs and other monetary savings and quality of life is substantial. For example:

  – Every dollar spent on child safety seats saved US$34.
  – Every dollar spent on painting lane lines on roads saved US$61.
  – Every dollar spent on passing child bicycle helmet laws saved US$43.
  – Every dollar spent on zero alcohol tolerance for drivers under the age of 21 years saved US$22.

- **Basic and timely prehospital care can make the difference between life and death for injured children.** Increasing post-crash response time is particularly relevant in LMICs where distances from the location of injury to access medical care may be long journeys. Implement a single emergency phone number, standardized ambulance dispatch and train first responders.

- **Several key enablers exist to facilitate the implementation of evidence-based interventions in road safety for children, adolescents, their families and communities. These include:**

  – Leadership committed to evidence-informed action;
  – Management and multi-sectoral coordination and active engagement of youth;
  – Innovation and sustainable financing as an investment to create and support change;
  – Education, information and visibility to raise awareness, increase knowledge and create behaviour change;
  – Data, research and evaluation to monitor trends and maximize lessons learned; and
  – Context and settings of communities and regions are incorporated in the design and delivery of interventions to ensure solutions are fit for purpose.

- **Road safety is not only a transport challenge.** It is also a child's rights issue, linked to health and survival, education, protection and participation rights and a global development challenge with strong impacts on health, wellbeing and economic growth. By addressing child road traffic injuries, we can increase co-benefits with other key public health, climate, transport and economic initiatives. The World Bank estimates that countries that do not invest in road safety lose between 7 per cent and 22 per cent of their potential per capita GDP growth. Thus, on average, a 10 per cent reduction in road traffic injury deaths raises per capita real GDP by 3.6 per cent. Change is possible. Core commitments to safe and healthy communities, including safe roads, are needed now. This will support reaching the targets of the Sustainable Development Goals and the Global Plan for the UN Decade of Action for Road Safety to reduce road deaths and injuries by at least 50 per cent in the period 2021–2030.

UNICEF's aim is that every child survives and thrives in a healthy and safe environment. Reduction of child road traffic injuries, deaths and environmental impacts are critical to achieve this aim.

1. Introduction

Scope of the Child Road Safety Technical Guidance

This Child Road Safety Technical Guidance provides an overview of the burden and impact of child road traffic injuries and fatalities and explains the risk factors involved. This is followed by a summary of evidence-based solutions and suggested implementation strategies, underpinned by the Safe Systems Approach (*see Box 1*). The guidance concludes with a section of tools and resources that can be consulted to support planning, implementation and monitoring of child safety actions in countries and regions with key stakeholders.

Child road injury and definition context

This guidance addresses children and adolescents aged 0–19 years and is intended for UNICEF professionals and partners working for children, their environment and circumstances. For the purpose of this guidance, a road traffic injury is defined as a fatal or non-fatal injury incurred as a result of a road traffic crash or incident which occurs on a public road and involves at least one moving vehicle.[2] These road traffic injuries may occur to a pedestrian, cyclist or a passenger or driver of a motorized vehicle: moped, scooter, motorcycle, automobile, bus or truck.

Why is road safety for children important?

Road traffic crashes are a leading killer of children and adolescents around the world. These deaths are preventable. Low-cost solutions with cross-cutting benefits for people, planet and profits exist. Sadly, these solutions are often ignored because our roads have been designed to meet the needs of adults using motorized transport and not the needs of children who interact with the road environment as pedestrians, cyclists, passengers and in some instances as drivers. Children living in low-income settings, informal settlements and inadequate housing communities in high-speed areas, as well as children with disabilities, are particularly vulnerable. Transforming environments to enable children's safe mobility promotes their physical activity,[3] active travel, independence and development. Wider social, economic and environmental benefits of these transformations include reduced health system costs from fewer road traffic injuries and disabilities, less traffic congestion, lower air pollution, increased walking and bicycling to reduce non-communicable diseases and overall safer communities.

Rationale for engagement in road safety within UNICEF's new Strategic Plan and the Sustainable Development Goals

UNICEF is committed to engaging in road safety as part of its new strategic plan to address the leading cause of death for children and adolescents aged 5–19 years. This is aligned with UNICEF's aim to support the Sustainable Development Goals (SDGs), the United Nations (UN) Decade of Action for Road Safety 2021–2030 and UNICEF's new initiative 'Healthy Environments for Healthy Children'. Reducing child road traffic injuries will help achieve many of the SDGs, in particular SDG Target 3.6, to decrease global road deaths and injuries by 50 per cent and SDG Target 11.2 to provide access to safe, affordable and sustainable transport for all by 2030.

Road traffic injury prevention is not only a transport challenge, but also a child's right issue, linked to health and survival, education, protection and participation rights and a global development challenge with strong impacts on health, wellbeing and economic growth. Children have a right to use a road environment free of injuries and free of pollution. But more than 90 per cent of the world's children under the age of 15 years breathe toxic air.[4] A great majority of that pollution is linked to the transport sector, which places children's health as well as their physical and mental development at serious risk.[5] Particularly in countries where road traffic injuries and fatalities among children are inequitably high, UNICEF is beginning to implement a coordinated approach to reduce this health burden. By addressing child road traffic injuries, we are able to increase co-benefits with other key public health initiatives to build back better and prepare child responsive urban planning. The COVID-19 pandemic has also highlighted systematic inefficiencies and inequities across sectors and the need to rebuild with a sustainable mobility agenda in mind. Such an agenda would combine road safety with air quality and fair mobility for all children.[6] This would include the use of new technologies such as electric cars, congestion changes to prevent heavy traffic and rerouting. When children are able to move and play freely in their local neighbourhoods, they reap significant health, physical, social and mental development benefits.[3] Yet when policymakers fail to prioritize the safety of children on roads, many children face restricted independent mobility.[7]

The purpose of this guidance is to:

- Raise awareness about the magnitude, impacts and risk factors of child and adolescent road traffic injuries at the national, regional and global levels;
- Draw attention to the preventability of child and adolescent road traffic injuries and share what is known about evidence-based intervention strategies; and
- Support and provide guidance for planning, implementation and monitoring of child and adolescent road safety recommended actions in UNICEF Country and Regional Offices.

Co-benefits of making roads safe for active travel

Improved air quality

Walking and cycling help reduce air pollution by decreasing dependence upon motorized vehicles to transport children. Globally, 1.6 billion more people would breathe cleaner air if transport pollution was reduced by half.

Climate action

Non-motorized transport prevents environmental deterioration and global warming. An important source of greenhouse gas emissions worldwide are from the transport sector.

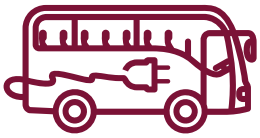
Urban quality

Motorization degrades urban areas through heavy traffic, noise pollution, and space taken up by car parks. Creating safe places to walk and cycle helps, along with the use of technologies to reverse this damage.

Equity

Walking and bicycling are inexpensive and flexible modes of transport that allow people in lower-middle income countries to participate in the economy and the community, improving access to education, health care and other services.

Economic gains



Non-motorized transport reduces health care and energy costs.

Improved physical and mental health

Walking and bicycling increase active movement that contributes to better health including a positive state of mind and increased time outdoors.

Source: Sustainable Mobility for All[8]

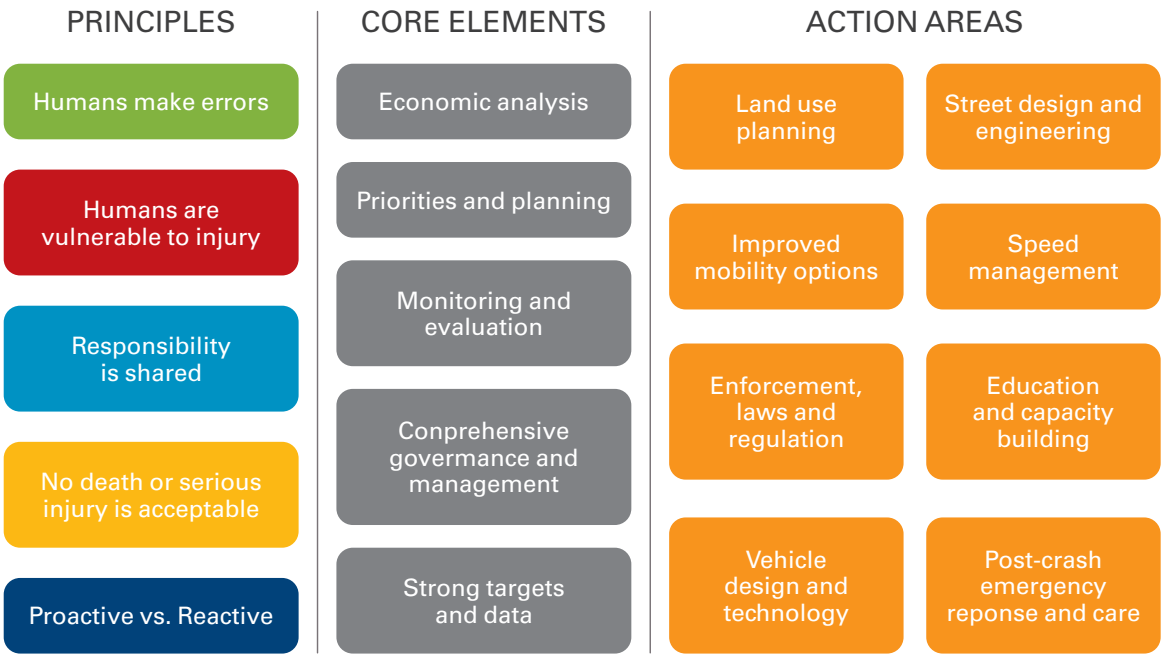
Box 1: Safe Systems Approach

The Safe Systems Approach is based on the premise that road traffic deaths are unacceptable and avoidable if effective injury prevention strategies are implemented. The principles of this approach are:

- Individuals make mistakes.
- The human body by nature has a limited capability to sustain collision forces.
- It is a shared responsibility between all persons who interact in the road environment to take appropriate actions to ensure that road collisions do not lead to serious or fatal injuries.
- All components of the system must be interconnected to strengthen and multiply their impacts.

The approach has evolved over many years and is the foundation for Vision Zero. Though it was developed in Sweden, it can be applied in countries at all income levels and is relevant to road users of all ages, but particularly children. The Safe Systems Approach saves lives on the road and improves road safety equity when implemented in ways that close the safety gap between communities with low and high rates of road injuries. The approach shifts the burden of responsibility from vulnerable road users, such as pedestrians and cyclists, to road engineering and vehicles. The Safe Systems Approach embodies planning roads that anticipate human error and protect vulnerable road users.

Principles, core elements and action areas of the safe systems approach



Sources: Sustainable and Safe: A Vision and Guidance for Zero Road Deaths,[9] and Recommendations of the Safe System Consortium[10]

2. Burden and impacts

Road traffic injuries are a substantial health burden to children. Worldwide nearly 220,000 children and adolescents aged 0–19 years die annually due to road traffic injuries and it is the leading cause of death for children and adolescents 5–19 years (*see Table 1*). That is more than 600 preventable road deaths among children and young people each day – or a death almost every two minutes. Road traffic injuries are the second leading cause of death for children aged 5–9 years and 10–14 years and the leading cause of death for adolescents aged 15–19 years. More children aged 5–19 years die of a road traffic collision (total of 169,215) than of diarrhoeal diseases (total of 156,199) or of tuberculosis (total of 110,561). Children become more vulnerable to road traffic injuries beginning at age 5 as they become more independently mobile. These road traffic fatalities impact the immediate family and even generations to come. This high burden of road traffic injuries to children needs to be recognized and commitments made to address this leading killer of children.

What are the leading causes of death in your country? Use the following links to show the top 10 causes of death, including injuries, by country, year, sex and age group. Global Health Estimates: Leading causes of death (who.int) and UNICEF Adolescent Health Dashboards also share data on the burden of injuries by country, sex and age.

Table 1: Leading causes of death in children and adolescents, aged 0–19 years, by age group, globally, 2019

Rank	Age under 1 year	Deaths	Age 1 to 4	Deaths	Age 5 to 9	Deaths	Age 10 to 14	Deaths	Age 15 to 19	Deaths	Age 0 to 19	Deaths
1	Prematurity	1,031,945	Respiratory infections	205,093	Diarrhoeal diseases	76,189	Diarrhoeal diseases	52,982	Road injury	72,656	Prematurity	1,043,452
2	Birth asphyxia and birth trauma	639,342	Diarrhoeal diseases	171,536	Road injury	53,999	Road injury	42,560	Tuberculosis	59,685	Respiratory infections	811,505
3	Respiratory infections	538,796	Malaria	165,894	Tuberculosis	39,894	Malignant neoplasms	21,648	Interpersonal violence	45,952	Birth asphyxia and birth trauma	652,399
4	Congenital anomalies	398,845	Measles	69,255	Respiratory infections	35,142	Respiratory infections	20,691	Self-harm	35,634	Diarrhoeal diseases	536,716
5	Neonatal sepsis and infections	341,379	Tuberculosis	67,201	Meningitis/ encephalitis	24,864	Meningitis/ encephalitis	18,802	Diarrhoeal diseases	27,028	Congenital anomalies	485,701
6	Diarrhoeal diseases	208,980	Whooping cough	53,401	Measles	23,474	Drowning	17,485	Malignant neoplasms	26,284	Neonatal sepsis and infections	341,437
7	Malaria	102,676	Congenital anomalies	48,430	Malaria	22,233	Other unintentional injuries	16,998	Cardiovascular diseases	25,192	Malaria	310,163
8	Meningitis/ encephalitis	76,737	HIV/AIDS	42,707	Malignant neoplasms	20,638	HIV/AIDS	16,883	Maternal conditions	19,124	Tuberculosis	244,791
9	Measles	72,567	Drowning	41,492	Congenital anomalies	18,243	Congenital anomalies	13,486	HIV/AIDS	16,349	Road injury	219,637
10	Tuberculosis	67,029	Other unintentional injuries	40,717	Drowning	17652	Cardiovascular diseases	13,461	Other unintentional injuries	16,075	Meningitis/ encephalitis	167,993
11	Whooping cough	45,547	Road injury	40,392	Other unintentional injuries	16,823	Malaria	11,348	Drowning	13,012	Measles	165,417
12	Nutritional deficiencies	39,146	Meningitis/ encephalitis	38,447	HIV/AIDS	12,373	Tuberculosis	10,982	Respiratory infections	11,783	Other unintentional injuries	136,883
13	Tetanus	30,191	Nutritional deficiencies	38,163	Cardiovascular diseases	9,675	Self-harm	10,172	Meningitis/ encephalitis	9,143	HIV/AIDS	110,748
14	HIV/AIDS	22,438	Malignant neoplasms	19,735	Whooping cough	9,195	Interpersonal violence	8,004	Malaria	8,012	Whooping cough	110,292
15	Cardiovascular diseases	14,551	Fire, heat and hot substances	16,952	Nutritional deficiencies	7,809	Falls	6,584	Congenital anomalies	6,697	Drowning	95,947

Source: World Health Organization, Global Health Estimates, 2019 (data made publicly available in 2021).

2.1 Disability burden due to child road traffic injuries

In addition to a high mortality burden, road traffic collisions cause a significant number of children to be disabled, sometimes for life. Years lived with disability (YLD) is a measure of the years of healthy life that are lost due to disability. Road traffic injuries are the tenth leading cause of YLDs among children aged 15–19 years and the thirteenth overall cause of YLDs for children aged 0–19 years (*see Table 2*). A study in Cape Town, South Africa, showed that for children under 13 years old injured in road traffic crashes, the main cause of disability were fractures, resulting in three years of life lived with a disability per 100,000 people. Most of those affected were male pedestrians aged 5–9 years.[11] Hospital data from southern Thailand over a 12-year period showed that road traffic injuries resulting in traumatic brain injuries were the main cause of severe disability and mortality for children aged 0–14 years (average patient age was 6 years). Those most affected were young motorcycle drivers between the very early ages of 7–14 years.[12]

Table 2: Causes of years lived with disability in children and adolescents, aged 0–19 years, by age group, globally, 2019

Rank	Age under 1 year	Deaths	Age 1 to 4	Deaths	Age 5 to 9	Deaths	Age 10 to 14	Deaths	Age 15 to 19	Deaths	Age 0 to 19	Deaths
1	Nutritional deficiencies	2,072,199	Nutritional deficiencies	5,445,246	Nutritional deficiencies	5,864,595	Nutritional deficiencies	3,392,361	Nutritional deficiencies	2,288,070	Nutritional deficiencies	19,062,472
2	Congenital anomalies	619,575	Prematurity	1,692,767	Prematurity	1,172,023	Prematurity	1,105,311	Prematurity	1,002,690	Prematurity	5,515,635
3	Prematurity	542,844	Diarrhoeal diseases	1,277,634	Respiratory infections	1,039,019	Diarrhoeal diseases	884,848	Respiratory infections	768,919	Diarrhoeal diseases	4,328,474
4	Diarrhoeal diseases	523,595	Congenital anomalies	1,085,300	Diarrhoeal diseases	975,395	Respiratory infections	829,010	Diarrhoeal diseases	667,001	Respiratory infections	3,759,775
5	Respiratory infections	201,243	Respiratory infections	921,585	Congenital anomalies	789,426	Congenital anomalies	645,407	Congenital anomalies	549,503	Congenital anomalies	3,689,211
6	Malaria	103,042	Malaria	507,195	Malaria	549,382	Neonatal sepsis and infections	421,859	Cardiovascular diseases	544,202	Malaria	1,789,875
7	Birth asphyxia and birth trauma	97,992	Neonatal sepsis and infections	369,390	Neonatal sepsis and infections	442,410	Cardiovascular diseases	396,686	Falls	530,193	Neonatal sepsis and infections	1,724,131
8	Neonatal sepsis and infections	95,670	Birth asphyxia and birth trauma	317,285	Birth asphyxia and birth trauma	347,942	Falls	365,049	Other unintentional injuries	398,681	Birth asphyxia and birth trauma	1,362,887
9	Whooping cough	57,027	Tuberculosis	171,350	Other unintentional injuries	271,407	Other unintentional injuries	330,908	Neonatal sepsis and infections	394,802	Cardiovascular diseases	1,269,378
10	Other unintentional injuries	38,172	Other unintentional injuries	170,094	Cardiovascular diseases	246,789	Malaria	328,843	Road injury	364,445	Other unintentional injuries	1,209,262
11	Malignant neoplasms	20,139	Cardiovascular diseases	74,433	Falls	218,601	Birth asphyxia and birth trauma	315,252	Malaria	301,412	Falls	1,195,293
12	Exposure to mechanical force	12,840	Falls	74,284	Tuberculosis	189,220	Road injury	176,736	Birth asphyxia and birth trauma	284,416	Tuberculosis	695,685
13	Tuberculosis	10,008	Meningitis/ encephalitis	72,051	Exposure to mechanical forces	116,130	Exposure to mechanical forces	160,149	Interpersonal violence	272,287	Road injury	631,506
14	Meningitis/ encephalitis	9,691	Whooping cough	65,561	Meningitis/ encephalitis	112,587	Chronic obstructive pulmonary disease	153,433	Chronic obstructive pulmonary disease	215,935	Exposure to mechanical forces	560,874
15	HIV/AIDS	8,670	Exposure to mechanical forces	64,089	Collective violence and legal intervention	96,815	Interpersonal violence	137,444	Tuberculosis	213,341	Interpersonal violence	503,148

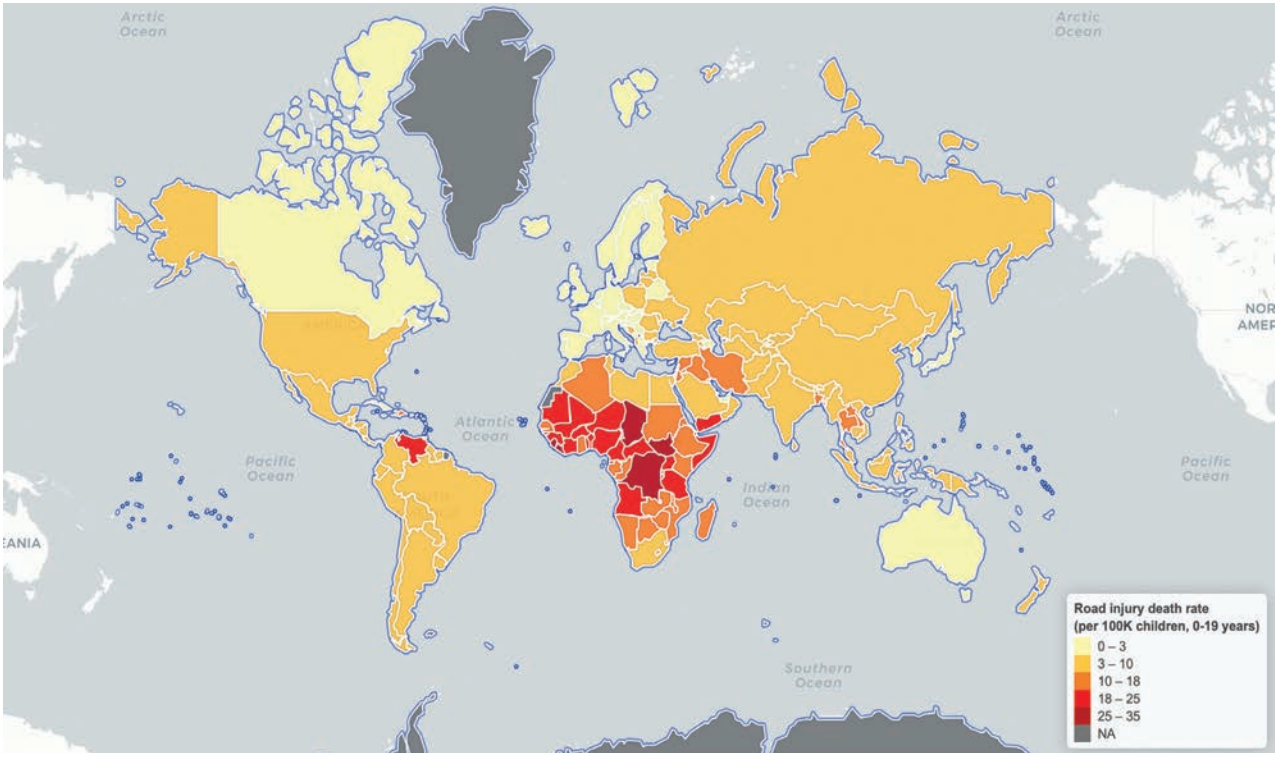
Source: World Health Organization, Global Health Estimates, 2019 (data made publicly available in 2021).

