

A young child with light brown hair, wearing a grey fedora-style hat, a white t-shirt, blue jeans, and red sneakers with white laces, is walking across a red and white striped crosswalk. The child is carrying a yellow backpack. The background shows a paved road and a concrete curb.

WHITE PAPER

# Can Vision Zero become a reality?

A QUICK GUIDE TO ROAD SAFETY

**PTV GROUP**  
the mind of movement



## THE SAFETY ISSUE

The pursuit of transport network efficiency has, in many parts of the world, led to safety becoming a lesser consideration. Yet, there are many reasons why safety needs to be prioritized. Around the world, poor levels of safety have led to significant loss of life and had a profound, negative, often permanent effect on people's health. Poor road safety also affects economic prosperity, typically in countries and among social groups, which can least afford it.



**“The long-term trend is positive, yet far from sufficient to achieve international road safety objectives.”**

**Young Tae Kim**  
Secretary-General,  
International Transport Forum

“Traffic fatalities only show the tip of the iceberg. The number of road deaths is not a sufficient road safety indicator. The global total of 1.35 million annual road deaths must be seen in the context of an estimated 20 to 50 million serious injuries sustained in crashes around the world every year, according to the 2018 WHO Global Status Report on Road Safety.

Close monitoring of the evolution in the number of road casualties, but more importantly on the development of key performance indicators, will be essential to assist policy makers in implementing successful road safety strategies in the next decade.

Road Safety has been a key pillar of the work undertaken at the International Transport Forum and has been for over 60 years. Our International Traffic Safety Data and Analysis Group (IRTAD), through its collection and aggregation of data on road crashes, provides an empirical basis for international comparisons and more effective road safety policies.

The year 2020 will be a very important year for road safety, with the 3rd Global Ministerial Conference on Road Safety in Stockholm in February being an opportunity to share successes and lessons from implementation of the Global Plan for the Decade of Action for Road Safety 2011–2020, and to chart future strategic directions for global road safety to 2030 and beyond.”

Annually, 1.35 million people are killed each year in road-related accidents and up to 50 million are injured.<sup>1</sup> In comparative terms, road traffic deaths account for a quarter of all injury-related deaths. It is the eighth leading cause of death, surpassing HIV/AIDS, tuberculosis and diarrhoeal diseases. Even though the number of people dying annually on the roads surpasses those dying from these diseases, the investment in road safety is only a small fraction of that made to combat them. Between 2013 and 2016, the overall number of road deaths increased in 104 countries.<sup>2</sup>

Economically, national estimates have shown that road traffic crashes cost countries enormously, considering costs from medical care, emergency, police services, property damages, productivity and quality of life. In developing nations, the financial burden caused by such crashes can exceed the amounts received through foreign aid.<sup>1</sup>

Even so, we may still not know the true extent of the social and economic effects of transport- and road-related accidents. This holds true even for developed nations. The European Transport Safety Council (ETSC) has stated that levels of injuries related to road accidents may be under-reported<sup>3</sup>, with significant misclassification according to severity; there is reason to believe that an increasing number of people live with lasting impairments as a result of traffic injury.<sup>4</sup> Despite efforts to improve matters, this is an enduring issue and the OECD has

#### ANNUAL COSTS OF ROAD ACCIDENTS

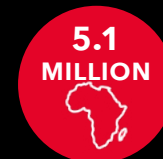
\$1,436,600,000,000,  
which is roughly 2% of  
the Gross World Product.  
This sum can buy:



Amazon.com, Inc.



Burj Al Arab Hotel, Dubai



Annual school fees  
for children in Africa

#### THE DAILY TOLL OF ROAD ACCIDENTS

Each day 3,700 people  
die in road accidents.  
This equals  
the capacity of:



AIDA Blu Cruise ships



Airbus A380 planes



London double-deck buses



called for better, combined analysis of police and hospital data in order to gain a better sense of the scale of the issue.<sup>5</sup>

What this means, however, is that an already major issue may in fact be even greater than we know. This reinforces the need to address current trends.





**“All transport projects must answer one question: Does this contribute to improving the safety of everyone who moves?”**

**Sergio Avelleda**

Director, Urban Mobility

WRI Ross Center for Sustainable Cities

World Resources Institute

**“Road safety remains a challenge for transport workers.**

It's the most crucial challenge. For obvious ethical reasons, no transport project can be developed without road safety as its priority. All projects must answer one question: Does this contribute to improving the safety of everyone who moves? Deploying safe traffic systems remains the most critical challenge in the world of mobility.

It is urgent to reduce the unacceptable number of traffic deaths. The adoption of zero vision has proven to be the most efficient method for continuously reducing traffic mortality. Engaging all actors in this immense challenge must be our main task.”