2.2 Unequal burden of child road traffic injury between regions

The road traffic injury burden is unequally distributed both between and within UNICEF regions. Across countries, child road traffic injury mortality rates range from negligible levels in Antigua and Barbuda to a high of 31. 5 deaths per 100,000 children in South Sudan. Countries experiencing the highest child road traffic injury death rates are concentrated in the sub-Saharan Africa region with levels, on average, over nine times higher than in European and Central Asian countries (*see Figure 1*). However, there is also high variability in road traffic injury death rates within regions. For example, the average average child road traffic injury death rates for countries in the Latin America and the Caribbean range from negligible levels to as high as 18.5 deaths per 100,000 children.

The variability in rates is due to a combination of factors, including poorly designed roads, limited transportation options, inappropriate vehicle speeds and other risky behaviours as well as a lack of road infrastructure plans and policies.[9] As a result, many children are exposed to an unsafe road environment on a daily basis. In Addis Ababa, Ethiopia where 88 per cent of road traffic fatalities are pedestrians, the city administration reports a lack of adequate sidewalks and pedestrian crossings. Where sidewalks and crossings do exist, they are often in need of repair or used for parking or vendors, forcing pedestrians onto the streets, where vehicles move at high speeds.[13]

Figure 1: Map of road traffic injury death rates for children and adolescents, aged 0–19 years (for continuity), globally, 2019



UNICEF region*	Average road injury death rate	Lowest rate in the region	Highest rate in the region
Sub-Saharan Africa	17.6	2.9	31.5
Middle East and North Africa	6.9	2.0	22.0
South Asia	5.8	0.8	11.0
Latin America and Caribbean	5.5	0.0	18.5
East Asia and Pacific	5.2	0.1	17.6
North America	3.5	2.4	4.5
Europe and Central Asia	2.2	0.8	8.2

Source: World Health Organization, Global Health Estimates, 2019 (data made publicly available in 2021).
*See Appendix 1 for the list of countries belonging to each UNICEF region

According to the 2019 Global Health Estimates (GHE) – WHO's modelled cause of death data – India has a low child road traffic injury death rate, comparable to rates in Australia. These estimates are consistent with data from India's Ministry of Transport.[14] Yet India has a history of very high road traffic injury fatalities and injuries overall.[14] Potential reasons for this low child injury road traffic death rate are underreporting of fatal injuries; a decreased exposure among children to unsafe road environments (e.g., increased travel in school vehicles instead of walking or cycling to school); and high traffic congestion in urban areas contributing to lower speeds during peak hours, resulting in fewer fatal collisions involving children.[15]

The National Institute of Mental Health and Neurosciences in Bengaluru, India, which acts as a WHO Collaborating Centre for Injury Prevention and Safety Promotion, has indicated that a valid and reliable data source or injury surveillance system addressing child injuries does not exist in India, either at a state or national level.[16] This limits understanding of the burden of child injuries,[17] which is a common challenge in many low- and- middle-income countries (LMICs).

2.3 Child road traffic injuries by income level

The overwhelming majority of child road traffic injuries (97 per cent) are concentrated in low- and middle-income countries (LMICs) and only 3 per cent occur in high-income countries (HICs) (*see Table 3*). HICs have a long history of investing in road safety. For example, Vision Zero was adopted by the Swedish parliament in 1997 as a new direction for road safety, with the goal of zero deaths or serious injuries on roads.[18] This vision has now been adopted in many HICs.

Table 3: Proportion of child road traffic injury deaths by country income level, 2019

Income level*	Road traffic deaths	Proportion of road traffic deaths	Road traffic injury death rate per 100,000 children aged 0–19 years
Low-income	66,914	30%	19.5
Lower middle- income	105,590	48%	8.2
Upper middle- income	39,846	18%	5.8
High-income	7,288	3%	2.8

Source: World Health Organization, Global Health Estimates, 2019 (data made publicly available in 2021).
* See Appendix 1 for the income level of each country

2.4 Child road traffic injuries over time

Global trends can mask country variations in road traffic injury death rates. The general decline in global child road traffic injury death rates from 2000 to 2019 showed a marked difference in progress depending on country income level (*see Figure 2*). HICs on average had the lowest baseline levels of child road traffic mortality in 2000 and achieved the greatest reduction in mortality over the past two decades. Child road traffic injury death rates dropped 62 per cent in HICs during this time frame, compared with only 11 per cent in low-income countries (LICs).

This unequal burden of road trauma is largely attributable to differences in road safety standards and infrastructure and vehicle safety.[19] Additionally, in LICs, vulnerable road users, such as pedestrians, cyclists and motorcyclists, mix more frequently with cars and heavy vehicles travelling at high speeds because most roads do not have separate lanes for different road users. This is a sharp contrast to HICs which more frequently have roads that enforce separation of vehicles from vulnerable road users, rather than placing the burden on these unprotected users to avoid vehicles.

UNICEF is committed to investing in reducing both the road traffic injury burden and promoting non-motorized transport that contribute to a safer, healthier, cleaner and greener environments for children.

Figure 2: National road traffic injury death rates per 100,000 population for children and adolescents, aged 0–19 years, by country income level, 2000–2019

Income level		2000	2019	2015	2010	2005	Reduction from 2000 to 2019
Low-income countries	Number of deaths	47,222	52,085	55,210	61,895	66,914	11%
	Rate*	21.9	21.1	19.6	19.6	19.5	
Lower-middle-income countries	Number of deaths	119,561	121,233	116,806	107,637	105,590	22%
	Rate*	10.5	10.3	9.6	8.6	8.2	
Upper-middle-income countries	Number of deaths	76,853	67,087	52,721	46,040	39,846	41%
	Rate*	9.8	8.8	7.5	6.6	5.8	
High-income countries	Number of deaths	20,629	16,390	10,381	8,061	7,288	63%
	Rate*	7.7	6.2	3.9	3.1	2.8	

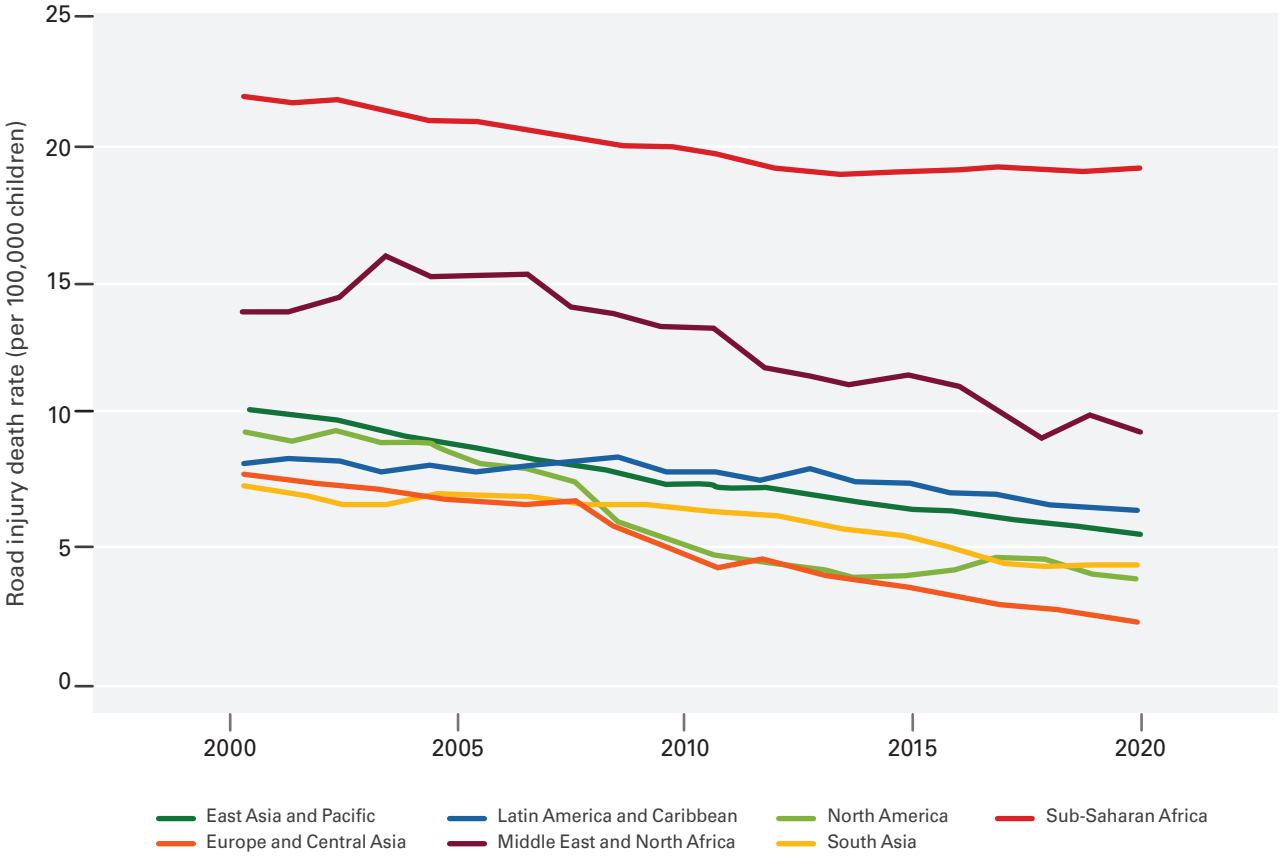
* Rate per 100,000 population for children, aged 0–19 years

Source: World Health Organization, Global Health Estimates, 2019 (data made publicly available in 2021). Countries listing available in Annex 1.

Note: The black bars represent the global average of national road injury death rates for a given year and the over layer of rates (dots) represent the death rates for specific countries and demonstrate the distribution of estimates between the countries based on income level. Dots are colour-coded by country income classification. HICs (purple dots) seem to be gathering towards the bottom of the graph, a pattern that becomes more apparent over time. This shows that lower child road death rates are among the HICs, while the rates of the LICs (red dots) stay more dispersed and generally stay on the top of the graph over the same time period with higher child road death rates.

When examining the death rate associated with child road traffic injuries by UNICEF region, a general downward trend is visible over time. However, there is a large gap between the rates in sub-Saharan Africa compared to all other regions (*see Figure 3*). In some countries, such as Afghanistan, Cameroon, the Dominican Republic and Zimbabwe, the death rate has even increased when comparing 2019 rates with those in 2015, as evidenced by the World Health Organization, Global Health Estimates from 2019 (data made publicly available in 2021), with countries listed in Annex 1.

Figure 3: Road traffic injury death rates for children and adolescents, aged 0–19 years, by UNICEF region, 2000–2019

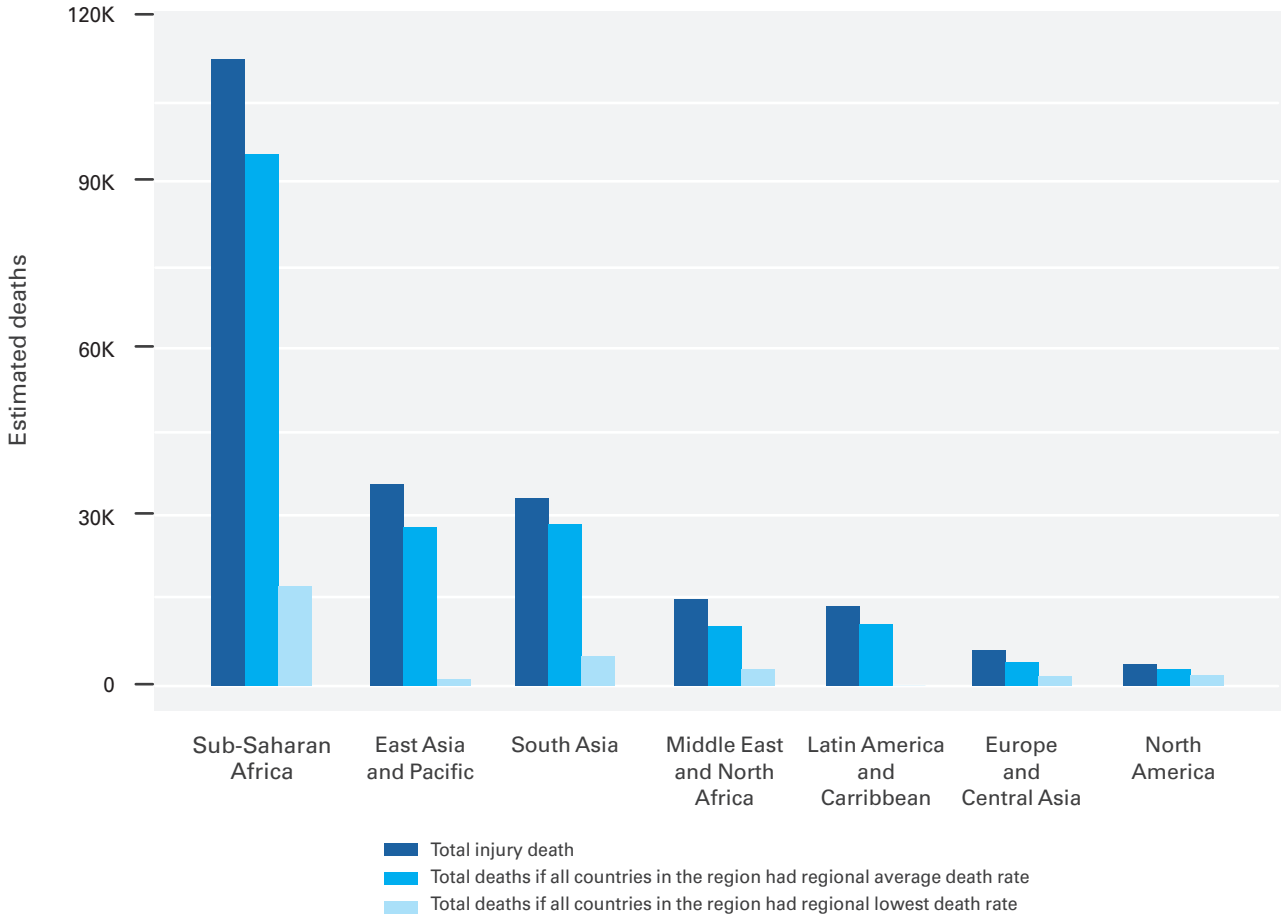


Region	2000 rate	2005 rate	2010 rate	2015 rate	2019 rate	% rate reduction 2019 vs. 2010
East Asia and Pacific	9,99	8,70	7,29	6,55	5,79	42
Europe and Central Asia	7,74	6,85	4,70	3,69	2,96	62
Latin America and Caribbean	8,16	7,98	7,82	7,18	6,57	19
Middle East and North Africa	12,78	13,79	12,21	10,71	9,31	27
North America	9,24	8,17	5,02	4,52	4,34	53
South Asia	7,35	7,14	6,49	5,32	4,74	35
Sub-Saharan Africa	22,62	21,28	19,89	19,02	19,07	16

Source: World Health Organization, Global Health Estimates, 2019 (data made publicly available in 2021). Countries listed in Annex 1.

Yet, there are many lives lost due to road traffic crashes that could be saved. If each country reduced road traffic injury deaths to the same rate as the best performing country in the region, more than 189,000 lives would have been saved in 2019 (*see Figure 4, light-coloured bar*). Over a 10-year period this would save nearly 2 million lives and contribute to reaching the SDG target of reducing road traffic deaths by 50 per cent by the year 2030. The largest disparity of deaths takes place in sub-Saharan Africa, where more than 95,000 deaths could be averted in just one year or 260 deaths everyday. A less ambitious goal is 39,000 potential lives saved if each country reduced the deaths to be the same as the regional average (*see Figure 4, cyan blue bar*).

Figure 4: Potential lives saved for child road traffic injuries globally



Source: World Health Organization, Global Health Estimates, 2019 (data made publicly available in 2021). Countries listed in Annex 1.

Note: Lives saved in each Region are calculated by estimating the number of deaths using the regional average injury death rate per 100,000 children and using the country with the lowest injury death rate in that Region per 100,000 children; in sub-Saharan Africa Seychelles has the lowest injury death rate at 2.9; in South Asia it is Micronesia; in East Asia and Pacific it is the Maldives; in Latin America and Caribbean it is Antigua/Barbuda; in Middle East and North Africa it is Israel in Europe and Central Asia it is Switzerland; and in North America it is Canada. Number of deaths at lowest regional rate not present in Latin America and Caribbean as Antigua and Barbuda had no reported child injury deaths in 2019.

2.5 Road traffic injuries and severity

Disability due to road traffic injuries rises with age as children increasingly become exposed to the road traffic environment, with the highest disability found among ages 15–19 years followed by ages 10–14 years. Boys have a higher number of years lived with disability compared to girls. When examining which type of road user is involved, the highest disability rate is seen among child cyclists followed by pedestrians, especially among those aged 15–19 years and among boys. The severity of crashes is often higher among cyclists and pedestrians than among vehicle occupants because of the lack of physical protection when cycling or walking. Research shows that the chances of a cyclist or pedestrian surviving a crash with a vehicle is dramatically lower when vehicle speeds are above 30 km/h. Although children can still suffer serious harm at speeds lower than 30 km/h, WHO recommends speeds of 30 km/h or less where children live, learn and play as the risk of death is reduced at lower speeds due to vehicles being more likely to stop in time.[5]

2.6 High cost of road traffic injuries

Deaths and injuries from road traffic crashes harm people, households and social networks and have negative consequences on countries' medium- and long-term economic growth. Adults of working age who have been impacted by road traffic injuries are unable to participate in the workforce, decreasing productivity. A study of five countries in South East Asia found that road traffic injuries cause a significant increase in the proportion of households reporting catastrophic health spending, leaving children and their families in financial jeopardy.[20]

Road traffic crashes are estimated to cost most countries 3 per cent of their gross domestic product (GDP).[21] A report by the World Bank using detailed data on deaths and economic indicators from 135 countries estimates that those countries which do not invest in road safety lose between 7 per cent and 22 per cent of their potential per capita GDP growth. Thus, on average, a 10 per cent reduction in road traffic injury deaths raises per capita real GDP by 3.6 per cent.[22] A survey on road traffic injuries in Nepal, Rwanda, Sierra Leone and Uganda demonstrated that road traffic injuries accounted for a significant proportion of disability, resulting in 39 per cent of all ages experiencing limitations to work or daily activities.[23] Unfortunately, the proportion of these injuries among children was not described.

Road traffic injuries at the country level yield very high costs to society. For example, Mozambique suffers staggeringly high rates of road traffic injuries, similar to other LICs. A study performed at the main hospital in the country, Maputo Central Hospital, found that on average road traffic injuries incur annual inpatient costs of approximately US $116 million for all ages (0.8 per cent of GDP).[24] This financial burden represents approximately 40 per cent of Mozambique's annual public health care budget. Though the study data do not offer insight into the impact on children specifically, they highlight the economic impact of road traffic injuries and the importance of an organized trauma system to reduce costs for all. Another example is from Brazil, where road traffic injury victims have an average of one-week hospital stays, resulting in significant costs, according to the Brazilian National Hospital Information System.[25] As countries investigate the costs of road traffic injuries, it would be valuable to quantify the impact on children and adolescents as a way to advocate for their right to safe roads.

2.7 Limitations in reported road injury data

The child road traffic injury data presented in this report require careful interpretation for a number of reasons. First, multiple government departments or agencies collect and release road injury data in most countries and while some estimates are adjusted for underreporting, others are not. Second, because in some countries police are not present at crashes and some hospitals are not able to record data on the cause of injury due to a high patient load, data from police and hospitals may significantly underreport the real number and seriousness of road crashes.[26] Underreporting is a major problem for child pedestrians and cyclists as police may not be notified of crashes and children may not be transported to a hospital for treatment. In some countries victims and/or families do not report road collisions and sometimes not even deaths and just bury their relatives, especially in rural areas. According to WHO, on average only 17 per cent of road fatalities are reported in LICs, compared to 77 per cent in MICs and 88 per cent in HICs.[5] For example, the Central African Republic, Equatorial Guinea, Liberia and Rwanda are unable to provide annual data on road traffic injuries. In addition, there are issues of inconsistency, inaccessibility and delay in release of data globally and this may also include non-disaggregated data as child-focused data is not always readily available.[27]

3. Risk factors

Road traffic injuries are the result of a complex combination of risk factors including speed, traffic volume, road design, vehicle safety, road-user behaviour and post-trauma care. Being aware of and understanding the risk factors children face on their journeys will assist in the development and implementation of interventions to mitigate these risks. This section provides an overview of risks and solutions for these risks are shared in the following section.

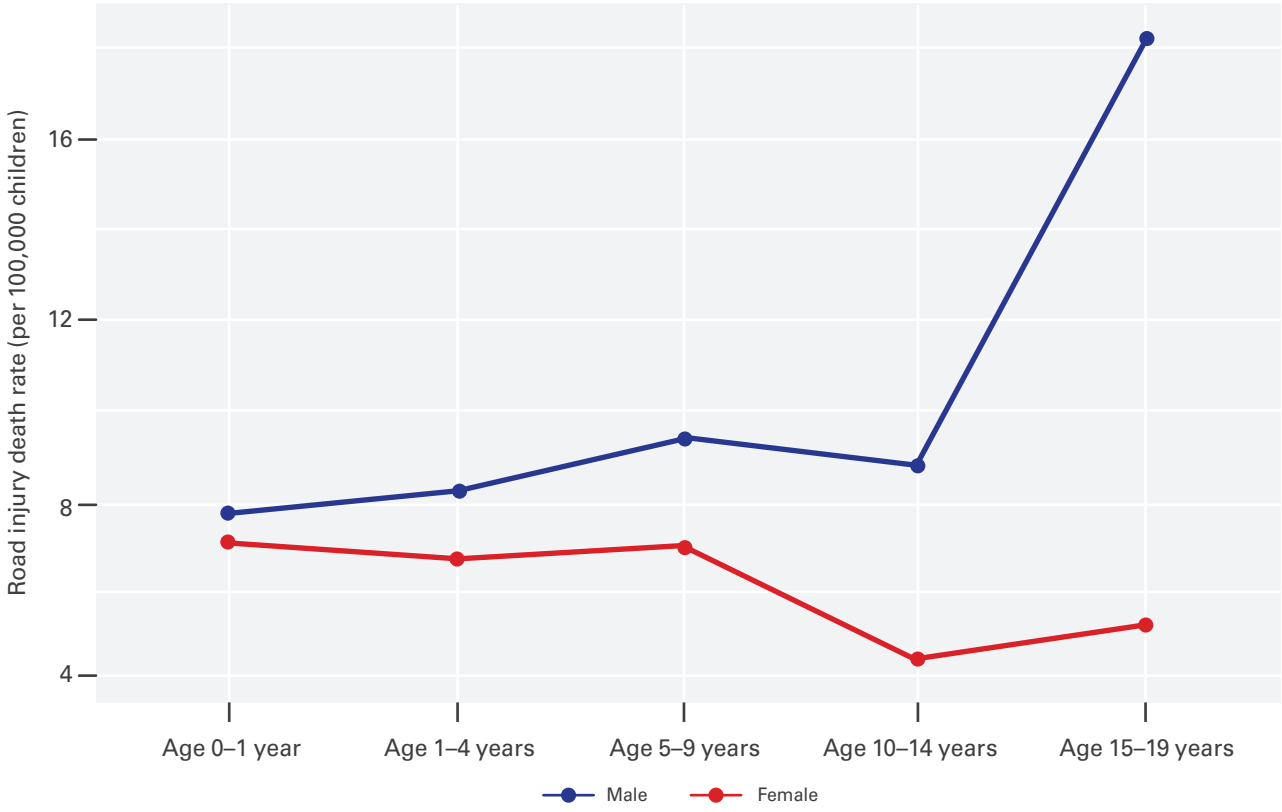
3.1 Child age and sex

As children grow, they shift from exploring their home environment by crawling and walking to exploring the outdoor environment through play and their journey to and from school in the years thereafter. However, the road environment is designed for adults and vehicles, not children. Children are physically smaller and therefore less visible, move unpredictably and under age 10 are unable to complete the various cognitive tasks necessary to safely cross a road (detect motion, ascertain if the motion is toward or away and estimate the speed of the vehicle to forecast when the vehicle will be close to their moving space).[28] As children age they often make the journey to school without an adult, creating another risk factor for road traffic injuries. Older children who are developmentally delayed or have deficits in psychomotor skills may also be at increased risk. Data from Ghana show

that children under 10 years of age were two times more likely to die from road traffic injuries compared to adults aged 30–59 years.[29]

When sex is considered, boys are consistently more likely than girls to die from road traffic injuries in every age group from 0–19 years and the difference increases with age, with the largest difference occurring in age group 15–19 years (*see Figure 5*). The rate of road traffic injury deaths for boys aged 0–19 years is nearly two times higher for boys compared to girls (11 boys vs. 5.9 girls per 100,000). The difference between boys and girls may be explained by boys having higher exposure to traffic and experiencing different gender expectations. For example, boys tend to take more risks and to have the social acceptability of greater freedom to explore their environment and drive mopeds or motorcycles to earn income at a younger age than girls.[30, 31] By contrast, girls have lower rates of injury but lack safety in urban environments due to sexual harassment, exploitation and security risks in public spaces and on public transport.[32]

Figure 5: Rate of death due to road traffic injury by age and sex, globally, 2019



Age group	Male		Female	
	Deaths	Rate	Deaths	Rate
Age 0–1 year	5.402	7.73	4.628	7.04
Age 1–4 years	22.857	8.21	17.534	6.71
Age 5–9 years	31.806	9.34	22.193	6.96
Age 10–14 years	28.758	8.77	13.802	4.51
Age 15–19 years	57.340	18.29	15.316	5.23

Source: World Health Organization, Global Health Estimates, 2019 (data made publicly available in 2021).

Box 2: Targeting gender equity as part of road safety

Women and girls are often the primary caregivers of children and the road environment plays a significant role in the mobility of women and girls. When the road environment is unsafe, too expensive or too time consuming many women face real barriers to both physical and social mobility. Women in LMICs have reported fear of sexual harassment and personal security on public transport and in public spaces resulting in their reduced ability to access services for themselves and for their children.[32]

For example, a study conducted in areas outside of Delhi, India with collaboration from the FIA Foundation found that women regularly used less than a third of streets due to a lack of safety in public spaces and public transport.[33] Women highlighted the lack of and/or poor quality of walking paths as a main infrastructure barrier to mobility as it is difficult to walk. Road safety audits found that 84 per cent of walking paths in the three study areas were nonexistent or extremely poor.

Furthermore, women and girls' mobility is further reduced in adverse weather conditions, with many unable to attend school as the streets are unusable for them. This limits their opportunity to access safe and equitable education, a basic human right and part of the SDGs and the New Urban Agenda. A co-benefit of safer streets will be to provide young women and girls access to all public spaces and in turn education, employment and active participation in society.

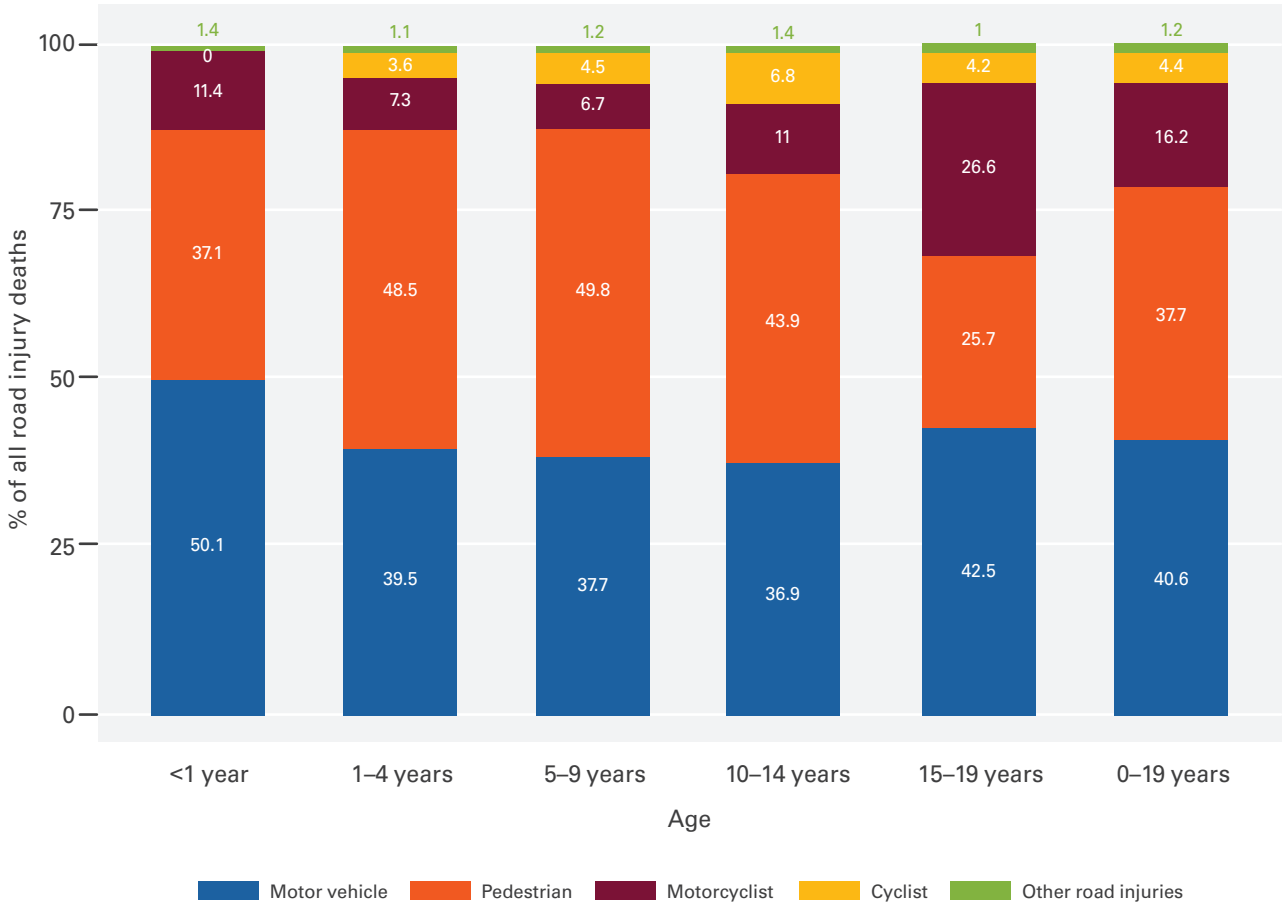
Sources: Uteng et al.[32] and FIA Foundation[33]

3.2 Specific risks based on type of road user

Children and adolescents make their journeys in many ways, ranging from walking, biking, use of mopeds or as passengers and drivers in vehicles. Over time, there has been an increased use of motorized vehicles as a means of transport and this has led to a decline in walking and cycling in children and adolescents. The result has been increasingly sedentary lifestyles with consequences to children's and adolescents' health, in addition to the burden of road traffic injuries. This increase in the use of motorized vehicles is occurring not only in HICs, but also in LMICs, where urbanization is rapidly underway (*see Box 3*).[34]

Each mode of transport is linked to specific risks. As noted earlier, children are considered vulnerable road users as pedestrians or cyclists as they have no protection in a crash when compared to passengers or drivers in closed vehicles. Vehicles with functioning safety features, such as three-point seatbelts, child car restraint systems and front and side airbags, are more likely to keep a child safe in a crash than vehicles without these lifesaving features. The same is true for helmets while cycling or as passengers or drivers on mortorized two-wheeled vehicles and lowering speed and safe segregated road infrastructure. Figure 6 is a visualization of road injury deaths by age for each of these modes of transport.

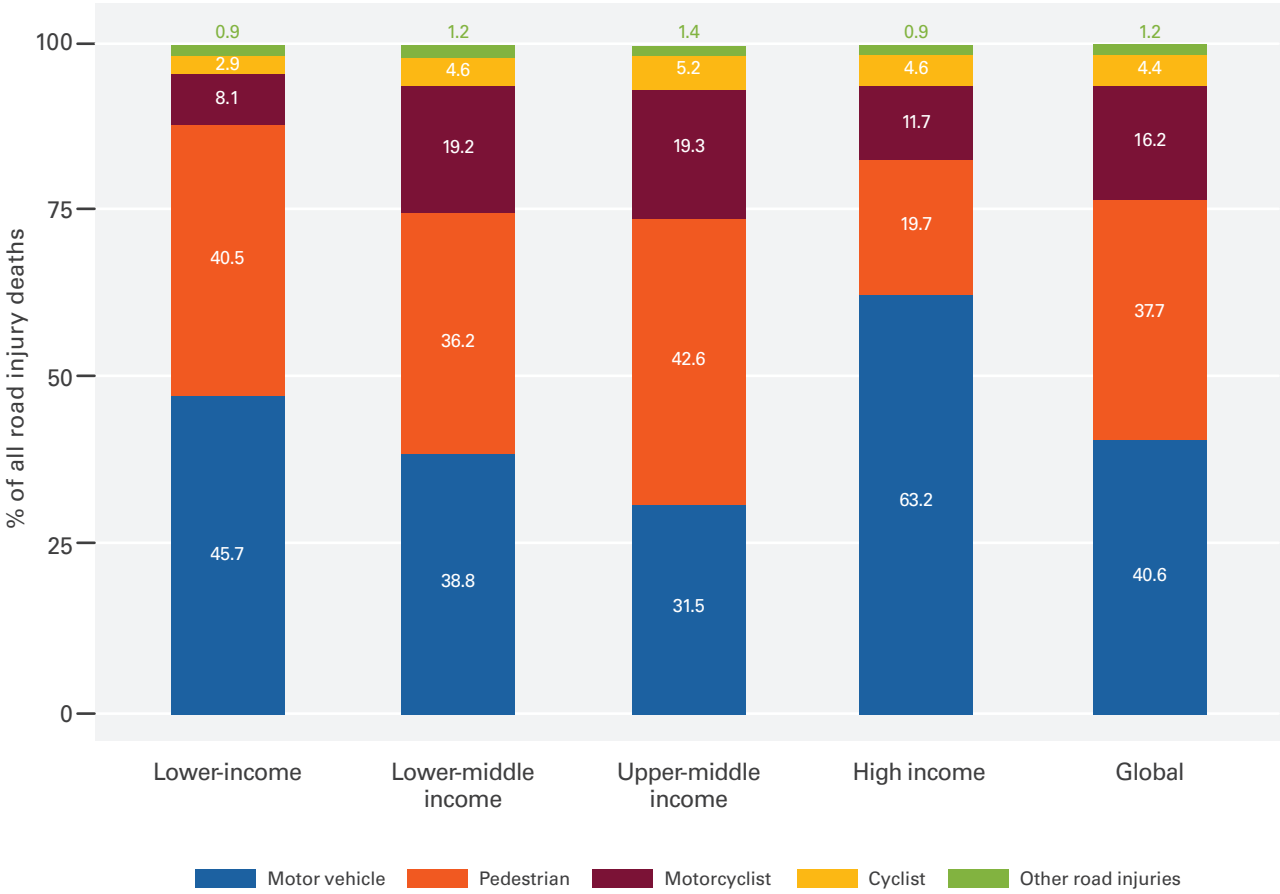
Figure 6: Child road injury deaths by mode of transport and age group, globally, 2019



Source: World Health Organization, Global Health Estimates, 2019 (data made publicly available in 2021).

Children in LMICs often use different modes of transport from children in HICs due to limited resources or differences in road infrastructure. For example, transport for children in LMICs may be on a moped without a helmet or clinging to an adult at the front of a motorcycle. Motor vehicle deaths are higher in HICs, while motorcycle and pedestrian deaths are higher in upper-middle income countries (*see Figure 7*), which are faced with the challenge of vehicles that lack safety measures. To date it is estimated that the majority of motor vehicles in LMICs are not meeting United Nations Road Safety Vehicle Standards.[3] This is a serious risk that needs to be addressed.

Figure 7: Child road injury deaths by mode of transport and country income level, globally, 2019



Source: World Health Organization, Global Health Estimates, 2019 (data made publicly available in 2021).

Most people in LMICs walk as their means of transport,[35] especially females in rural areas.[36] Data from the Red Cross War Memorial Children's Hospital in South Africa showed that 75 per cent of children aged 0–12 years who were injured in road traffic were pedestrians, some others were injured in minibus taxis or in seats without restraints.[37] In Lilongwe, Malawi, where pedestrians represented 54 per cent of the children aged 0–16 years injured in road traffic and 78 per cent of deaths. Children aged 0–16 years made up 71 per cent of moderate to severe head injuries, with about half of these from being hit by cars and the other half hit by large trucks, buses and lorries.[38]

A study in the South West Region of Cameroon, an LMIC, found that children aged 0–10 years were most at risk as pedestrians, followed by as passengers on bicycles and then as passengers in cars.[39] The pattern for the highest two risks were reversed for those aged 10–19 years when children are more independent, with child passengers on bicycles at the greatest risk, followed by pedestrians and then passengers in cars.

In Malaysia, country descriptions are not consistently abbreviated, road safety data show that private vehicle crashes were the leading group of road traffic injuries among children aged 1–4 years (44 per cent) and children aged 5–9 years (30 per cent).[40] Only 36 per cent of Malaysian parents were aware of the importance of a child restraint system and even fewer (27 per cent) used them. The use of a child restraint system in different regions of Malaysia ranges from 5 per cent to 42 per cent. As a result, the Malaysian Government mandated the use of child restraint systems starting 1 January 2020.

3.3 Specific risks based on type of road user

Children depend on caregivers to use products such as child restraint systems that can ensure their safety on roads. Yet use of these devices varies greatly across the globe. For example, a study conducted in 30 provinces in rural China from 2015 to 2016 found that 66 per cent of the caregivers who transported children in cars did not use child restraint systems; 44.4 per cent of them believed they were unnecessary and 33 per cent had never heard of them.[41] In addition, in the same study, over 70 per cent of primary caregivers who transported children on motorcycles did not have a helmet for their child, more than 50 per cent thought it was unnecessary and 26 per cent reported being unable to buy suitable child-size helmets.

A study exploring barriers to child restraint use in an under-served population in South Africa found that parents did not own a child seat because of its high cost and the belief that seatbelts were a suitable alternative. An overwhelming 92 per cent of survey respondents claimed to have knowledge of current child restraint legislation, however only 32 per cent of those parents/caregivers were able to correctly identify age requirements and penalties for not using child restraints.[42] In fact, only 8 per cent of child passengers were properly using child restraint systems during an observation of seven suburbs of Cape Town.

Box 3: Injuries and deaths from road crashes to children in Lebanon

Like many Eastern Mediterranean countries, Lebanon suffers high road traffic deaths and injuries:

- 2/3 of the children injured or killed from road crashes were Lebanese and approximately 1/3 were Syrian or Palestinian refugees
- Boys were disproportionately affected, experiencing 73 per cent of road traffic injuries and deaths among children and youth aged 0–17 years
- The 6–14-year age group experienced the highest proportion of fatalities (42 per cent), followed by those aged 0–5 years (31 per cent) and 15–17 years (26 per cent)
- Most commonly reported contributing factors were child occupants of vehicles travelling at high-speed (25 per cent), children in vehicles with distracted drivers (20 per cent) and child pedestrians crossing roads (14 per cent)
- Most common body parts sustaining an injury were upper and lower extremities followed by head injuries
- Due to underreporting of road crashes, it is difficult to have an accurate assessment of the complete burden of road injuries to children

Source: Al Hajj, 2020[43]

3.4 Unsafe vehicles in lower- and middle-income countries and link to air pollution

Safe vehicles play a critical role in averting crashes and reducing the likelihood of serious injury. Since the 1960s, improved vehicle safety standards have driven down road fatality rates in HICs. Improvements include antilock brake systems, electronic stability control, safety belts and child seats, frontal airbags, side airbags, side-door beams, side structure and padding and vehicle front-end design for pedestrian protection.[44] The success indicates that if LMICs also increased the use of such safety improvements through regulation, they too would experience fewer deaths and disabilities for all ages.[44] This is key to achieving the road safety targets of the SDGs for 2030.

Yet a report based on an in-depth analysis of 146 countries by the United Nations Environment Programme (UNEP) found that vehicle design is a neglected issue in policy efforts in LMICs. Fourteen million used light-duty vehicles were exported worldwide between 2015 and 2018, 80 per cent to LMICS and of these, more than half to Africa,[45] the continent with the highest child road injury rates. These used vehicles are typically very old. For example, the average age of used vehicles exported to Gambia is 19 years and a quarter of used vehicles exported to Nigeria are almost 20 years. As a result of their age, the used vehicles do not include proven safety devices that are in all newer vehicles and they do not meet current vehicle emission standards. The UNEP report found a direct correlation between high road traffic injury death rates and countries with "very weak" or "weak" used vehicles regulations (e.g., Burundi, Malawi, Nigeria and Zimbabwe). Countries with stronger used vehicles regulations experience comparatively lower death rates.

Most cars sold in LMICs do not meet even the relatively low United Nations safety standards. Vehicle modification, poor maintenance standards, inappropriate use (e.g., passenger overloading) and lack of safety enforcement exacerbate this lack of baseline safety.[19] These unsafe vehicles are dangerous, result in more frequent injuries and contribute significantly to air pollution in cities. Approximately 9 million people a year are estimated to be dying due to air pollution,[46] to which transport is a significant contributor.[47] As a result, outdoor air pollution is predicted to be the leading cause of environment-related child death by 2050, with a significant number due to motor vehicles.[45] Globally, the average contribution of transport to direct CO_2 emissions is 24 per cent, with three quarters of that being from road vehicles (cars, trucks, buses and two and three wheelers).[48] The UNICEF report Clean Air for Children, looks at how children, particularly the most disadvantaged, are affected by air pollution, including vehicles.

3.5 Link between lack of safe independent mobility and reduced physical activity in children

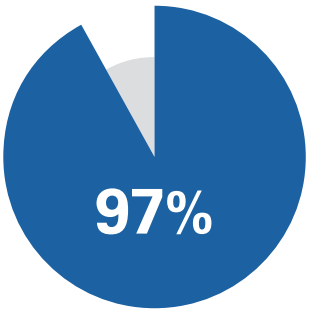
Children have the right to independent mobility and to equal and safe access to age-appropriate services and opportunities in their surroundings. But weak transportation policies and poor urban planning and lack of safe infrastructure in many countries prevent children and their families from moving about safely in their neighbourhoods.[49] This lack of safe mobility has a direct impact on children's physical health. Recent research estimates that 3 per cent of global child deaths are due to physical inactivity linked to poor walkability and lack of access to recreational areas.[3] The ability for children to safely exercise independent mobility, rather than relying upon motorized transport, results in multiple co-benefits including low transport costs and environmental sustainability thanks to reduced car use, traffic volume and air pollution.[50] Such mobility is demonstrated by cities engaged in UNICEF's Child Friendly Cities. The Child Friendly Cities Initiative in the Philippines includes child's rights and road safety as important components.

Box 4: The child road injury burden from urban growth

About 70 per cent of the global population is expected to live in urban settings by 2030.

A number of factors are important to helping adults and children feel safe in road traffic, including:

- walking paths and other infrastructure for pedestrians;
- controlled intersections with signs, signals and clear markings;
- well-marked street crossings; and
- reduced traffic speed and volume of vehicles.[51]



of road traffic fatalities among children 19 and under occur in

Low- and middle-income countries

By 2030

the number of cars is expected to double worldwide

2 billion+ Motor vehicles

220,000 children and adolescents

died from a motor vehicle crash in 2019

Over 600 children and adolescents die in road traffic crashes daily

Source for number of cars: Sperling et al.[52]
Source: World Health Organization, Global Health Estimates, 2019 (data made publicly available in 2021).

Box 5: Benefits of green spaces to children along the journey

Green spaces designed with safety and accessibility in mind[53] support traffic calming, reduce road traffic injuries in urban environments[54] and encourage walking and cycling rather than motor transport. Research shows that even trees along streets can increase the likelihood of children walking and cycling outdoors.[55, 56]

Green spaces benefit many aspects of children's development – from infancy into adulthood – as described in UNICEF's recent publication: The Necessity of Urban Green Space for Children's Optimal Development.[57] Benefits include higher birthweight,[58, 59] improved mental health,[60] better academic performance,[61] more physical activity,[62] increased social cohesion[63] and increased concern for nature later in life.[64]

For example, green space significantly increases mental health and wellbeing and reduces stress and depression, especially for children of low-income families, by providing a place of play, refuge and recovery.[65] Children naturally seek out green spaces during times of crisis and hardship.[66]

In informal settlements of Mumbai, lack of safe open spaces often prevents children – especially girls, younger children and children with disabilities – from playing outdoors.[67] Common space is claimed by adults and older boys and some have turned into places to dump garbage and hot spots for crime and violence due to the lack of everyday maintenance. Children who do not have access to natural play environments within the community actively seek out more distant green spaces, often taking great risks such as crossing major roads with heavy traffic.

Additional benefits of green spaces in cities include reduced violence and crime,[68, 69] lower health care costs,[70] dampened noise, cooler temperatures, increased biodiversity, drainage and aquifer recharge for flood control and better air quality and CO_2 absorption. Green spaces are also lucrative, yielding energy savings of 6 per cent to 30 per cent and increased real estate values of 5 per cent to 20 per cent, depending on the location.[71] In cities where air pollution levels are high, direct measures must be taken to reduce emissions from pollution sources, such as traffic, industry and heating. Planting trees and other vegetation can help filter fine particles from the air and improve city-wide air quality, but this is not sufficient to clear high levels of air pollution.

Air circulation determines, to a large extent, whether air pollution, such as from vehicle exhaust, builds up or gets disbursed. Densely planted trees and greenery can therefore improve air quality in children's corridors and play spaces if planted as a buffer between these spaces and major sources of air pollution, such as highways.[72] Along transport corridors without space to include a green buffer between heavy traffic and children walking or biking adjacent to it, extra care must be taken in planting trees without causing reductions to air circulation.[73]

3.6 Road injury risks differ in urban and rural areas

Both urban and rural settings should provide safe and inclusive public and green spaces such as playgrounds and parks. In many countries, child road traffic fatalities occur more frequently in rural areas because of high speeds, lack of physical separation of lanes, numerous intersections, poorly maintained roadsides and use of modified motorized vehicles with an overload of passengers, including children going to school. Another problem is the mixing of road users; for example child pedestrians and cyclists are in close proximity to speeding vehicles. This also increases not only road crashes, but also their severity.[74]

In cities, it is often more difficult to create these spaces because of greater population density and lack of safe infrastructure. If such spaces exist, they may be dominated by motorized traffic. In urban areas, streets around green spaces may be dominated by two- and four-wheeled vehicles, often moving at fast speeds. As a result, children may have to stay home and cannot engage in social activities or explore different environments. This hinders the development of their physical and cognitive skills.

Greening urban environments with trees and vegetation makes outdoor spaces more attractive for children to play in and has added benefits such as filtering air pollution and reducing urban noise and urban heating to decrease the risk of dehydration.[75] It also makes sense from an economic perspective as the health-promoting effect of green spaces has been shown to result in savings in health care costs.[76]

Box 6: Children co-designing safer and greener journeys to school

An integrated network of safe roads and safe and accessible green spaces can create an oasis for children as they journey from home to school to cherished spaces of play and leisure, especially when children themselves are full partners in the design process. For example, in Regensburg, Germany, a participatory urban planning process was used to improve safety and accessibility in an underprivileged neighbourhood. Professional planners conducted neighbourhood strolls with local children who pointed out their favourite places, places they were scared of and places where traffic was unsafe. Older children also completed a questionnaire in which they wrote down and marked on a map the meeting points they frequented, their school routes and their wishes for improvement. Based on these data the professionals, together with the children, developed suggestions for improving the neighbourhood that were presented and approved by the city council. The project has resulted in the child-friendly renewal of the neighbourhood, including the creation of a big park with inclusive playgrounds for handicapped children, wheelchair accessible sidewalks and the recruitment of 'student pilots' to escort students as they cross the street on their way to and from school.

Source: UNICEF Child Friendly Cities Initiative Inspire Awards. 2019. [77]

3.7 Road injury recovery and post-crash trauma care

A major factor in whether children survive a road traffic injury is timely and accessible medical treatment. Gaps may exist is the health system affecting the capacity to immediately and efficiently respond to road traffic injuries. Many volunteers or first responders at the scene of a collision may not be trained in first aid and lack of transportation to medical care is a common problem in LMICs.[78] Further, even if children are brought to an ambulance or emergency room, some of these may lack child-sized equipment, including basics such as tubes to intubate and ventilate younger children. Also, many doctors and nurses in LMICs have not received adequate training in emergency treatment of children. Children have different physiologies and different medical needs from adults (they are not just 'little adults').

Very few countries in sub-Saharan Africa have developed systematic and financially sustainable approaches to delivering emergency medical services at scale.[79] For example, in Malawi, access to professional prehospital care was reported as almost nonexistent in 2017.[80] Outside of sub-Saharan Africa, in Lagos, Nigeria, less than 3 per cent of road traffic crash victims received emergency medical services. And in one third of those cases, it took between one and six hours post-injury for them to access medical services.[81] A review of emergency medical services in LMICs found that the main barrier to an organized emergency system was lack of finances. Most ambulances were used for transport only and lacked equipment to serve as emergency care vehicles.[82] In addition, rehabilitation to reduce the long-term impact of injuries for children in LMICs may be very limited, particularly mental health support after the trauma yet child-focused trauma care can avert deaths and disability.[83]

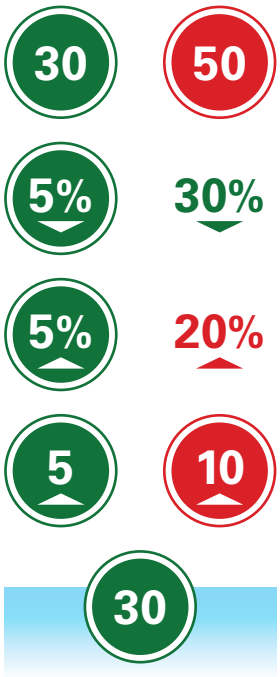
3.8 Speed as a major risk factor for road traffic injuries

Speed still remains one of the main causes of fatal road traffic injuries. WHO cites speeding as a contributing factor in most crashes. As average road speeds increase, so does the probability of death or crash severity. Specifically, speed has been noted as a contributing factor in 15 per cent to 35 per cent of fatal road crashes. Children's lives are lost due to speeding vehicles, as faster vehicles may be harder to avoid and the vehicles carry more energy which increases the level of damage in the event of a child being struck. Speeds below 30 km/h save lives and are a key focus of the Second Decade of Action on Road Safety.[51] Low speeds are the foundation of the Safe Systems Approach, which incorporates road designs that minimize the opportunity for drivers to speed, protecting vulnerable road users, including children.

Box 7: Speed kills

Of the many factors contributing to deaths and injuries on the world's roads every year, speed is arguably the largest and most controllable.

Speed contributes to about one-third of all fatal road crashes in high-income countries, and up to half in low- and middle-income countries. Excessive speed is an aggravating factor in all crashes.



Children hit by a car at 30 km/h may survive. At 50 km/h, most will die.

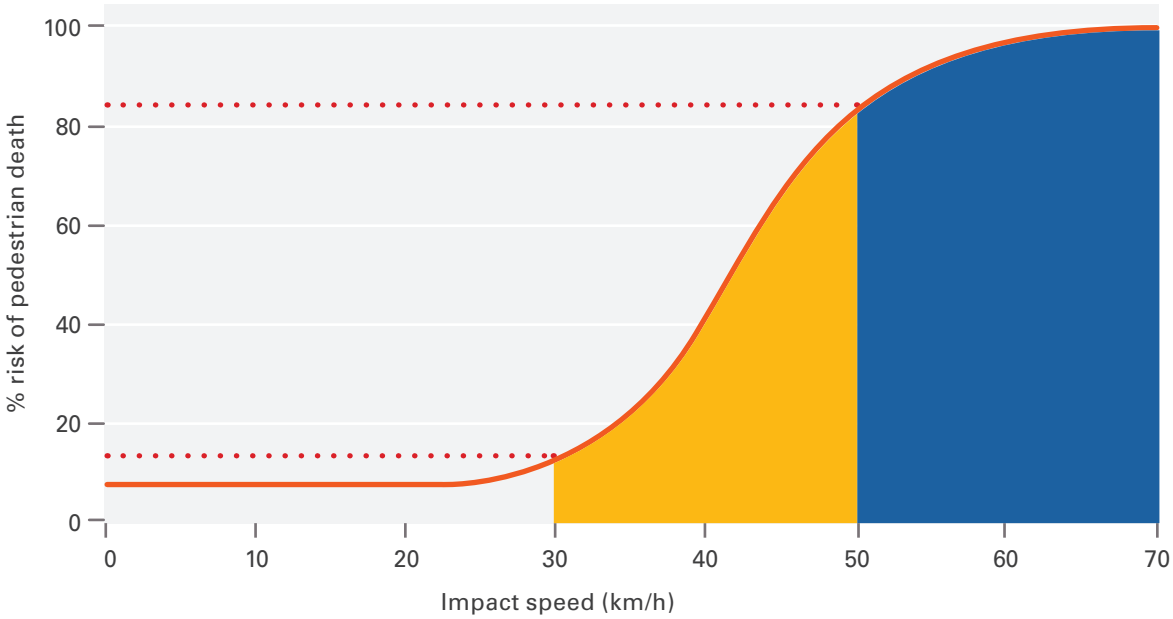
A 5% cut in average speed can result in 30% reduction in the number of fatal crashes.

A 5% increase in average speed leads to a 10% increase in crash-related injuries and a 20% increase in fatal crashes.

Speeds 5 km/h above average in 60 km/h urban areas, and 10 km/h above average in rural areas double the risk of a fatal crash.

Lowering speed zones, for example from 50 km/h to 30 km/h, helps decrease pollutant emissions, improving air quality. This is crucial in school zones, as children are particularly susceptible to the adverse effects of air pollution.

The relationship between pedestrian safety and the impact speed of vehicles



Source: FIA Foundation, 'Speed Kills Children: Use the vaccine', 2017.

3.9 Alcohol as a contributing risk factor in road traffic injuries

The International Transport Forum states that driving under the influence of alcohol is a factor in 10 per cent to 30 per cent of fatal crashes among its 62 member countries, which include a range of LMICs and HICs.[74] A quarter of road deaths in Europe are estimated to be related to driving under the influence of alcohol.[84] Although these data are not available for all countries, preventing driving while under the influence of alcohol is a major component of efforts to reduce road traffic injuries and fatalities.[85]

Hazardous alcohol consumption is rising in LMICs.[5] For example, increasing rates of alcohol consumption and binge drinking among adolescents has contributed to a higher number of injuries in Latin America and the Caribbean.[86] An analysis in Ghana determined that a 1 per cent increase in the proportion of drivers exceeding the legal blood alcohol content was associated with a 4 per cent increase in road traffic fatalities.[87]

Driving under the influence of alcohol poses a major threat to children on roads in two ways: as pedestrians being hit by an impaired driver or as passengers in a car driven by an impaired driver. Adolescents may also be the impaired driver themselves. In countries where blood alcohol content testing is not available or standard practice, it is difficult to ascertain the role of alcohol in road traffic injuries because police do not test potential offenders at the roadside or in hospitals. Nonetheless, globally, between 5 per cent and 35 per cent of all road traffic deaths are attributable to alcohol.[5]

3.10 Distraction from hand-held devices as a risk factor among pedestrians and drivers

Children, adolescents and adults of all ages are increasingly using mobile phones.[88] Observations of pedestrians crossing streets in cities around the world indicates that pedestrians distracted from mobile phone use is a common problem, ranging from 12 per cent to 45 per cent.[89] Evidence shows a direct relationship between pedestrians speaking on the phone or texting and rates of crashes and near misses.[90]

An even greater threat to safety is distracted driving. Talking on the phone while driving (handheld or hands-free) results in a four-fold increase in the probability of a crash. This risk increases to approximately 23 times for texting while driving.[91] Parents driving their children, aged 1–12 years, frequently engage in a variety of potentially distracting behaviours such as using a mobile phone, passing food to a child or picking up a toy.[92] Other unsafe driving behaviours, such as driving while fatigued and speeding, along with mobile phone distraction, increases the risk of a crash.

In Iran, a study found that over 90 per cent of drivers reported using their mobile phones while driving at least once a week and 30 per cent always used their cell phones while driving.[93] The majority of drivers in that study believed that they were able to drive safely while using a mobile phone. A survey completed by adolescents found that 83 per cent reported engaging in electronic device use while driving at least once in the previous 30 days.[94] As mobile phone usage has dramatically increased globally, including in LMICs, it is crucial for countries to determine the level of risk and implement a Safe Systems Approach to mitigating the risks, such as enacting and enforcing legislation to prohibit mobile phone use while driving, including hand-held or hand-free devices combined with awareness-raising and advocacy campaigns.

3.11 Development of risk from new mobility forms

The motorization of conventional scooters, bicycles and other two-wheeled vehicles has created new road safety challenges in HICs. Though we cannot yet fully quantify the risk to children due to limited crash statistics for these modes globally, a large number of countries participating in the International Transport Forum have reported new types of crashes involving these modes of transport, particularly when they go at high speeds,[74] and a further risk of crashes by many youth using headphones to listen to music while on electric scooters. This is worrying as they are now starting to emerge in urban parts of LMICs, where they will further increase road traffic injuries and deaths. This new trend will need to be monitored to determine the need for new regulations and policies.

4. Good practice interventions

Knowing 'what works' is at the heart of developing good policy and programmes for road safety. Use of evidence-based interventions or 'good practices' is central to achieving safe road environments and the reduction of road death and injuries. Using the Safe Systems Approach when identifying, selecting, implementing and monitoring road safety interventions is key. This approach is of particular value in child road safety since it moves away from the idea that children should adapt their behaviour to cope with traffic and recognizes that children's needs should be addressed in the design and management of the whole road system. Awareness, education and capacity building of road safety skills and behaviours are components of the Safe Systems Approach to support and compliment engineering modifications and enforcement of legislative interventions.

A number of effective evidence-based interventions exist for road safety. Table 4 provides an overview of child- and adolescent-related road safety good practices, based on a recent literature review and analysis by Johns Hopkins International Injury Research Unit (JH-IIRU) and UNICEF. **Road safety actions at the global, regional and country levels should focus on evidence-based interventions that are implemented in an integrated Safe Systems Approach, combining engineering, enforcement of legislations and education interventions.**

Table 4: Road safety interventions

Engineering interventions	Effective	Promising	Insufficient	Ineffective	Harmful
Environmental modifications for the reduction of speed (e.g., around schools)	×				
Separating different types of road users	×				
Using appropriate child restraints and seatbelts	×				
Requiring children to sit in the rear passenger seat	×				
Using appropriate bicycle and motorcycle helmets	×				
Increasing the visibility of pedestrians		×			
Increasing use of vehicle design and modifications (daytime running lights, safer car fronts, crumple zones, reversing sensors, alcohol interlock, etc.)	×				
Using mobile phone soft blockers (muted or hidden messages and notifications)		×			
Putting children under 12 years on a seat with a front air bag					×
Legislation, regulation and enforcement interventions	**Effective**	**Promising**	**Insufficient**	**Ineffective**	**Harmful**
Enacting and enforcing legislation to a maximum speed limit of 30 km/h on roads with a high concentration of pedestrians (e.g., around schools)	×				
Enacting and enforcing legislation requiring the use of child restraints, seatbelts and the use of ISOFIX child restraint anchorage points	×				
Enacting and enforcing legislation requiring the use of helmets for all riders of 2 and 3 wheelers on all roads and all engine sizes.	×				
Enacting and enforcing legislation for drink-driving (minimum drinking age, blood alcohol content limits, zero tolerance for offenders)	×				
Enacting and enforcing graduated driver licensing systems with supervised driving practice	×				
Enacting and enforcing legislation banning the use of mobile phones while driving (hand-held or hands-free)			×		
Licensing novice teenage drivers					×
Education interventions	**Effective**	**Promising**	**Insufficient**	**Ineffective**	**Harmful**
Implementing multi-faceted interventions for road safety education programmes and awareness campaigns to increase used of protective equipment (child passenger restraints, bicycle helmets)		×			
Implementing community-based multi-faceted education/advocacy to prevent pedestrian injuries and improve pedestrian crossing skills with practical training		×			
Implementing cycling and motorcycling skills training			×		
Implementing designated-driver programmes				×	
Implementing instruction in schools on the dangers of drink-driving				×	
Implementing school-based driver education				×	
Increasing post-crash response	×				

Each intervention was assessed using the following definitions for child road safety interventions. These are based on previous work done on child injuries prevention:[i]

Effective – programmes or strategies that have peer-reviewed, documented empirical evidence of their effectiveness demonstrated through experimental trials, meta-analysis or systematic review of experimental trials.

Promising – programmes or strategies that have some scientific research or data showing positive outcomes related to prevention, but do not have enough evidence to support generalizable conclusions. These include empirical studies comprising of quasi-experimental studies, studies conducted only in high-income settings, one-time studies irrespective of the context or systematic review of all types of study designs.

Insufficient – programmes or strategies that do not currently meet the definition of either effective or promising and further research is warranted. These may include policy, opinion pieces, descriptive studies, case series and case reports.

Ineffective – programmes or strategies where documented empirical evidence indicates that they are not effective. These may also include anecdotal and expert opinion.

Potentially harmful – programmes or strategies where there is documented empirical evidence that they may increase the risk of injury.

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[i] Categories and examples are taken from Peden et al.[95] and Quan et al.[96] in consultation with Linda Quan, MD and Stephen Langendorfer, PhD.

The following section highlights good practice evidence-based road safety interventions targeting children and adolescents that enhance road safety and are grouped into three areas:
1) engineering design interventions;
2) legislation and enforcement interventions;
3) education interventions.

For each intervention, we indicate the strength of the evidence as effective, promising, emerging, ineffective or harmful based on a review of the scientific literature.

4.1 Engineering interventions

A number of engineering designs, innovations and modifications can greatly influence the environment and conditions in which children and adolescents travel. Efforts are underway and should be enhanced in countries and communities to provide children with safe daily journeys. Improvements in transport plans, vehicle design, safety equipment and physical road infrastructure that increase the opportunities for safe walking and cycling need to be strengthened. In addition, provisions for available, affordable and accessible public transport supports safe mobility for children.

4.1.1. Environmental modifications for the reduction of speed (e.g., around schools) (Effective)

Engineering design solutions to reduce pedestrian and cycling risks, such as traffic calming infrastructure to slow motor vehicle speeds, have led to a reduction in injuries and have been shown to be cost effective.[97, 98] Traffic calming infrastructure includes pedestrian crossings, speed bumps, bollards, narrowing roads, chicanes and pedestrian islands. Area-wide urban traffic calming schemes have also been shown to reduce the number of crashes resulting in injury by 25 per cent on residential streets and 10 per cent on main roads.[2] Engineering modifications are more effective when supported by educational and enforcement activities in a combined Safe Systems Approach.[97] See the Low-Speed Zone Guide for planning, designing, building and evaluating low-speed zones for different contexts.

4.1.2. Separating different types of road users (Effective)

Where road traffic volume is greater and speeds are higher, separation of pedestrians and cyclists from motorized vehicles is an important feature to reduce interaction and possible collisions. For pedestrians, dedicated space free from vehicles with sidewalks or footpaths reduces casualties by 40 per cent to 60 per cent.[99] Also, pedestrian refuge islands for standing and waiting for the appropriate time to cross are also essential and reduce casualties by 25 per cent to 40 per cent. In addition, overpasses or underpasses to separate pedestrian crossings show a 60 per cent casualty reduction but require high costs and time for construction, while signalized and unsignalized crossings are low cost and demonstrate a 25 per cent to 40 per cent casualty reduction.[99]

Examples of engineering solutions for cyclists include protected and separated cycling lanes, bicycle tracks and paths, advanced stopping lines, use of colour to manage the road network including cycling routes, speed management and roundabout design. While engineering solutions that separate cyclists from traffic can reduce risks to children cycling, they are still at increased risk when a cyclist and motor vehicle do reach points of interaction (e.g., in intersections or roundabouts). Therefore, designs that eliminate or minimize the potential for those interactions are preferred.[100]

Innovative approaches used in cities to create separation of different types of road users include a line of parked cars; permanent structures for trees, bushes and flowers; low-level concrete barriers; railings and fencing.

The Infrastructure Toolkit for Non-Motorised User Safety in African Cities outlines evidence-based solutions to protect children in urban traffic. There is also the Traffic Conflict Technique Toolkit from the Centers for Disease Control (CDC) in the United States, which is a good complement to ensure that not only is the infrastructure safe, but also that people are interacting with it safely.

Designing and coordinating safe journeys to school is an important prevention measure that has gained attention and action in many countries. The Star Rating for Schools (SR4S) is an evidence-based tool for measuring, managing and communicating the risk children are exposed to on school journeys. SR4S combines an easy-to-use school assessment Android tablet app and a Global Reporting for Schools web application to measure the contribution of road design to the risk for pedestrians at spot locations. Once measured, solutions can be considered with the support of the International Road Assessment Programme's (iRAP's) Road Safety Toolkit and Demonstrator tools by exploring the impact of changes in road features and speed. An investment plan can be determined, interventions tracked and results showcased to funders (*see Box 9*).

Box 8: Road safety assessments using the Star Rating for Schools

The Star Rating for Schools (SR4S) is a systematic evidence-based approach to measure, monitor and communicate the risk children are exposed to on journeys to and from school. Since its launch, SR4S has been used by 834 schools in 52 countries across five continents. The easy-to-use universal application is a low-cost way to support quick interventions that start saving lives and preventing serious injuries from day one. SR4S does the following:

- Measures safety before and after road improvements.
- Provides an evidence-based rating of road safety.
- Supports education campaigns for students, drivers and the wider community for safe travel around schools.
- Guides decision-makers in prioritizing road upgrades around schools by assessing different options.

Using evidence-based research of road features that affect pedestrian safety on a journey to school, a star rating is calculated at spot locations. In the rating, one star is the least safe and five-star is the safest. SR4S combines a central web application and a data collection Android app that together harness the power of the iRAP Star Rating for Pedestrians.

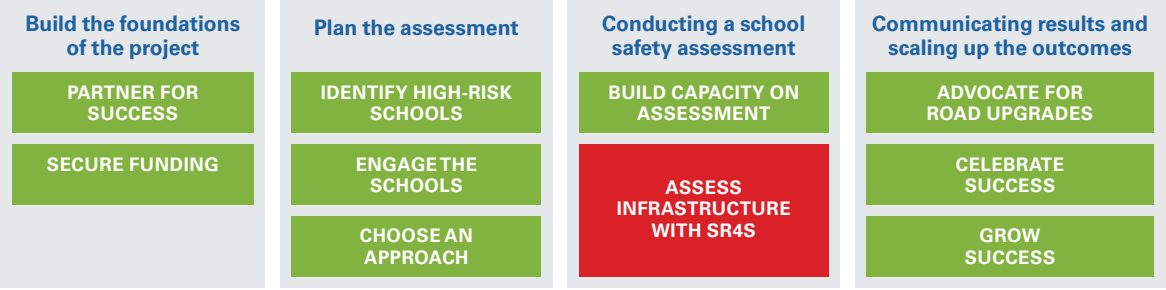
Once the risk is measured, effective scenarios of road treatments and their impact on safety can be simulated to identify cost-effective solutions. The implementation of the improvements can ultimately be tracked by reassessing spot locations so that the partner and funder can see the benefits of their investment and the school teaching staff can educate students on the correct use of the improvements (e.g., marked pedestrian crossings).

Experiences from Star Rating for School Partners implementing safe infrastructure around the world show that simple life-saving improvements can cost from US$650 to US$25,000 around each school, depending on the complexity of the selected interventions and the country within which they are being implemented. The table below shows how simple improvements can increase star ratings for pedestrians.

Star Rating	Pedestrian infrastructure
★	No sidewalk, no safe crossing, 60 km/h traffic
★★★	Sidewalk present, pedestrian refuge, street lighting, 50 km/h traffic
★★★★★	Sidewalk present, signalized crossing with refuge, street lighting, 40 km/h

SR4S has been used in projects that have seen millions of dollars of investment in school safety improvements. In Bogota, for example, simple intersection interventions implemented by the municipality resulted in an improvement from two- and three-star to four- and five-star safety and speeds at intersections were reduced by up to 25 per cent. In Mexico, interventions taking star ratings from one to three stars led to a 69 per cent decrease in road traffic conflicts. In Pleuku, Viet Nam, safety was improved around two schools as part of the AIP Foundation's Slow Zones, Safe Zones Programme. Interventions took star ratings from two and three stars to five stars for the schools and resulted in increases in parent knowledge of the speed limit from 15.9 per cent to 72.5 per cent and reductions in speeds by 20 km/h for large vehicles, 11 km/h for cars and 5 km/h for motorcycles in the vicinities of both schools.

SR4S can be used a part of a school assessment and infrastructure upgrading project and can be conducted through the application of 10 main steps. These steps are further explained in the FIA School Assessment Toolkit, available at: http://school-assessment-toolkit.fia-grants.com/get-started/



Box 9: UNICEF Philippines assess and upgrade roads for safer journeys to school

Road traffic injuries and deaths are a leading cause of death for children in the Philippines. To tackle this, UNICEF Philippines, Safe Kids Worldwide Philippines, University of the Philippines – National Center for Transportation Studies and local and national authorities are implementing a Child Road Traffic Injury Prevention (CRTIP) programme.

The programme targets high-risk schools in the country, aiming to contribute to national goals of reducing road traffic deaths as embodied in the Philippine Road Safety Action Plan (2017–2022). CRTIP aims to make roads safer for children in the Philippines by developing models for child road traffic safety programmes, strengthening data collection and analysis, improving road safety laws and policies, enhancing multisectoral action for children's safety and improving road safety education for school children. A total of 66 schools have been assessed with SR4S in the pilot areas of Valenzuela and Zamboanga City, with plans to scale up assessments in the rest of metro Manila and Region IX.

Dr. Jose Regin F. Regidor, National Center for Transportation Studies of the University of the Philippines, said it is important to assess road quality to check its safety. "There are plenty of factors, like infrastructure and traffic, which we need to assess to know how we can improve our walking environment. Most of our students walk to and from school. Their safety is critical," he said.

Thanks to the efforts of CRTIP, four of the assessed schools have been upgraded and star ratings have improved from three- and four-star to five-star. Improvements include crossing facilities, better delineation and school warning signs and pedestrian fencing. The project also includes other road safety activities, such as an interactive learning session on basic road safety tips and a practical exercise where children are guided on the streets to apply their learnings and develop skills on how to better protect themselves while on the road.

UNICEF Philippines and its partners in the CRTIP programme express their appreciation to the city governments of Valenzuela and Zamboanga and the Department of Public Works and Highways. Their cooperation has been crucial for the implementation of necessary interventions to make the road environment safer for children.

Source: https://starratingforschools.org/crtip-upgrades-schools-in-the-philippines/

4.1.3. *Using appropriate child restraints and seatbelts* (Effective)

Child passenger restraint systems (car seats and seatbelts), when used appropriately, are highly effective. They are designed to secure the child to the vehicle so that in the event of a crash, the child is secured in place and the force of the impact is spread out across the body to reduce the severity of the injury. The vehicle should be equipped with ISOFIX child restraint anchorage points that secure the restraint directly to the frame of the vehicle to be the most effective. There are four types of child passenger restraints that are required to be correctly fitted and appropriate for a child's age, size and weight:

- Rear-facing child seats
- Forward-facing child seats
- Booster cushions or seats
- Three-point seat belts

Use of child passenger restraints has led to decreases in both deaths and injury to children.[101] Estimates of the effectiveness of child passenger restraints relative to the use of no restraint vary for younger children from 71 per cent to 95 per cent for rear-facing restraints and 54 per cent to 60 per cent for forward-facing systems.[102] Keeping children rear-facing for longer has been shown to increase protection by three to five times[103] and evidence from Sweden supports rearward rear-facing to four years of age.[104]

For children aged 4–7 years, booster seats are estimated to reduce the risk of sustaining a serious injury during a crash by approximately 60 per cent.[105-107] Booster seats have also been shown to reduce the risk of non-fatal injury among children aged 4–8-years by 45 per cent compared with seat belts alone.[108] Car seat check-up events, car seat fitting stations, free car seat distribution and education tailored to each community is effective in increasing appropriate use of children passenger restraints.[109, 110] Use of seatbelts leads to decreases in both death and injuries.[111] Seat belts can reduce deaths by 40 per cent to 50 per cent and serious injury by 45 per cent to 55 per cent, but only if used appropriately.[112] For older children who no longer require child restraints, use of properly fastened seatbelts can be lifesaving.

4.1.4. *Requiring children to sit in the rear passenger seat* (Effective)

Where a child sits matters. Sitting in the rear-seating position of a vehicle is the safest location for child passengers regardless of whether or not there is a passenger-side air bag present.[113, 114] Children in the rear row(s) of the vehicle are one-half to two-thirds less likely to sustain injury than those in the front seat.[115] Education through community-based education programmes and awareness campaigns supports the increased use of rear seat positions.[116, 117] Efforts to encourage the rear-seating position for child passengers should address parents' risk perception and their experiences of pressure to relax seating rules.[118, 119]

4.1.5. *Using appropriate bicycle and motorcycle helmets* (Effective)

Children are vulnerable to head injuries while bicycling and the impacts to a child's brain in the early stages of development can be very serious. At a young age, children can easily fall while bicycling as their motor skills are still developing and they are learning to cycle in different environments and situations. As children age, helmets are important as their journeys are more likely to take place among motorized vehicles that are travelling at higher speeds and have increased risks for greater impacts.

A helmet aims to reduce the risk of serious head and brain injuries by mitigating the force of collision to the head. Use of bicycle helmets that are designed to meet safety standards and are fitted and worn correctly leads to reductions in injuries. Estimated effectiveness includes a 48 per cent reduction in head injury, 60 per cent reduction in serious head injury, 53 per cent reduction in traumatic brain injury and a 34 per cent reduction in the total number of cyclists killed or seriously injured.[120] Use of a bicycle helmet, as well as correct usage, is impacted by parental knowledge, helmet availability, accessibility, cost and ease of use.[121] Reducing the cost of helmets through give-away programmes and discounts facilitates increased helmet use.[122]

Motorcycle helmets also offer important protection to riders. Helmets should be used by all drivers and passengers. Children in many parts of the world and in particular in LMICs, are passengers on motorcycles and motorized two wheelers as part of their daily transportation and adolescents are often drivers. Motorcycle helmets are estimated to reduce the risk of head injury by approximately 69 per cent and death by approximately 42 per cent.[41] Proper use of motorcycle helmets, similar to bicycle helmets, is also impacted by their availability, accessibility and affordability. This includes small-sized helmets suitable for young children.

4.1.6. Increasing the visibility of pedestrians (Promising)

Being visible to other users on the road is an important safety issue in road safety. Vulnerable road users, such as pedestrians and cyclists, are at greatest risk if they are not seen early enough to avoid a collision. Young children, due to their small size, are often not visible to motorists and are therefore at increased risk. Increasing the visibility of children using the road is demonstrated to be promising in reducing pedestrian injuries. Strategies to increase visibility include engineering modifications to increase street lighting, which has been shown to reduce injuries by 10 per cent to 25 per cent.[98, 99] Use of fluorescent materials in yellow, red and orange improves detection and recognition in the daytime. At night, lamps, flashing lights and reflective clothing and strips in red and yellow increase detection and recognition. However, reflective materials should be one component of a wider visibility strategy that is most effective when combined with engineering infrastructure and enforcement of policies to improve the visibility of pedestrians.[123]

4.1.7. Increasing use of vehicle design and modifications (Effective)

Inherent in the design of vehicles are safety features such as brakes and driving lights. In addition to these basic safety features, newer modifications have been added to improve safety for children and reduce the risk of pedestrian fatalities. These include crumple zones and side impact bars that have been incorporated into many current automobiles. Such structural safety features have been designed to absorb energy in a predictable way that creates less compression to the passenger zone and therefore offers more protection for children. These features are shown to increase safety by 25 per cent to 40 per cent when compared to older cars.[99] Such technology should be equitably available globally to enhance that protection of children and all vulnerable road users. This EuroNCAP video demonstrates the advances technology is supporting to make vehicles safer for pedestrians.

When on a motorcycle, high visibility and reflective clothing and use of headlights or daytime running lights are effective in increasing motorcyclist visibility.[124] However, at this time there is no study directly linking increased visibility to a reduction in injury. Campaigns promoting visibility and reflective clothing should ensure motorcycle riders are made aware that, even if wearing high visibility and/or reflective clothing and having been seen by a car driver while waiting at an intersection, it does not mean that the car driver is able to accurately appraise their approach speed, especially at night.[124]

Reverse cameras and reverse parking sensors have been added to new vehicles as effective ways to reduce the rate of collisions when reversing. Back-over injuries to pedestrians, which occur when a driver reverses a vehicle and strikes a pedestrian and particularly children who may not be visible due to their smaller stature, are a significant road safety issue. Compared to vehicles without any of these technologies, vehicles with reversing cameras were shown to result in 60 per cent fewer back-over injuries, vehicles with reverse parking sensors had 69 per cent fewer back-over injuries and vehicles with both reversing cameras and sensors had 70 per cent fewer back-over injuries.[125]

Alcohol-interlock programmes give offenders who would normally lose their driving license the possibility to continue driving as long as they are sober. The ignition interlock device only allows drivers to start the engine after completing a breath test that indicates no alcohol consumption. A study from the Netherlands found a 54 per cent decrease in repeat driving under the influence offences for drivers using an alcohol-interlock system compared to drivers who did not.[126] The high cost for the installation and maintenance of these devices is one of the main reasons for the low participation rate, as the cost is paid by the offenders.[127] Also passive alcohol sensing technology is now available and is another good practice intervention that can be used to reduce drinking and driving. However, until technology of this nature is more affordable and accessible, it is unlikely to be implemented in LMICs.

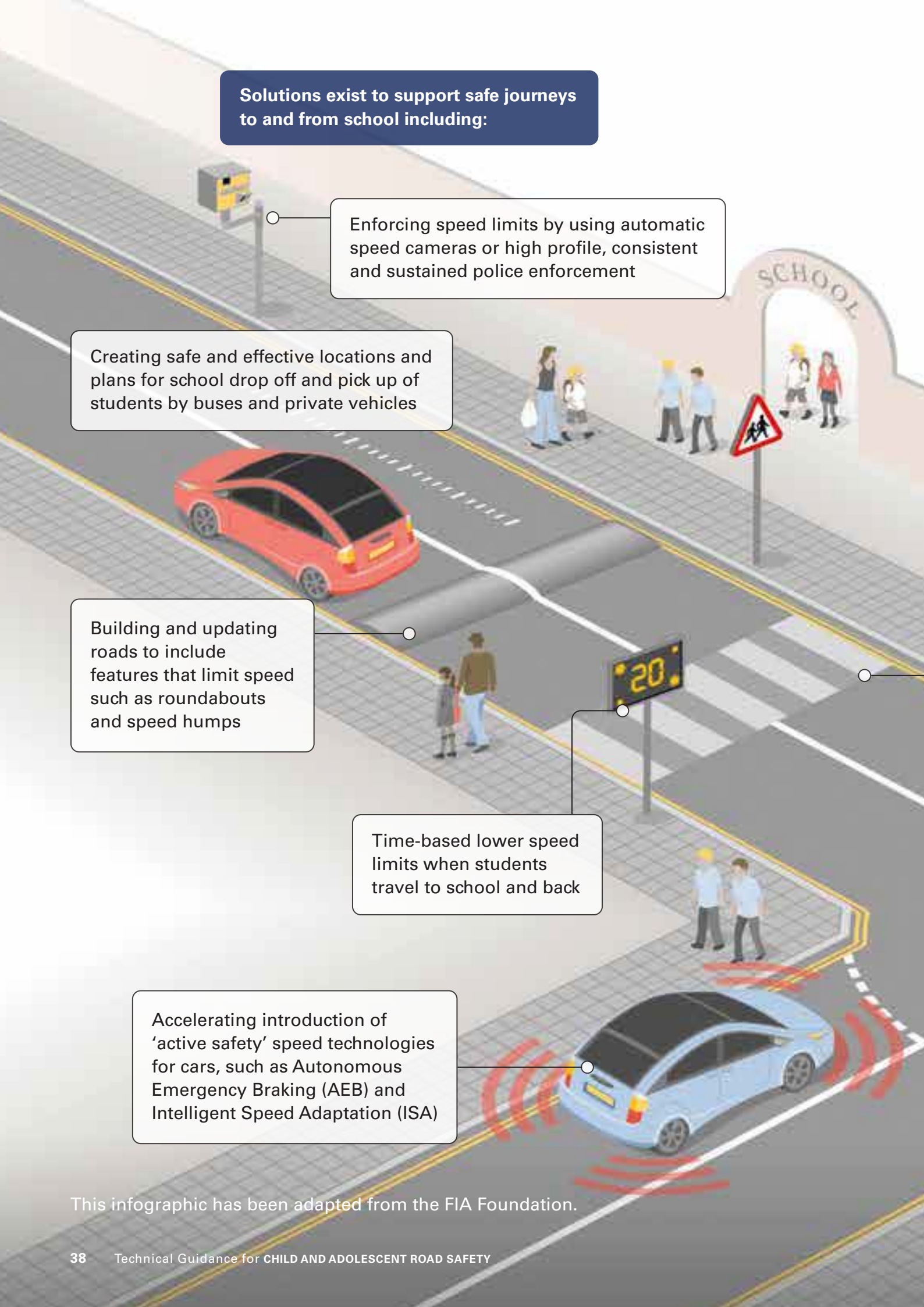
4.1.8. Using mobile phone soft blockers (Insufficient)

The use of mobile phones is on the rise globally among children and adolescents. Soft blocker apps on smartphones, such as those that mute or hide incoming messages and notifications and/or automate messages to the caller indicating the driver is unable to respond, have been found to reduce driver screen touches by 20 per cent per minute of driving.[128] When adopted, this technology can support adolescent drivers in driving with fewer distractions. Mobile phones are also creating distractions for pedestrians and cyclists. There is no evidence, yet, that soft blockers are effective for vulnerable road users. Mobile phones should not be used while cycling and walking in high traffic locations.

4.1.9. Putting children under 12 years on a seat with a front air bag (Harmful)

A car with a front passenger airbag is considered safer than a car without one, but if infants or children are seated behind them they can cause serious harm. Even in a relatively low-speed crash, the airbag can inflate, strike the child restraint and cause serious brain injury and even death. Air bags inflate rapidly, in less than one twentieth of a second and move at speeds of over 320 km/h. Therefore, it is recommended that infants and young children under the age of 13 years ride in the back seat. If that is not possible and the child must travel in the front seat, move the seat back as far as possible from the car dashboard, buckle the child properly and if there is an airbag, ensure it is turned off. Car manufacturers are now developing smart airbags that will sense if the passenger is too close and not belted properly and issue a warning, yet due to the age of the fleet in LMICs, this technology may not be available in many locations.

Solutions exist to support safe journeys to and from school including:



Enforcing speed limits by using automatic speed cameras or high profile, consistent and sustained police enforcement

Creating safe and effective locations and plans for school drop off and pick up of students by buses and private vehicles

Building and updating roads to include features that limit speed such as roundabouts and speed humps

Time-based lower speed limits when students travel to school and back

Accelerating introduction of 'active safety' speed technologies for cars, such as Autonomous Emergency Braking (AEB) and Intelligent Speed Adaptation (ISA)

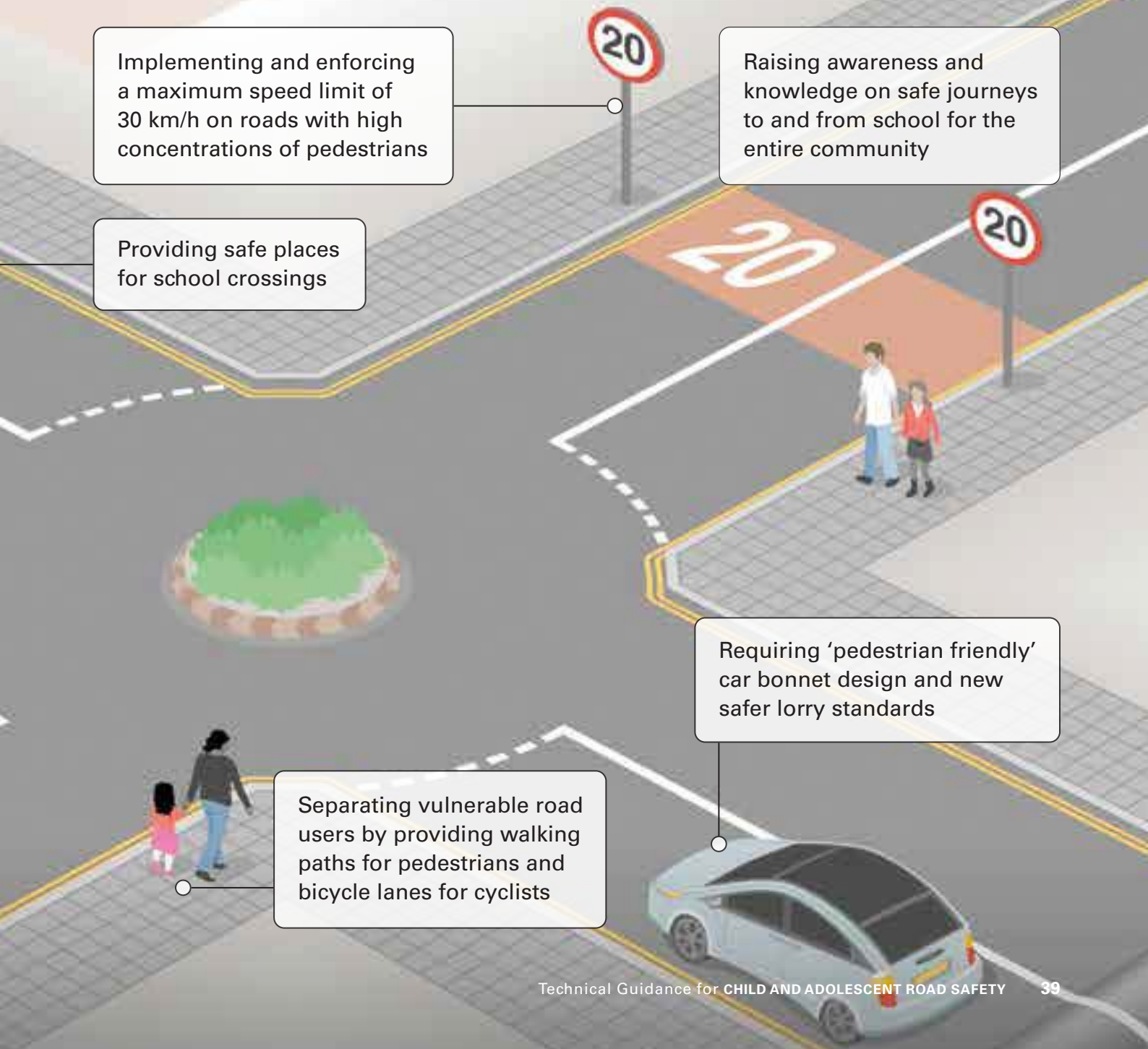
This infographic has been adapted from the FIA Foundation.

SAVE LIVES.
SUPPORT SAFE JOURNEYS TO SCHOOL!

Speed management is crucial in areas where young people live, learn, and play. Whether it's a small child chasing ball or a teenager chatting on their mobile phone, their behaviour and movements are unpredictable, and their bodies cannot sustain the same impact as adults.

So, we must protect our most vulnerable road users, and we can start with the trip that children make every day – the journey to and from school.

To ensure a 'Safe System' in which serious injury to children is prevented, urban traffic speeds on residential streets and on school routes where traffic and children come into direct contact must be kept below 30 km/h. If this can't be enforced the road must be designed to physically prevent higher speed.



4.2 Legislation, regulation and enforcement interventions

The development, adoption, implementation and strict enforcement of road safety regulations has the potential to prevent up to half of all deaths and serious injuries.[22] Therefore, enforcement of regulations is very important to ensuring the effectiveness of legislative intervention to reduce road safety injuries and deaths.

4.2.1. Enacting and enforcing legislation to a maximum speed limit of 30 km/h on roads with a high concentration of pedestrians (e.g. schools) (Effective)

Enacting and enforcing legislation to a maximum speed limit of 30 km/h on roads with a high concentration of pedestrians (e.g. schools) has been shown to lead to changes in driver behaviour and a reduction in injuries.[129] In these locations, lower speeds, such as use of 30 km/h speed zones can reduce the severity of injuries and increase survival rates for child pedestrians and cyclists and has been demonstrated to reduce crashes by 60 per cent.[2] In the United Kingdom for example, the introduction of 20 mph (32 km/h) speed limit zones resulted in a 70 per cent reduction in fatal child pedestrian injuries.[130] Legislation is most effective when strictly enforced and supported by educational activities.[131] Key stakeholders such as enforcement officers, elected officials and the general public need to be aware of the danger that speeding causes, the benefits of reduced speed and the effectiveness of 30 km/h zones. Monetary fines issued from the placement of automated speed cameras can be used as an enforcement mechanism to limit vehicular speeds around schools, residential areas and play areas near school zones.

Box 10: Call to action and commitment for child road safety at national, regional and community levels

The Child Health Initiative's Manifesto 2030: Safe & Healthy Streets for Children, Youth & Climate, also known as the 'Stockholm Manifesto' was launched at the Stockholm Ministerial Conference on Road Safety in 2020 and supports the Stockholm Declaration.

Specific demands of the Stockholm Manifesto calling for governments to take action to ensure safe, child- and climate-friendly neighbourhoods include:

- viable footpaths on every urban street,
- design-protected crossings,
- speed limits of no more than 30 km/h on streets where children and traffic mix and
- every city to integrate kilometres of protected cycle lanes.

Child road safety stakeholders from national, regional and community levels chose the speed limit of 30 km/h as the flagship recommendation to make streets safe and healthy for children. This is because low speed has a critical role to play in achieving the 2030 SDG road traffic injury target, as well as enabling many other policy goals. Low-speed streets reduce child road injuries and allow for a shift to walking and cycling. This contributes to creating safe, healthy, green and livable cities not just for children but for all citizens.

4.2.2. *Enacting and enforcing legislation requiring the use of child restraints, seatbelts and the use of ISOFIX child restraint anchorage points* (Effective)

Enacting and enforcing laws requiring use of age-appropriate child restraint systems is demonstrated to be effective in increasing their use.[132] Incentives and multifaceted approaches such as the provision of free or low-cost child safety restraints, free installation and home visitation programmes have been shown to increase child safety seat use by 17 per cent.[109] Legislation requiring seatbelt use for older children leads to increased use,[133] and there is evidence from Australia to show that the introduction of seatbelt legislation increased the use of age-appropriate restraints among children under 7 years of age from 59 per cent to 71 per cent.[134] Furthermore, child restraint regulations should ensure that instead of holding the child seat in place with an adult seatbelt, the vehicle should be equipped with ISOFIX child restraint anchorage points that secure the restraint directly to the frame of the vehicle.

4.2.3. *Enacting and enforcing legislation requiring the use of helmets for all riders of 2 and 3 wheelers on all roads and all engine sizes* (Effective)

Enacting and enforcing legislation requiring the use of bicycle helmets leads to increased use and a reduction in head injury rates.[135, 121] In Australia the introduction of legislation resulted in a 70 per cent and 20 per cent increase in bicycle helmet use among primary and secondary school children respectively. HICs that have adopted such legislation have found meaningful reductions in head injury for all ages:

- 45 per cent in provinces with legislation in Canada,[135] and
- 19 per cent reduction in head injuries among cyclists during the first three years of legislation in New Zealand.[121]

Most countries where helmet legislation is enacted have not done so until high levels of bicycle helmet wearing have been attained in the population.[122] Researchers have also noted that the effect of helmet-wearing legislation is smaller when the bicycle helmet law is not inclusive of all ages.[136] Therefore, an all-ages regulation will better support injury reductions for children in the long term. Legislation takes time following implementation to produce the desired effect and again, in this case, legislation is most effective when supported by enforcement and educational activities. Implementers of helmet legislation may also wish to address concerns regarding decreased ridership following the introduction of legislation. Research from Canada suggests helmet legislation is not associated with a reduction in cycling over the long term.[136]

Enacting and enforcing legislation requiring motorcycle helmet use also results in significant reductions in the frequency and severity of head injuries and deaths in motorcycle crashes.[137] This should be enforced for all riders, especially in LMICs where multiple riders are transported on motorcycles. Compulsory helmet-wearing has been found to reduce the number of serious head injuries to moped riders and motorcyclists by 20 per cent to 30 per cent.[138, 137] In Viet Nam, legislation resulted in a 63.4 per cent increase in motorcycle helmet use from 2007 to 2016. This in turn resulted in 15,000 fewer fatalities and 500,000 fewer injuries for all ages at a cost savings of US$3.5 billion.[139] The level of enforcement of motorcycle helmet laws directly supports compliance and evidence suggests legislation is most effective when supported by awareness-raising and educational activities.

4.2.4. *Enacting and enforcing legislation for drink-driving* (Effective)

Regulations to restrict drug or alcohol impaired driving among adolescent drivers are impactful. Enacting and enforcing legislation setting the minimum drinking age to 21 years has been demonstrated to reduce traffic crashes by 10 per cent to 16 per cent among youth aged 20 years and younger.[140]

Setting the legal blood alcohol concentration limit while driving at or below 0.05 g/dL is also effective.[140] Many countries set a lower limit of between 0 and 0.02 g/dl for drivers under the age of 21 years because the risk of road crashes rises for younger drivers at lower levels. These lower limits have been found to reduce the incidence of crashes among adolescent drivers between 4 per cent and 24 per cent.[141] The most successful programmes to reduce impaired driving due to alcohol share the following attributes: (1) social acceptance, (2) high level of public awareness, (3) low cost, (4) year-round availability, (5) provision of rides to and from drinking venues, (6) multiple funding partners, (7) user convenience and (8) perceived safety.[140]

Enacting and enforcing legislation on lowering blood alcohol concentration limits for novice drivers, along with night-time driving curfews for young and novice drivers and zero tolerance for offenders, is shown to be effective. Enforcement of drink driving and night-time curfew policies, between 10 PM and 3 AM, for young and novice drivers is shown to reduce fatal crashes by 10 per cent.[141, 142]

4.2.5. *Enacting and enforcing graduated driver licensing systems with supervised driving practice* (Effective)

Countries have different minimum age limits for obtaining a motor vehicle driving licence, ranging from 14 to 18 years. Those that allow licences at younger ages tend to have more rural settings where licences support industries such as farming.[95] Licensing policies that increase the age at which motor vehicle licences can be obtained are effective in reducing risk of injury in children and young people.[143] To date, despite the increased risk of crashing among young drivers of quad bikes, motorcycles and other off-road vehicles, there is no evidence to support increasing the age at which children are permitted to operate them.[143] It is highly likely that increasing the age at which young people are allowed to operate a quad bike or other off-road vehicles will reduce the risk of injury as has been the case for young motor vehicle drivers.[144]

The development and uptake of graduated driver's licence programmes is an important intervention addressing the risk of crashes among young drivers. Such programmes place restrictions on new drivers, usually during the first two years of their driving, including limitations, for example, on late-night driving, penalty infractions and amount of time to be accompanied by an adult when driving. These programmes have been shown to be effective, reducing road traffic incidents among 16-year-olds by 10 per cent to 16 per cent.[140, 145, 146] Stricter graduated drivers licensing programmes for novice drivers, such as those requiring longer supervised driving time frames and limited night-time driving, can have additional road safety benefits.[146]

4.2.6. *Enacting and enforcing legislation banning the use of mobile phones while driving (handheld or hand free)* (Insufficient)

Currently approximately 47 countries have enacted laws banning the use of mobile phones while driving.[147] However, further evaluation is needed to determine the effectiveness of this intervention. Further, strict enforcement with meaningful penalties, along with targeted awareness campaigns to communicate the need to restrict the use of handheld electronic devices while driving, will likely increase the effectiveness of such legislation.[51]

4.2.7. *Licensing novice teenage drivers* (Harmful)

Most road traffic crash statistics show an over-representation of novice drivers and for novice teen drivers this number is even higher. Inexperience, risk behaviours and immaturity may lead to situations where novice teens do not recognize or know how to respond when faced with an immediate hazardous situation. Countries are encouraged not to immediately license novice teen drivers but rather delay licensing or implement graduated driver's licence programmes (described above) to reduce teen driving risks.

Box 11: UNICEF Paraguay: Developing child-responsive urban planning and sustainable urban transportation

In Paraguay, road traffic crashes are a leading cause of injury and death for children.[148] Actions to address road safety are therefore critical to ensure the health and safety of children and adolescents. Paraguay took up the challenge to strengthen their national and local capacity in child-responsive urban planning to develop and improve transportation systems for vulnerable populations and are now looking to scale up these actions in the future.

UNICEF Paraguay and the National Traffic and Road Safety Agency, through their collaborative efforts, were successful in building road safety capacity. Thirty-two professionals were trained as trainers by UNICEF and other international organizations to replicate and scale-up training activities for other university students and professionals on child-responsive urban planning.

In addition, 19 professionals were trained, including officials of the National Agency for Traffic and Road Safety, the Ministry of Education and Sciences, the Ministry of Childhood and Adolescence, the Ministry of Urban Planning, Housing and Habitat, the Vice Ministry of Transport, the Highway Patrol and municipalities. Also, 10 independent professionals, consultants and non-governmental organizations participated in the child-responsive urban planning workshop to support planning and implementation. The Ministry of Urban Planning, Housing and Habitat issued a resolution that recommends the implementation of the concepts learned in the workshop into the design of projects for public spaces and homes.

Source: National Traffic and Road Safety Agency[148] https://www.youtube.com/watch?v=KXiAd-nPiRE

An on-site intervention with high school students was designed and implemented in the city of Fernando de la Mora, benefiting approximately 600 children and their families in three schools that now have safer and accessible school routes. School children can now cross on pedestrian crosswalks and on elevated pedestrian crossings, which were not available before the intervention. Also, students now have the support of 'student guides' and municipal traffic police officers so that drivers respect the crossing of children, mainly at school entry and exit times. Likewise, the narrowing of the roadway through painting and temporary items placed on the asphalt have reduced vehicle speeds. These urban planning measures, combined with a reduction in traffic speeds to 30 km/h and an increase in green corridors, provide children and their families with a safer and healthier journey to school and an approach that will be scaled to other communities.

Source: National Traffic and Road Safety Agency, Paraguay.

4.3 Education interventions

Education, awareness and capacity building are components of the Safe Systems Approach designed to improve knowledge, skills, behaviour and attitudes. For road safety, education is best when physical practice and interactive training is included. Educational programmes are most effective when used to support the implementation of environmental modifications and law enforcement policies as part of a multifaceted approach to enhance road user safety. Educations programmes are less effective if used as a stand-alone prevention strategy.

4.3.1. Implementing community-based multifaceted interventions for road safety (Promising)

Community-based interventions are those that target a group of individuals or a geographic community, such as a whole city or school, but are not aimed at a single individual. Important elements of community-based approaches that increase effectiveness are having a long-term strategy, effective focused leadership, multi-agency collaboration, involvement of the local community, appropriate targeting and time to develop a range of local networks and programmes.[149]

Community-based interventions combining information on child passenger restraint safety with enhanced enforcement campaigns increase correct usage.[150, 151] The effectiveness of combined interventions is enhanced with collaboration and involvement of the local community, appropriate targeting and time to develop a range of support programmes and awareness-raising campaigns. Other strategies to increase child passenger restraint use include incentives such as free or low-cost child safety restraints, free installation and home visits combined with educational programmes.[151, 150] More intensive programmes involving multiple elements and communication mechanisms are associated with greater increases of use.[152]

Community-based education and advocacy programmes around child helmet-wearing lead to increased bicycle helmet-wearing.[153, 122] Community helmet-wearing programmes are more likely to be effective when they include provision of free helmets, distribution and fitting, are culturally appropriate and involve parental participation and helmet-wearing by riding partners (adults or other children) to influence positive behaviour change.

Community-based, multi-faceted education/advocacy to prevent pedestrian injuries and improve pedestrian crossing skills with practical training has the potential to increase safety-related knowledge and behaviour. For example, interactive education and training approaches, such as practical roadside experience for pedestrian safety, have led to improved child pedestrian crossing skills.[154]

In principle, community-based training programmes work when they are well-designed, delivered in an effective manner and at a developmentally appropriate level.[154, 98] Large-scale system-wide educational programmes have great potential, particularly if endorsed by government, in that they can lead to longer-term sustainability rather than one-off programmes.[155] This includes broader road safety education as a mandatory part of elementary or secondary school education curricula. However, implementing good road safety education takes time to obtain buy-in and support from school administration and teachers.

4.3.2. Implementing cycling and motorcycling skills training programmes (Insufficient)

Community-based bicycling skills training programmes still have insufficient evidence on increasing children's knowledge of cycling safety.[156] For children to ride safely in traffic requires that they are knowledgeable about traffic rules, can read and interpret signs and have the necessary cognitive and motor skills. The most comprehensive programmes have all incorporated helmet education, traffic rules, safety guidelines and on-bike physical training into their curricula. However, age is a consideration as children under 10 years may not be able to master the basic cognitive and motor skills necessary for the complex task of riding a bicycle on the road.[157] Bicycle skills training should promote and support the use of safe routes that separate bicycles from motor vehicles.[157] Also, motorcycle rider skills training to improve knowledge and riding skills has been underway for many years. However, evaluations to date still report there is insufficient evidence to demonstrate this as a promising intervention.[158]

4.3.3. Implementing adolescent driver education programmes (Ineffective)

Education and skills training are important components in many areas of child and adolescent development, but evaluations of adolescent driver education programmes are shown to be ineffective. These include implementing designated driving programmes and instruction in schools on the dangers of drink driving, as well as implementing school-based driver education. Education can improve knowledge, but there is no evidence that education on its own will improve the level of road safety behaviour or reduction in road crashes.[159]

4.4 Post-crash response

4.4.1. Increase post-crash response (Effective)

Basic and timely pre-hospital care can make the difference between life and death for injured children. This is particularly relevant in LMICs where distances from the location of injury to access medical care may be long journeys. Existing evidence shows that solutions to increase the post-crash response include having:[160, 79]

- An emergency medical service system consisting of a single emergency number to call,
- Standard procedures to regulate the dispatch of ambulances to collision scenes with equipment designed for children,
- Awareness-raising and advocacy for the development of organized and integrated pre-hospital and facility-based emergency care systems,
- Community first responders trained in first aid skills (e.g., teachers, police, firefighters, and drivers for bus, taxi and school transport services) and
- Child focused hospital trauma care services, with equipment and skilled personnel with training on different responses of children to trauma.

Unfortunately, to date there is a gap in information on the post-crash response specific to children. This is an inequity that needs to be addressed.

Box 12: Effectiveness of road traffic safety interventions for all ages

Intervention*	Estimated effectiveness
30 km/h speed zones	70% reduction in fatal child pedestrian injuries
Sidewalks/footpaths	40–60% casualty reduction
Separated cycling lanes	44% fewer bicycle deaths in cities
Pedestrian refuge islands	25–40% reduction in pedestrian injuries
Bicycle helmets fitted and worn properly	48% reduction in head injury 60% reduction in serious head injuries 53% reduction in traumatic brain injuries 34% reduction in the number of deaths or serious injuries
Motorcycle helmets	69% reduction in the risk of head injury 42% reduction in the number of deaths
Child passenger restraints	71–95% reduction of serious injuries for rear-facing restraints 54–60% reduction of serious injuries for forward-facing systems 59% reduction for booster seats
Seat belts used appropriately	40–50% reduction in number of deaths 45–55% reduction in serious injuries
Street lighting	10–25% reduction in pedestrian injuries
Bicycle helmet legislation	45% reduction in rates of bicycle-related head injuries
Moped and motorcycle helmet legislation	20–30% reduction of serious head injuries
Multi-faceted car seat educational programmes**	17% increase use of child passenger restraints
Enacting and enforcing legislation for minimum drinking age at 21 years	10–16% reduction of traffic crashes among youth aged 20 years and younger
Graduated licensing programmes	10–16% reduction in road traffic incidents among 16-year-olds

* Selection of road safety interventions relevant to child road safety and LMIC from literature referenced in this guidance

** Commonly includes incentives such as provisions for free child safety restraints, free installation and home visits combined with educational programmes. Data provided in this box are from the Child Safety Good Practice Guide [161]

Box 13: Cost effectiveness examples for road safety prevention interventions

Not only are many road safety injury prevention interventions effective in reducing injuries and deaths, many that have been tested and implemented in HICs are cost-effective. Below is a list of the tremendous cost savings and return on investment that can be achieved by adopting, implementing and enforcing evidence-based interventions.

The cost-benefit ratio is the saving achieved for every dollar spend on an intervention with respect to medical costs and other monetary savings and quality of life.

Road safety interventions	Estimated cost-benefit ratio
Child safety seat distribution (ages 0–4 years)	34
Booster seat distribution (ages 4–7 years)	64
Bicycle helmet distribution (3–14 years)	47
Painting lines on roads (to create lanes to stay in for different modes of transport)	61
Mobile speed camera	19
Red light camera	4
Pass child safety seat law (ages 0–4 years)	30
Pass booster seat law (ages 4–7 years)	57
Pass safety belt law (all ages)	16
Pass motorcycle helmet law (all ages)	3
Pass bicycle helmet law (ages 3–14 years)	43

Alcohol-related road safety interventions	Estimated cost-benefit ratio
Alcohol testing ignition interlock	6
Minimum legal drinking age of 21 years	3
Driver blood alcohol concentration limit of 0.8%	14
Reduce driver blood alcohol limit to 0.05% from 0.08%	6
Zero alcohol tolerance, drivers under age 21 years	22
Sobriety check points (random breath testing for driving under the influence of alcohol)	7
Alcohol tax of 20%	9

Data provided are sourced from Miller, T.R.[162, 163] and Kostyniuk, L.P.[164]

Note: The intervention cost-benefit ratios provided are based on information available in the published studies used to develop them. They represent the best available information, but it is important to note that some interventions cost more to develop, implement, enforce and maintain than others and some address hazards that result in more frequent or severe injuries than others.

5. Implementing good practice interventions

Putting what works into practice is critical to reducing deaths and serious road traffic injuries. Good practice or evidence-based road safety interventions, exist and we must aim to adopt, implement and monitor the uptake of these solutions. The following key steps will support an overall approach to move road safety forward at the local, national and regional levels.

5.1 Situational analysis

Awareness and understanding that our way of getting from one place to another for many, especially children, may be complex and unsafe. In most countries around the world, road traffic injuries are a leading cause of death and motorized transport impacts our environment as a large source of air and noise pollution. It is important to identify the problems and assess the situation transport raises for the health and wellbeing of communities, in particular its youngest members.

Box 14: Summary of key steps for implementation of road safety strategies

- Identify the problem, underlying factors and current state of road safety through a situation analysis;
- Assemble and engage multi-sectoral partners to identify, plan, address and monitor the issue;
- Set an agreed vision, plan and targets;
- Select evidence-based interventions to implement based on agreed prioritization criteria;
- Implement strategies using enablers to reduce barriers and enhance facilitators;
- Monitor progress and evaluate outputs and outcomes based on targets and indicators agreed on at the onset; and
- Review, adjust, adapt and sustain action and mainstream and scale up when and where feasible.

The first step in designing and implementing child road safety interventions is to understand the current situation and determine the key issues to address. For UNICEF, the inclusion and examination of child road safety in the preparation of our Country Strategy Note and Situational Analysis will raise awareness and understanding of the societal, environmental and behavioural factors influencing the prevalence of road traffic injuries and their risk factors. It will also assist in investigating the large
impact and burden road traffic injuries place on children, adolescents, families, communities and the country.

Gathering and analysing the following information and baseline data will provide a reflection of your country's child and adolescent road traffic injury situation:

- Data on the road traffic injuries and their causes;
- Disaggregated road traffic injury data by age and sex;
- Underserved or high-risk groups and locations;
- Existing laws, policies, regulations and programmes supporting child road safety evidence-based interventions (*see Table 5*);
- Sectoral and multi-sectoral plans relevant to road safety, urban planning, the environment and child injury prevention;
- Existing national and subnational capacities (e.g., multi-sectoral mechanisms and capacities of policymakers, health, education, environment, urban professionals);
- Accessibility and safety of physical spaces where children and adolescents live, learn, play and journey in the built environment; and
- An understanding of social norms, knowledge, attitudes and practices that contribute to high child road traffic injury burdens.

A comprehensive road safety situational analysis questionnaire for assessing the road safety situation in a country is available from WHO in the Save Lives-Road Safety Technical Package Appendix.

5.2 Identify partners and roles

Planning and implementing child road safety evidence-based interventions requires a diverse set of partners across sectors and disciplines due to the multi-sectoral nature of road traffic injuries as a public and primary health care issue. Planning and implementation of road safety strategies is also more successful when the partners are working together (*see Box 15*). UNICEF for example, is an active member of the United Nations Road Safety Collaboration and the United Nations Road Safety Fund.

Governments at multiple levels, academia, civil society, youth, donors, media, development agencies and the general public all have important roles to ensure an effective road safety intervention can be successfully implemented and sustained. Early engagement, shared vision, agreed targets and respect for the diverse perspectives that multiple partners bring to the implementation process should be attained.[165]

Key partners in road safety implementation

- **Governments and communities** to develop, adopt, implement and monitor child road traffic policies and programmes, e.g., enforcement of traffic laws for 30 km/h speed zones around schools, residential and play areas; use of child passenger restraints and seat belts; use of protective helmets for motorcycles and bicycles and drink driving limits. The Ministry of Health (MoH) has a unique role in many countries working with the ministries of transport, environment and other associated ministries to effectively work across sectors to support the reduction of a leading primary health care issue.
- **Schools and academia** to advocate and implement child road safety policies and programmes to raise awareness, knowledge and behaviour change among students, caregivers and community members, e.g., road safety education with practical on-road training incorporated into the primary and secondary school curriculum.
- **Civil society and youth** to advocate and support child and adolescent road safety awareness-raising and implementation of policies and programmes, e.g., advocating for reduced speeds and safe infrastructure for communities including sidewalks, bicycle lanes, street crossings, speed bumps and other traffic-calming measures.
- **Donor partners** including from the private sector, foundations and multi-lateral institutions, engaged to co-create and implement cross-cutting approaches for innovation, integration, mainstreaming, scaling up and sustainability of child road safety policies and programmes in countries and regions, e.g., partners in safe journeys to school and safe road planning and design.
- **Media** to advocate, raise awareness and share knowledge of the impact, available solutions and call for action needed to address injuries as the leading cause of death for children and adolescents aged 5–19 years, e.g., widely disseminate road safety facts; support road safety advocacy efforts of youth, communities and civil society champions; and challenge decision makers to respond to the call for action using evidence-based decision making.
- **Development agencies** to collaborate, advocate and guide the uptake of child road safety policies and programmes, e.g., United Nations agencies coordinate the development and use of standardized tools, resources and system-strengthening processes to guide and support the uptake, mainstreaming, scaling up and sustainability of evidence-based road safety interventions, indicators and data monitoring. United Nations agencies can collaborate on joint road safety projects as part of the United Nations Road Safety Fund. UNICEF is currently partnering on country road safety action with UNDP, UN Habitat and WHO.

Box 15: Jamaica: X Marks the Spot road safety project

UNICEF Jamaica is committed to ensuring a safe and healthy journey to school for all children. The country's child road safety injury prevention programme aims to protect children on the roads through actions aimed at influencing road safety policies, improving infrastructure, advancing service responses to traffic collisions and raising awareness amongst road users.

The 'X Marks the Spot' road safety project was designed to address the lack of safe infrastructure near schools and the dangerous behaviour of road users. One main objective of the project was to engage key stakeholders including government ministries, non-government organizations, international development agencies and the private sector to collectively strengthen their capacities and public advocacy for road safety.

UNICEF Jamaica successfully partnered with the National Works Agency, Ministry of Education, Youth and Information, National Road Safety Council, Jamaica Constabulary Force and Road Safety Unit and private sector partners, including the Jamaica National Fund, Abertis, FIA Foundation and national and local media outlets.

Together, partners developed their capacities and joint advocacy to improve more than 50 school crosswalks, including eight major school crosswalk projects across the county between 2017 and 2020. More than 5,000 students were reached annually through upgrading and extending the reach of the pre-existing 'Police in Schools' road safety programme. Extensive media exposure was acheived through major television, radio and newspaper coverage.

UNICEF Jamaica identified that early and sustained engagement of a steering committee with representatives from key stakeholder groups from both the public and private sectors facilitated their work.

UNICEF programmes and roles for integrating road safety actions

Developing, implementing and maintaining a safe, healthy and sustainable transport system is best attained when actions are integrated across sectors and disciplines. UNICEF programme areas at global, regional and country offices are well positioned to include road safety activities within their scope of work and across programmes for joint benefits and engagement of partners from diverse sectors.

Health

The health programme leads the overall response to child injury prevention including road safety. It develops technical guidance and coordinates activities in-house and with global mechanisms such as the United Nations Road Safety Collaboration and the United Nations Road Safety Fund and wider partnerships to support and advocate for the advancement of road safety evidence-based policy and programme interventions.

Adolescents

Globally for adolescents aged 10–19 years, road traffic injuries are their number one cause of death. Activities in adolescent programming are well positioned to contribute to road safety prevention. A great deal of the risk-taking behaviour of adolescents, such as alcohol consumption and use of high vehicle speeds, has direct impact on their level of safety while making their journeys.The adolescent programme could include road safety activities within the non-communicable diseases (NCDs) programming data dashboards. Additionally, social media posts addressing mental health and substance abuse could be effective. Adolescent engagement could also be achieved through the voices of youth themselves to promote safe road use. Community-based programming could promote road safety and evidence-based policy uptake among novice drivers.

Healthy environments for healthy childen

To attain and maintain a healthy environment, improvement and maintenance of safe and sustainable means of transport is essential. Collaborative action to advance healthy and safe environments benefits by including road safety within data collection and reporting for incidences and exposures, indicator setting and monitoring. It also includes communication for raising awareness and contributing to a knowledge base of the impacts of road safety on healthy environments and safe solutions, such as community programming for interventions, which will have co-benefits for the environment and joint messaging and amplification of messaging on transport safety. For example, reduced road speeds will save lives, reduce air and noise pollution and provide safer ways for walking and cycling that will improve physical and mental wellbeing.

Urban development

The world is urbanizing at a fast pace. By 2050, the 70% of the global population will be living in urban areas and most of the growth in urban is unplanned and unregulated. Child responsive urban planning can contribute to making urban policies and planning standards child responsive, better design and management of public spaces including streets to make them child friendly, by promoting road safety interventions and incorporating children's views in the design and management of public spaces.

Child protection

Communities and settings with dense traffic and/or weak safety infrastructure leave children at greater risk of harm from road traffic injuries. Collaboration to include road safety activities within child protection programmes can support governments to adapt and/or implement regulatory policies that protect children from harmful environments and conditions.These include programmes to prevent alcohol and substance abuse among youth and increased access to prevention programmes to support caregivers in risky settings, which includes road environments.

Climate

The transport system has a large impact on our climate and joint efforts to create sustainable systems that will reduce the carbon footprint to our planet are beneficial to many programme areas. By reducing overall use of motorized vehicles, we can reduce the exposure to road traffic crashes as well as reducing air and noise pollution emissions. The climate programme can include road safety activities within their research, data and reporting. It is important to raise awareness and understanding of their interconnectedness and the co-benefits and this can be done with shared communications and messaging.

Disabilities

Road traffic injuries can lead to many children and adolescents living their lives with a permanent disability. Joint work to support the prevention of road traffic injuries can reduce disabilities due to road traffic crashes. Collaborative action can be attained through collection and sharing of data on disabilities caused by road crashes, prevention measures to reduce such incidents and community-based programming to make journeys more accessible for children and adolescents with disabilities.

Early childhood development

The first journey a newborn takes is from their place of birth to home. Caretakers' learning and understanding of safe means of transport at the start of a child's life can set a safer path from day one. Early childhood development (ECD) programmes can raise awareness and help plan for safe journeys through communications and community activities including correct use of child restraint systems and road safety education as part of home-visiting programmes for mothers of newborns and children under the age of four years.

Education

Core road safety education, awareness and capacity building needs to be provided to children, adolescents and caregivers as a key component of road safety interventions along with environmental design modifications and policy enforcement. A road safety education programme in schools as part of the national curriculum can enable sustainability and equity for all children and adolescents to their right to a safe environment and provides a means to teach practical applications of road safety skills. This can provide support and advocacy for safe school zones with reduced speeds (30 km/h), use of traffic-calming devices and collection of associated road injury data.

There are also unique roles that UNICEF Country Offices, Regional Offices and Headquarters can undertake collectively to reduce child and adolescent deaths and disabilities due to road traffic injuries.

Country Offices – Adopt, implement and monitor child and adolescent road safety prevention policies and programmes; build capacity of implementing partners; raise awareness within communities; and mobilize resources through local and national partnerships.

Regional Offices – Develop networks, share lessons learned, advocate for child and adolescent road safety policies and programmes, build capacity of partners and mobilize multi-country resources in the region.

Headquarters – Develop global knowledge products and standardized tools, advocate and raise awareness for the uptake of evidence-based interventions, foster regional networks, build capacity to support regional and national policy and programme action and mobilize resources to support child and adolescent road safety prevention policy and programming at the country, regional and global levels.

5.3 Set an agreed vision, plan and targets

Children and adolescents have the right to safe and healthy journeys. Mobility is an essential component of daily life as children make their ways to school, home, work, medical treatment and care and for some, journeys for collection of water, bathing and other social needs. Safe, healthy and sustainable transportation is critical to equitably access basic needs including education and mitigating impacts of climate change. Key yet diverse partners should convene and establish an agreed vision and plan of action for road safety based on the reflection of the situational analysis. The action plan or strategy does not need to be a stand-alone document but rather should ensure the prioritized actions and selected targets are integrated within broader strategies, such as within ministries of health, transport, climate, education and urban development.The United Nations road safety legal instruments also provide a strong foundation for the road safety actions at the national, regional and global levels to build upon (*see Annex 2*).

5.4 Select and prioritize interventions for implementation

Evidence-based interventions for road safety exist. Section 4 of this technical guidance specifically provides an overview of road safety prevention interventions based on engineering, legislation, regulation and enforcement of policies and educational strategies. UNICEF advocates for the uptake of the strongest evidence-based interventions as change strategies. The interventions listed in Table 5 serve as good practices, have been assessed as **effective** or **promising** and will have the greatest probability to create positive road safety changes.

Table 5: Road safety evidence-based interventions that are effective or promising

Road safety evidence-based interventions	Effective	Promising
Reduce speed	×	
Increase safe road design	×	
Use child restraint systems and seatbelts	×	
Use bicycle and motorcycle helmets	×	
Increase the visibility of pedestrians		×
Uptake safer vehicles standards	×	
Reduce drink driving	×	
Use graduated driver licensing systems	×	
Implement education programmes and awareness campaigns		×
Increase post-crash response	×	

These effective or promising road safety interventions provide the best options for countries and regions to adopt, implement and monitor impact, based on the local context, to create positive child and adolescent road safety change. These interventions will be most effective when combining engineering, enforcement of legislation and educational interventions in a Safe Systems Approach.

As time, capacity and finances are limited for the implementation of interventions, additional criteria are important to consider when needing to prioritize which interventions to implement. Successful uptake of an evidence-based intervention is not only dependent on the level of effectiveness of an intervention, but also on other influencing factors. Following is a set of questions to guide the prioritization process to address your community, country and/or regional child and adolescent road-related deaths and injuries and associated interventions to implement:

- MAGNITUDE – What is the magnitude of the specific child injury issue?
- SEVERITY – What is the level of severity of the specific child injury issue?
- VULNERABLE POPULATION – Is there a need among vulnerable populations to address the specific injury issue?
- SOLUTIONS – Are there one or more evidence-based interventions available to address the child injury issue?
- COMMITMENT – Is there community and key stakeholder willingness, interest and commitment to act on the specific child injury issue?
- IMPACT – Can a measurable impact on the specific child injury issue be achieved?
- RESOURCES – Can needed resources and partnerships to implement evidence-based interventions be secured to address the specific child injury issue?

5.5 Use enablers to support and advance implementation

Several key enablers exist to facilitate road safety actions and address barriers that might impede your efforts for the adoption, implementation and monitoring of road safety evidence-based interventions for children, adolescents, families and communities. Those collaborating to address road safety are encouraged to have the needed enablers in place, as outlined in Box 16, to support the uptake of evidence-based interventions for road safety.

Leadership

Commitment and clear direction to prioritize road safety by senior leadership in countries will greatly influence the ability to provide safe, healthy and sustainable mobility. Leadership and use of good governance can foster whole-of-government action and policy coherence. Strong leadership is needed to assign a lead organization and focal point for road safety and to ensure that it includes a focus on children and adolescents, as most road environments have not been designed with children in mind. Developing, funding and monitoring a national road safety strategy that includes specific evidence-based interventions and targets for children and adolescents will guide needed actions.

Management and multi-sectoral coordination and active engagement of youth

Transport is a diverse sector, engaging actors from across many sectors and professions. Therefore, to effectively prevent and treat road traffic injuries, it is critical for effective management and multi-sectoral coordination of actions to take place. UNICEF's diverse cross-cutting programmes are well-positioned to support such action. Health, for example, is responsible the addressing the large burden of road traffic injuries. Yet the actions needed to reduce or eliminate these tragedies require government policy support and the combined efforts from many sectors including transportation, police, urban planning and infrastructure, along with efforts for engineering and design of vehicles and protective equipment.

Active engagement of youth is also essential and has many benefits. Youth can voice the risks they experience on their journeys, participate in road safety assessments, contribute to data collection, advocate for changes to their road environments and raise awareness of safe journeys. Youth for Road Safety (YOURS) advocates that youth themselves must be part of the road safety solution. The Policymakers' toolkit from YOURS, guides policymakers and decision-makers on how to meaningfully engage and involve young people in road safety.

Innovation and sustainable financing

Creation, development and implementation of new and creative approaches will enable and even accelerate ways forward, as well as provide a means to address challenges and improve intervention effectiveness and efficiency for road safety. Existing and prospective innovations from other programme areas should be monitored and considered for importing, testing and scaling up when proven effective. New road and environment technology, designs and diverse forms of media and data use should be examined for adaptation and transferability to new contexts and settings. Innovation should also prioritize seeking a diverse range of partnerships with government, academia, foundations and private sectors to invest in road safety as a new area of work and foster innovation.

The benefits of these innovations and investments can be shared across UNICEF programme areas and contribute to a sustainable approach for programming and operations, as well as financing. For example, a percentage of funds attained from speeding violations at the national and or subnational levels could be reinvested into engineering modifications, road safety policy enforcement and educating children, caregivers and communities for safe journeys to schools.

Box 16: Adoption, implementation and monitoring (AIM) process for child injury prevention: Checklist of enablers for road safety interventions

Use this checklist

- Before you get started to help identify important issues that should be considered as you begin planning your road safety project interventions:
- During the **A**doption, **I**mplementation and **M**onitoring (AIM) process* to keep you focused on factors that will increase the likelihood of success and
- At the end of a project as a reflective tool to help identify lessons learnt

How to use this checklist: Review each item and check it off if in place. Where you do not feel you can put a check in the box, consider whether further action is or was required. If you are just beginning planning or are somewhere in the middle of the AIM process, adjust your plan to include the needed action. If you are at the end of the project, consider what the impact of not being able to check off the box was on the project and what might have been done. Then apply that learning to your next project.

Leadership

- Competent stable leader(s) in place ❑
- Leadership 'needs' considered across the AIM process ❑
- Senior-level commitment obtained from all partners ❑
- Road safety champions identified and engaged ❑
- Shared vision of road safety prevention strategy and planning agreed upon by all partners across sectors ❑

Management and multi-sectoral coordination

- Project plan covers the AIM process including measurable road safety prevention targets ❑
- Early and sustained engagement of key road safety and associated stakeholders (transport, health, urban planning and education among others) ❑
- Right people involved in planning and implementation (multi-sectoral, timing and skills) ❑
- Clear roles and responsibilities ❑
- Effective internal and external communication ❑
- Respect for diverse perspectives ❑

Innovation and sustainable financing

- Adequate funding across the AIM process ❑
- Plan for financial scale-up and mainstreaming for road safety intervention sustainability ❑
- Build partnerships to support research, development and new technology for road safety interventions ❑
- Explore and leverage opportunities for funding partnerships with diverse road-related agencies (grants, investments, joint public and private ventures, insurance levies and fines, social impact bonds, multi-lateral lending and profit generation for reinvestment) ❑

Data, research and evaluation

- Road injury-related data available to support planning and implementation (mortality, morbidity, and disaggregation by age, sex, location) ❑
- Road data available to support monitoring and evaluation ❑
- Database sharing with partners across sectors (health, transport, police, coroners, social services) ❑
- Road data collection process put in place where data are not available ❑

Education, information and visibility

- Capacity-building activities including education and information on road safety strategies as part of the process ❑
- Availablity of sufficient work force with the necessary road safety knowledge and skill sets to achieve planned objectives across the AIM process ❑
- Target audience and stakeholders aware of the issues and solutions ❑
- Adequate resources for road safety visibility-raising activities and engagement with media ❑

Context and setting

- Situational analysis conducted before planning ❑
- Target audience and key stakeholder needs identified ❑
- Risk analysis regarding possible opposition to the road safety prevention strategy to be undertaken ❑
- Vulnerable groups considered (gender, disability, impoverished non-motorized road users) ❑

Prevention strategy

- Evidence-based road safety prevention strategy selected ❑
- Road safety prevention strategy feasible in community context and specific setting ❑
- Prevention strategy acceptable to target audience and key stakeholders ❑
- Road safety lessons learned from other communities and countries considered and applied ❑

* AIM process: Adoption – an explicit or overt decision to take up a prevention strategy; Implementation – action taken to put a prevention strategy into operation, including appropriate enforcement activities; Monitoring –collection and analysis of data for the specific purpose of examining how well a prevention strategy is being implemented and its impact against expected results.

This checklist has been adapted from the child injury prevention project TACTICS (Project #20101212) and reflections from Vincenten et al.[165]

Education, information and visibility

Increased awareness of the impact that road traffic injuries have on children and adolescents and their families and communities is needed, as well as increasing awareness about the solutions that exist. Visibility of the issue will support action on road safety. Building capacity through awareness, knowledge and skills is a foundational component to addressing road injury and will support engineering modifications and road safety policy enforcement actions.

Data, research and evaluation

Quality information supports effective actions. Timely and accurate data are essential for road safety programming and policy work. Data are needed to determine the current situation and to determine if interventions that have been introduced are helping, as well as the level of impact the interventions may have. This will provide information on lessons learned and next steps to consider as part of monitoring and evaluation. Therefore, data management is critical. Research plays an important role in discovering new approaches, interventions, innovations and best practices for implementation, filling knowledge gaps and evaluating and adjusting approaches to road safety.

Context and setting

Evidence-based road safety interventions require multi-sectoral coordinated actions and need a good fit to the context and setting where they will be introduced. The effective implementation of road safety interventions is dependent on the interaction between the intervention and context. This includes the engagement and involvement of local stakeholders in the co-design of solutions. The sustainability of the intervention is the degree to which it becomes part of the context and setting.[166]

5.6 Monitor and evaluate

Ultimately, we want our work to have positive impacts on the lives of children and adolescents and their families and further, to communities, countries and regions. These impacts need to be monitored and measured so we can determine and reflect if our actions have contributed to making a real difference.

To support UNICEF planning, monitoring and evaluation processes for child and adolescent road safety, there are several key strategies, goals, commitments and targets at the global level that have policy links related to child road safety community work on the ground including:

- UNICEF Strategic Plan 2022–2025
- Sustainable Development Goals (SDGs)
- Second Decade of Action for Road Safety 2021–2030
- United Nations Global Road Safety Performance Targets
- New Urban Agenda Commitments

The use of baseline measures, quantitative and time-bound targets and standardized indicators should be set to measure the impacts achieved as part of road safety monitoring and evaluation. It would also be useful to understand the baseline for current internal capacity to deliver road safety programming.

UNICEF Strategic Plan 2022–2025

The plan includes relevant indicators for monitoring of injuries and their prevention. In addition, UNICEF country offices may wish to use additional indicators to track progress. Table 6 lists a draft set of core evidence-based policy action indicators that serve to guide country-level monitoring of child and adolescent road safety interventions that have already been piloted. The questionnaire template for the pilot child road safety core action indicators shown in Table 6 is available in Annex 3.

The inclusion of road safety as a specific element of UNICEF programming and advocacy at the country and regional level is encouraged. Core child road safety indicators serve as a starting point for standardized monitoring and reporting of road safety action. Additional indicators to monitor outputs and outcomes are under development. More detailed indicators of road safety activities can be included and linked into strategic planning and operational documents of the programme areas for adolescents, climate, child protection, education, healthy environments for healthy children, NCDs, urban planning and so forth.

UNICEF can play a pivotal role in filling data gaps for monitoring and evaluation in countries and regions. For example, there is limited timely and disaggregated data for road-related injury in many LMICs, infrequent reporting of the effectiveness of preventive interventions, as well as no quantifying of the cost of inaction during childhood and adolescence for road safety. This means prioritizing the preparation of evaluation plans, documentation of results and lessons learned when monitoring road safety programmes and evaluating long-term effects of interventions to prevent child and adolescent road traffic injuries. These are important components for achieving effective programme planning and implementation.

Injury action links to the UNICEF Strategic Plan 2022–2025 Goal Area 1: Every child, including adolescents, survives and thrives with access to adequate diets, services, practices and supplies.

Sustainable Development Goals (SDGs)

The SDGs include two road safety targets. These targets bring attention to the need for concerted action to address the tremendous burden of road traffic deaths and injuries. The strong scientific evidence base demonstrates that reduction of road deaths and injuries is possible.

SDG 3: Ensure healthy lives and promote wellbeing for all at all ages.

Target 3.6: By 2020, halve the number of global deaths and injuries from road traffic accidents.

SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable.

Target 11.2: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons. Adoption, implementation and monitoring of evidence-based child road safety interventions will support countries in their achievements of the SDG targets.

Decade of Action for Road Safety 2021–2030

In August 2020, the UN General Assembly adopted resolution 74/299 'Improving global road safety', proclaiming the Decade of Action for Road Safety 2021–2030, with the explicit target of preventing at least 50 per cent of road traffic deaths and injuries by 2030. These global targets set another opportunity for country leaders and decision makers to align their policy actions to support these high-level commitments (*see Box 17*).

Table 6: UNICEF Child Injury Prevention Core Indicators – Pilot for Road Safety

	Core Action Indicator-Road Safety	Moldova	Jamaica	Kazakhstan	Papua New Guinea	Philippines	South Africa
Q1	Does your country have a national law that requires the use of age-appropriate child passenger car restraint systems?	Yes	Yes	No	No	Yes	Yes
Q2	Does your country have a national law that regulates vehicle speed limits, including speed limits for residential neighbourhoods, schools and playgrounds?	Yes	In process or partially	Yes	Yes	Yes	Yes
Q3	Does your country have a national law that sets drink-driving limits (e.g., blood alcohol concentration limit)?	Yes	Yes	Yes	Yes	Yes	Yes
Q4	Does the national legislation use a blood alcohol concentration limit of less than or equal to 0.05 g/dl?	Yes	In process or partially	No	No	Yes	Yes
Q5	Does your country have a national law that requires helmets to be worn by child passengers when riding on motorized two-wheelers? (If the answer is 'no', skip to Q8)	No	Yes	No	In process or partially	Yes	Yes
Q6	Does your country have a national helmet law applicable on all road types (e.g., urban, rural, motorway)?	NA	Yes	NA	Yes	Yes	Yes
Q7	Does the law for helmet use require helmets to meet specific safety standards?	NA	Yes	NA	Yes	Yes	Yes
Q8	Is there a national law in place that limits the age and number of child passengers allowed on motorized two-wheelers?	No	Yes	No	No	In process or partially	Yes
Q9	Is there a national law that requires children of all ages to wear a bicycle helmet when riding a non-motorized two-wheeler?	No	Yes	No	No	In process or partially	Yes
Q10	Does the country's national health management information system (HMIS) data capture and provide summary estimates for child road traffic injuries outcomes?	In process or partially	Yes	In process or partially	No	In process or partially	Yes
Q11	Does your country have a national law that requires traffic calming measures (e.g., any one of the following: speed bumps, curb extension, lane narrowing, etc.) around residential neighbourhoods, schools and playgrounds?	In process or partially	In process or partially	In process or partially	Yes	In process or partially	Yes
Q12	Does your country have a national law that assumes driver responsibility in a crash involving a child pedestrian?	Yes	Yes	Yes	In process or partially	In process or partially	In process or partially
Q13	Does your country have a national policy that provides guidance on safe road design for different type of road users (e.g., pedestrians, cyclists)?	In process or partially	In process or partially	In process or partially	No	In process or partially	Yes
Q14	Does your country have a national policy making road safety education a mandatory part of elementary or secondary school education curricula?	No	In process or partially		In Process or partially	In process or partially	In process or partially
Q15	Does your country have national laws to restrict or prohibit the use of mobile phones while driving?	Yes	In process or partially		Yes	Yes	Yes
Q16	Does your country have national targets to minimize the time interval between a road traffic crash and the provision of first professional emergency care?	Yes	No		Yes	In process or partially	In process or partially

This indicator questionnaire has been adapted from previous child injury prevention road safety indicator surveys.[167, 168]

Box 17: Global Plan for the Decade of Action for Road Safety, 2021–2030

The Global Plan for the Decade of Action outlines recommended actions drawn from proven and effective interventions as well as best practices for preventing road trauma. It should be used as a blueprint to inform and inspire national and local plans that are tailored to the local context, available resources and capacity and have been incorporated into this UNICEF Technical Guidance on Child Road Safety. The Global Plan is aimed not only at senior policymakers, but also at other stakeholders that can influence road safety, such as civil society, youth communities, academia, donors and the private sector.

United Nations Global Road Safety Performance Targets

The 12 voluntary global performance targets for road safety risk factors and service delivery mechanisms are a means to enable countries to monitor and report on the progress on road safety efforts (*see Annex 4*). These targets align with the Decade of Action for Road Safety and provide further opportunities for countries to take up evidence-based road safety interventions to support a reduction of child and adolescent road traffic deaths and injuries.

New Urban Agenda commitments

The UN New Urban Agenda promotes integration of road safety into sustainable mobility and transport infrastructure planning and design. It focuses on the needs of all women and girls, as well as children and youth, older persons and persons with disabilities, working to adopt, implement and enforce polices and measures to promote equitable safe transport; cleaner, greener and safer cities; and nonmotorized transport, such as pedestrian and cycling mobility, that contribute to the prevention or road traffic injuries.

5.7 Review, adjust, adapt and sustain action, mainstream and scale up when and where feasible

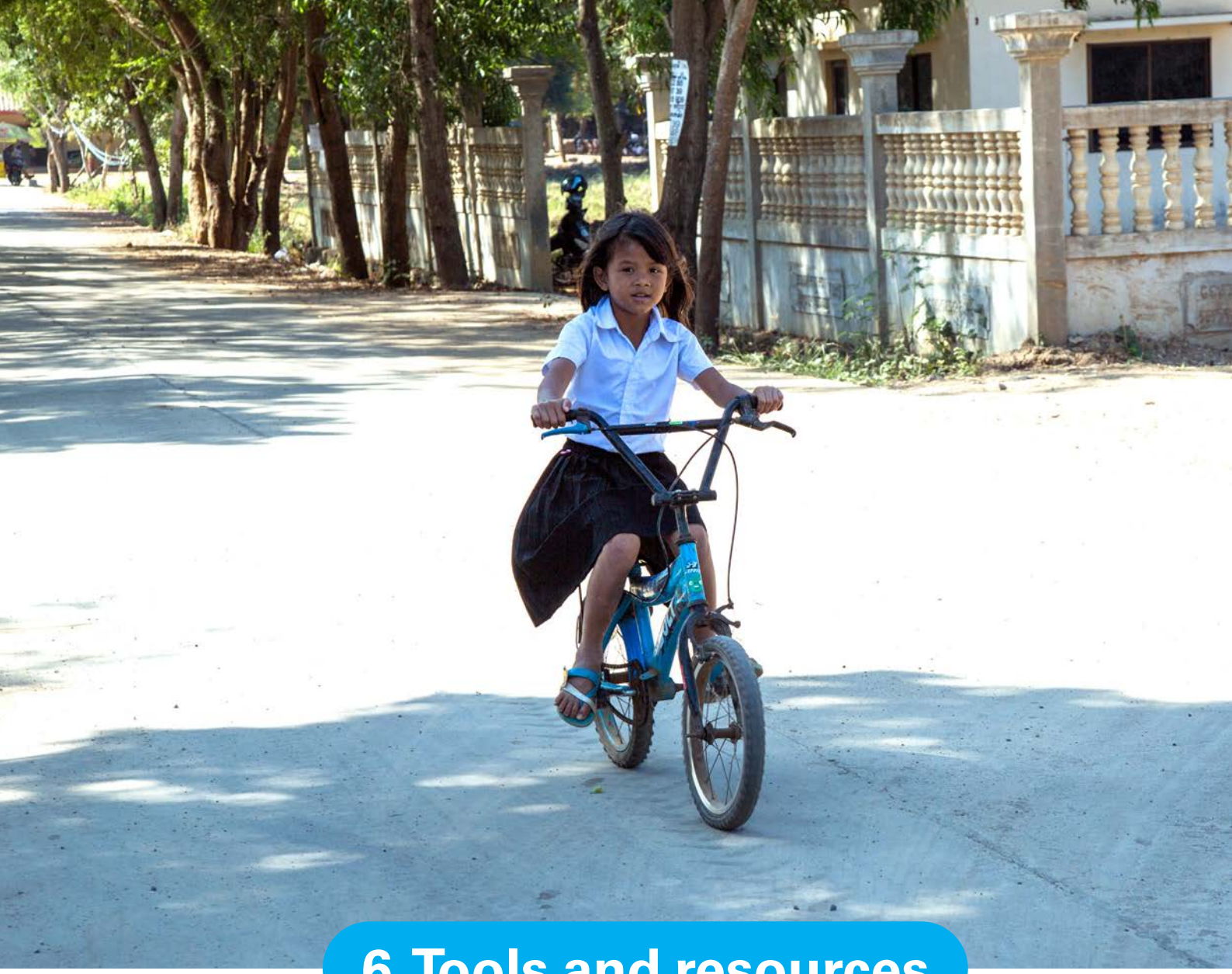
Monitoring and evaluation provide the opportunities to review, further adapt and adjust the evidence-based intervention implementation so it is best suited for the context and setting of communities, countries and regions. Collection and access to quality, timely, disaggregated data is needed to implement interventions, access results and guide next steps for policy and programme adjustments. Data will also be essential to guide actions to mainstream and scale up the implementation of interventions that have demonstrated success in pilots or smaller scale actions.

Mainstreaming and scale up of priority child and adolescent road safety interventions includes:

- Road safety curriculums and first aid as standard components of national curriculum;
- National legislation and strict enforcement of 30 km/h school zones, drink and drunk driving with BAC limits, use of child passenger restraints and helmets and restricted use of hand-held devices while driving; and
- National systems to activate post-crash response and capacity building for effective operation.

The way forward

UNICEF's aim is that every child survives and thrives in a healthy and safe environment. Reduction of child road traffic injuries, deaths and environmental impacts are critical to achieve this aim, as road traffic injuries are the leading cause of death globally for children and adolescents aged 5–19 years. Road safety solutions with cross-cutting benefits for people, the planet and profits exist and UNICEF is well equipped to mainstream these actions into diverse work streams. Road safety actions at the global, regional and national levels should focus on evidence-based interventions that are designed and implemented in an integrated Safe Systems Approach, combining engineering, enforcement of legislation and education interventions. Road traffic injury prevention is not only a transport challenge, but also a global development challenge with strong impacts on health, wellbeing and economic growth. It is critical that to reach the SDG targets, governments and partners will need to commit to sustained actions on road safety. This guidance supports UNICEF and its partners to move needed actions on road safety forward.



6. Tools and resources

6.1 Child road injury data collection

Toolkit for Child Health and Mobility for Africa

The mission of this toolkit is to design safe streets for children travelling with or without adults throughout Africa. It has been developed for local and national governments, road safety practitioners and citizens as a guide to the planning, design and implementation of interventions to improve mobility of children, including a list of interventions and best practices.

Save the Children: Photovoice guidance

This guidance document has been designed to provide 10 simple steps to deliver and facilitate children's participation through Photovoice, including involving children in the data gathering and the needs assessment process.

Traffic Conflict Technique (TCT) toolkit for school zones

TCT is a simple, evidence-based, low-cost approach to evaluate the impact of road safety interventions to prevent crashes, injuries and deaths. By counting and studying traffic conflicts, TCT can help decision makers select and evaluate the most effective strategies for improving road safety and preventing injuries. It is particularly helpful in locations where data are scarce.

Child Health Initiative: Safe Streets toolkit

The Child Health Initiative combines research, advocacy and evidence-based interventions to mainstream child health and mobility issues into international development and climate change policies, including a guidance on assessing risk and basic information on crucial monitoring and evaluation processes, e.g., baseline data before implementation and how to assess the ongoing impact of schemes.

6.2 Child road safety advocacy and education

World Health Organization: Reporting on road safety – a guide for journalists

Guidance on how to engage with media and support their advocacy for road safety.

Global Road Safety advocacy tools

This site provides how-to-guides on four topics: general advocacy campaign toolkit, policy implementation campaign toolkit, media advocacy toolkit and Global Road Safety Partnership Positioning Papers.

Global Alliance of NGOs for Road Safety

This alliance unites, empowers and strengthens NGOs to take action for road safety around the world, providing information on coalition building, networking and capacity building, including press releases on global meetings and ministerial meetings.

Sustainable Mobility for All

Sustainable Mobility for All (SuM4All) is an advocacy platform for international cooperation on transport and mobility issues, providing country dashboards and policy tools and frameworks.

The Global Youth Coalition for Road Safety: Youth and road safety action kit

This coalition unites individual youth and organizations for road safety and sustainable mobility. It offers resources, skills, partnerships and opportunities to take road safety ideas to the next level and maximize impact. The coalition also has developed the Youth and Road Safety Action Kit.

Manifesto 2030: Safe and Healthy Streets for Children, Youth and Climate

An advocacy hub, based within the Child Health Initiative, that is focused on supporting global, national and city campaigns. It has developed the Manifesto 2030, which calls for a transformation of urban streets, by 2030, into safe, low speed and accessible spaces that put people first, encouraging zero carbon walking and cycling. This is achieved by deploying the 'Speed Vaccine': safe footpaths and crossings, protected cycleways and maximum 30 km/h speed limits anywhere children and traffic mix.

Road safety education pack

A global teaching resource by the Eastern Alliance for Safe and Sustainable Transport (EASST) that provides stimulating and engaging activities to introduce road safety messages and behaviours to kids. It is currently available in eight languages and has been designed specifically so that it can be easily adapted into local versions.

YOURS Policy Makers' Tool Kit

The Toolkit is a document that will guide policymakers and decision-makers on how to meaningfully engage and involve young people. The Toolkit highlights that meaningful youth participation happens when youth experiences, youth ideas, youth expertise, and youth perspectives are integrated into institutions that support the development and implementation of programs, policies, and decision-making efforts.

Post-crash emergency response toolkit

This toolkit, developed by the European Bank for Reconstruction and Development (EBRD), sets out the key elements of effective post-crash emergency response, covering reasons for taking action, the main elements of post-crash response, examples of best practice and helpful resources.

6.3 Road safety technical resources

E-learning platform on road safety legislation

Online course developed to support capacity building in the field of road safety legislation that provides technical support to develop evidence-based national laws and regulations.

International Road Safety Assessment Programme (iRAP)

Star Ratings for Schools is a tool for measuring, managing and communicating the risk children are exposed to on school journeys. It combines an easy-to-use school assessment Android tablet application and a global reporting web application for schools.

Training - iRAP

iRAP also offers a range of training opportunities to build the knowledge and skills needed to establish a Road Assessment Program (RAP), plan and manage a project and perform an assessment.

Toolkit for Child Safety in Cars

This toolkit has practical resources for countries that do not have legislation regarding the use of child restraint systems (car seats, seatbelts) and for countries where their use is already widespread and where action should focus on providing specialized information to consumers.

Child Friendly Cities Initiative

A child-friendly city is one which implements the UN Convention on the Rights of the Child at the local level. Practice examples are provided from around the world. Tools and resources are providing for each step.

Healthy Environments for Healthy Children: Global programme framework for UNICEF

This framework assists governments and stakeholders to apply a child-specific lens to national policies and programmes on health and environment. The focus is on primary health care and work across sectors to prevent child exposure to environmental hazards.

Safe and Healthy Journeys to School During Covid-19 and Beyond

This UNICEF technical guidance provides measures to help keep students safe on school premises and the journey to school. This guidance is for education authorities, and policy makers, school administrators, teachers, and staff, parents, caregivers, community members and students.

Shaping Urbanization for Children: A handbook on child-responsive urban planning

Through 10 children's rights and urban planning principles, the handbook presents concepts, evidence, tools and promising practices to create thriving and equitable cities where children live in healthy, safe, inclusive, green and prosperous communities.

United Nations Road Safety Fund

United Nations Road Safety Fund (UNRSF) aims to help low- and middle-income countries put in place effective national road safety systems. Its mission is to finance – and leverage further funding for – high-impact projects based on established and internationally recognized best practices that increase road safety and minimize and eventually eliminate road crash trauma for all road users.

6.4 Child road safety implementation

United Nations Environment Programme (UNEP) strategies, case studies and toolkits to increase non-motorized transport: Walking and bicycling

This resource provides materials to kick-start a walking and cycling policy in a city or help local authorities to prioritize walking and cycling, to make sure that cities prioritize people instead of cars.

Ten Strategies for Keeping Children Safe on the Road booklet

Ten Strategies for Keeping Children Safe on the Road is a report from the World Health Organization highlighting ten key recommendations for policies to reduce child road traffic injury.

Save Lives Road Safety Technical Package: 'How Save LIVES applies to children'

This is an evidence-based inventory of priority interventions with a focus on speed management, leadership, infrastructure design and improvement, vehicle safety standards, enforcement of traffic laws and post-crash survival.

Vision Zero for Youth

Provides information on how youth can be the catalyst to build community support for Vision Zero and that Vision Zero should include a focus on youth. Includes Events as Tools for Change and Re-envisioning School Streets: Creating more space for children and families.

Star Rating for Schools (SR4S)

This is an evidence-based tool for measuring, managing and communicating the risk children are exposed to on a journey to school. It supports quick interventions that save lives and prevent serious injuries from day one.

AIP helmet vaccine intervention: Case study – Viet Nam

AIP Foundation works with governments, civil society and local communities to create a safer and more walkable environments for children. This includes details of a successful case study in Viet Nam to improve helmet safety.

Cleaner Air 4 Schools intervention in three cities

Pupils in London, Nairobi and New Delhi took part in a pioneering project to understand, monitor and take action on air pollution around their schools. The engagement of children, parents and school authorities in the project through 'citizen science' is explained and is transferable to other settings.

Amend projects on road safety

Amend works with development agencies, foundations, private-sector companies, governments and communities to deliver safe and healthy journeys in resource-poor countries, e.g., School Area Road Safety Assessment and Improvements (SARSAI) in Tanzania.

NACTO Streets for Kids guide

Streets for Kids is a multi-year programme of NACTO's Global Designing Cities Initiative to develop guidance and promote street designs that create safe and enjoyable streets for kids of all abilities to learn, play and move around a city. Streets for Kids aims to inspire leaders, inform practitioners and empower communities to make urban streets better safer for children and their caregivers.

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Annexes

Annex 1: List of countries by UNICEF Region and World Bank income classification

	East Asia and Pacific	Europe and Central Asia	Latin America and Caribbean	Middle East and North Africa	North America	South Asia	Sub-Saharan Africa
A	34	54	37	19	2	8	49
B	26	49	31	18	2	8	49
	Australia	Andorra*	Antigua and Barbuda	Bahrain	Canada	Maldives	Seychelles
	Brunei Darussalam	Austria	Bahamas	Kuwait	United States	Bangladesh	Equatorial Guinea
	China, Hong Kong Special Administrative Region*	Belgium	Barbados	Oman		Bhutan	Gabon
	Japan	Croatia	British Virgin Islands*	Qatar		India	Botswana
	Nauru*	Cyprus	Chile	Saudi Arabia		Nepal	Mauritius
	New Zealand	Czechia	Saint Kitts and Nevis*	United Arab Emirates		Pakistan	Namibia
	Palau*	Denmark	Trinidad and Tobago	Israel		Sri Lanka	South Africa
	Republic of Korea	Estonia	Turks and Caicos Islands*	Iraq		Afghanistan	Benin
	Singapore	Finland	Uruguay	Jordan			Cabo Verde
	China	France	Argentina	Lebanon			Cameroon
	Fiji	Germany	Brazil	Libya			Congo
	Malaysia	Greece	Colombia	Algeria			Cote d'Ivoire
	Marshall Islands*	Hungary	Costa Rica	Egypt			Ghana
	Thailand	Iceland	Cuba	Iran (Islamic Republic of)			Djibouti
	Tonga	Ireland	Dominica*	Morocco			Angola
	Tuvalu*	Italy	Dominican Republic	State of Palestine*			Comoros
	Cambodia	Latvia	Ecuador	Tunisia			Mauritania
	Indonesia	Liechtenstein*	Grenada	Syrian Arab Republic			Nigeria
	Kiribati	Lithuania	Guatemala	Yemen			Eswatini
	Lao People's Democratic Republic	Luxembourg	Guyana				Sao Tome and Principe
	Micronesia (Federated States of)	Malta	Jamaica				Senegal
	Mongolia	Monaco*	Mexico				Kenya
	Myanmar	Netherlands	Panama				Lesotho
	Papua New Guinea	Norway	Paraguay				United Republic of Tanzania
	Philippines	Poland	Peru				Zambia
	Samoa	Portugal	Saint Lucia				Zimbabwe
	Solomon Islands	San Marino*	Saint Vincent and the Grenadines				Burkina Faso
	Timor-Leste	Slovakia	Suriname				Central African Republic
	Vanuatu	Slovenia	Venezuela (Bolivarian Republic of)**				Burundi
	Viet Nam	Spain	Belize				Chad
	Democratic People's Republic of Korea	Sweden	Bolivia (Plurinational State of)				Democratic Republic of the Congo
	Cook Islands *	Switzerland	El Salvador				Gambia
	Niue *	United Kingdom	Honduras				Guinea
	Tokelau *	Albania	Nicaragua				Eritrea
		Armenia	Haiti				Guinea-Bissau
		Azerbaijan	Anguilla*				Liberia
		Belarus	Montserrat*				Mali
		Bosnia and Herzegovina					Niger
		Bulgaria					Ethiopia
		Georgia					Madagascar
		Kazakhstan					Malawi
		Montenegro					Sierra Leone
		North Macedonia					Togo
		Republic of Moldova					Sudan
		Romania					Mozambique
		Russian Federation					Rwanda
		Serbia					Somalia
		Turkey					South Sudan
		Turkmenistan					Uganda
		Kyrgyzstan					
		Tajikistan					
		Ukraine					
		Uzbekistan					

High income country (n= 61)
Upper middle income country (n = 54)
Lower middle income country (n = 55)
Low income country (n = 27)
No FY2022 WB income classification (n = 6)

A Number of countries
B Countries with data

* No data in WHO GHE 2019
** Using FY2021 income classification in absence of FY2022 classificaiton Holy See*

Annex 2: Road safety legal frameworks

United Nations (UN) road safety legal instruments provide a strong foundation for countries to build domestic legal frameworks and systems that contribute to road safety and facilitate international road traffic. They include the following:

- 1968 Convention on Road Traffic and its predecessor, the 1949 Convention on Road Traffic, which facilitate international road traffic and increase road safety through the adoption of uniform road traffic rules.

- 1968 Convention on Road Signs and Signals, which establishes a set of commonly agreed road signs and signals.

- 1958 Agreement concerning the Adoption of Harmonized Technical United Nations Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these United Nations Regulations, which provides the legal framework for adopting uniform United Nations Regulations for all types of wheeled vehicles manufactured, specifically related to safety and environmental aspects.

- 1997 Agreement concerning the Adoption of Uniform Conditions for Periodical Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of Such Inspections which provide the legal framework for the inspection of wheeled vehicles and for the mutual recognition of inspection certificates for cross-border use of road vehicles.

- 1998 Agreement concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be fitted and/or be used on Wheeled Vehicles, which serves as the framework for developing global technical regulations for vehicles on safety and environmental performance.

- 1957 Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) which provide standards including requirements for operations, driver training and vehicle construction, that can be applied to prevent and mitigate the impact of crashes involving dangerous goods.

To fully realize their benefits, implementation of UN Road Safety Conventions must go beyond accession. The vital next step is for the Conventions to be transposed into national or regional legislation and systems to ensure their effective application and thereafter be enforced through traffic police and inspection bodies.

Annex 3: UNICEF Child Injury Prevention Indicators – Pilot road safety questionnaire

For each question please ✕ yes, no, or in process of partially (some action underway)

Country .....

Contact name ..... Email .....

Amount of time needed to complete .....

Questions that need clarifications in wording for future use of these indicators

Q1	Does your country have a national law that requires the use of age-appropriate child passenger car restraint systems?	Yes No In process or partially
Q2	Does your country have a national law that regulates vehicle speed limits, including speed limits for residential neighbourhoods, schools and playgrounds?	Yes No In process or partially
Q3	Does your country have a national law that sets drink-driving limits? (e.g., blood alcohol concentration limit)	Yes No In process or partially
Q4	Does the national legislation use a blood alcohol concentration limit of less than or equal to 0.05 g/dl?	Yes No In process or partially
Q5	Does your country have a national law that requires helmets to be worn by child passengers when riding on motorized two-wheelers? (If the answer is 'no', skip to Q8)	Yes No In process or partially
Q6	Does your country have a national helmet law applicable on all road types? (e.g., urban, rural, motorway)	Yes No In process or partially
Q7	Does the law for helmet use require helmets to meet specific safety standards?	Yes No In process or partially
Q8	Is there a national law in place that limits the age and number of child passengers allowed on motorized two-wheelers?	Yes No In process or partially
Q9	Is there a national law that requires children of all ages to wear a bicycle helmet when riding a non-motorized two-wheeler?	Yes No In process or partially
Q10	Does the country national health management information system (HMIS) data capture and provide summary estimates for child road injuries outcomes?	Yes No In process or partially
Q11	Does your country have a national law that requires traffic calming measures (e.g., any one of the following: speed bumps, curb extension, lane narrowing etc.) around residential neighbourhoods, schools and playgrounds?	Yes No In process or partially
Q12	Is there a national law that assumes driver responsibility in a crash involving a child pedestrian?	Yes No In process or partially
Q13	Does your country have a national policy that provides guidance on safe road design for different type of road users? (e.g., pedestrians, cyclists)	Yes No In process or partially
Q14	Does your country have a national policy making road safety education a mandatory part of elementary or secondary school education curricula?	Yes No In process or partially
Q15	Does your country have national laws to restrict or prohibit the use of mobile phones while driving?	Yes No In process or partially
Q16	Does your country have national targets to minimize the time interval between a road traffic crash and the provision of first professional emergency care?	Yes No In process or partially

Annex 4: United Nations Global Road Safety Performance Targets

TARGET 1 2020

Target 1: By 2020, all countries establish a comprehensive multisectoral national road safety action plan with time-bound targets.

TARGET 2 2030

Target 2: By 2030, all countries accede to one or more of the core road safety-related UN legal instruments.

TARGET 3 2030

Target 3: By 2030, all new roads achieve technical standards for all road users that take into account road safety, or meet a three-star rating or better.

TARGET 4 2030 75%

Target 4: By 2030, more than 75% of travel on existing roads is on roads that meet technical standards for all road users that take into account road safety.

TARGET 5 2030 100%

Target 5: By 2030, 100% of new (defined as produced, sold or imported) and used vehicles meet high quality safety standards, such as the recommended priority UN Regulations, Global Technical Regulations, or equivalent recognized national performance requirements.

TARGET 6 2030 50%

Target 6: By 2030, halve the proportion of vehicles travelling over the posted speed limit and achieve a reduction in speed-related injuries and fatalities.

TARGET 7 2030 100%

Target 7: By 2030, increase the proportion of motorcycle riders correctly using standard helmets to close to 100%.

TARGET 8 2030 100%

Target 8: By 2030, increase the proportion of motor vehicle occupants using safety belts or standard child restraint systems to close to 100%.

TARGET 9 2030 50%

Target 9: By 2030, halve the number of road traffic injuries and fatalities related to drivers using alcohol, and/or achieve a reduction in those related to other psychoactive substances.

TARGET 10 2030

Target 10: By 2030, all countries have national laws to restrict or prohibit the use of mobile phones while driving.

TARGET 11 2030

Target 11: By 2030, all countries to enact regulation for driving time and rest periods for professional drivers, and/or accede to international/regional regulation in this area.

TARGET 12 2030

Target 12: By 2030, all countries establish and achieve national targets in order to minimize the time interval between road traffic crash and the provision of first professional emergency care.

- PILLAR 1: Road safety management
- PILLAR 2: Safer roads and mobility
- PILLAR 3: Safe vehicles
- PILLAR 4: Safe road users
- PILLAR 5: Post-crash response

Following the request of the United Nations General Assembly, on 22 November 2017 Member States reached consensus on 12 global road safety performance targets. For more information: http://www.who.int/violence_injury_prevention/road_traffic/road-safety-targets/en/

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