## TRAFFIC DEATHS

According to the World Health Organization:<sup>2</sup>



**1.35 MILLION**

**TRAFFIC DEATHS EACH YEAR**

8<sup>th</sup> leading cause of death for people of all ages



**#1 CAUSE  
OF DEATH**

Leading killer of children and young adults

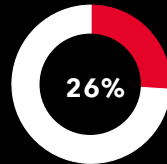


**3 TIMES HIGHER DEATH RATE  
IN LOW-INCOME COUNTRIES**

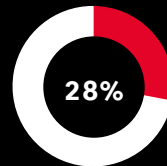
Compared to middle- and high-income countries

## VULNERABLE ROAD USERS

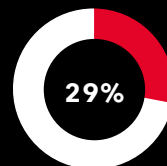
More than half of people killed on the roads are vulnerable road users:<sup>2</sup>



Pedestrians and cyclists



Motorized two- and three-wheelers



Car occupants

## AFFECTING THE MOST NEEDY

There is a strong connection between the income level of countries and the risk of a road traffic death. Ninety percent of global road deaths occur in low- and middle-income countries.<sup>3</sup> The risk is more than 3 times higher in low-income countries, compared to high-income countries.<sup>2</sup>

The differences between regions can be big. In Europe, for example, the annual average number of deaths per 100,000 head of population was 9.3 in 2016, whereas in Africa, the poorest-performing of the WHO-defined regions, the figure is more than double that, at 26.6.<sup>2</sup> Unsurprisingly, so-called vulnerable road users – pedestrians, cyclists and motorcyclists – are at greatest risk. These people are also often the most economically vulnerable and so have more limited mobility choices.

There is a disproportionate risk according to age. Road-related accidents are the number one cause of death among young people.<sup>5</sup> However, there is also a worrying increase in road-related deaths among the elderly; within the 37 countries which are members of the International Transport Forum's International Traffic Safety Data and Analysis Group (IRTAD) pedestrians account for around 25 percent of all fatalities. As the share of old people in the world population grows, traffic-related deaths among those aged 65 and above, have increased by 6.9% between 2010 and 2016.<sup>2</sup>



The situation in developing countries is especially pressing because of population growth and increasing urbanization. The current world population of just over 7 billion people is projected to reach 9.3 billion by 2050 and over 10 billion by 2100. Most of this increase will occur in 39 developing countries in Asia, Africa and Latin America. By 2030, almost six out of 10 people, or close to 5 billion, will live in cities or large agglomerations.<sup>6</sup>

Urbanization, while fostering economic growth, brings its own problems. It places highly localized pressures on infrastructure networks and the environment. It forces the close co-existence of many different social groups and modes of travel. By 2050, according to the OECD, the overall demand for mobility will triple by comparison with 2000 levels and most of this will occur outside the developed nations.<sup>7</sup>

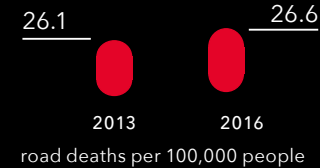
At the same time, rural areas are not without their challenges. A 2018 study of European Union countries showed that while most road accidents were in urban areas, 62% of fatalities were in non-urban areas.<sup>8</sup> Speed levels on inter-urban roads, poor or non-existent road lighting on remote road sections and a whole host of other factors play a part. This all increases the need to improve safety and be innovative in how we approach the whole concept of mobility.

## REGIONAL INEQUALITY

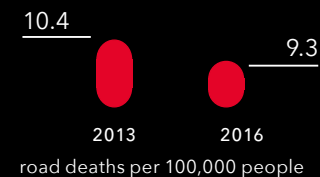
In 2018, the World Health Organization determined that:<sup>2</sup>

- 1 Wealthier countries managed to reduce road traffic deaths. But not a single low-income country succeeded in doing so since 2013.

- 2 Africa has the highest road traffic death rate, and it has increased since 2013.



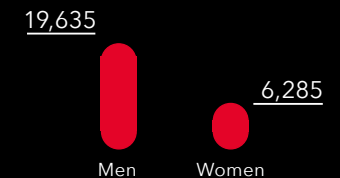
- 3 Europe has the lowest rate. It has decreased by 10.5% since 2013.



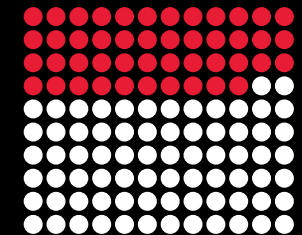
## GENDER, LOCATION, TIME

The Annual Accident Report 2018 by the European Road Safety Observatory found that in Europe:<sup>8</sup>

- 1 Men are more than three times as likely to die from a road traffic injury than women.



- 2 38% of fatalities occur inside urban areas and 62% on rural roads and motorways.



- 3 Fatalities peak at 5pm and are lowest at 4am.





**“To sustain momentum, we must do better in two vital areas: speed management and funding of road safety.”**

**Soames Job**

Global Lead for Road Safety, World Bank,  
and Head of the Global Road Safety Facility

“Vision Zero and safe system principles offer a powerful way forward for road safety. The current UN Decade of Action on Road Safety (2011-2020) has delivered vital results, including stemming the rise in road crash deaths and improvements to policy and infrastructure. But the ambitious target of halving deaths by 2020 will not be met. To sustain momentum, we must do better in two vital areas: speed management and funding of road safety.

Speed is the toxin in road crashes. Reducing speeds is a major, yet under-appreciated, opportunity to improve safety, and reduce pollution, emissions, and to some extent congestion. It can also contribute to better social inclusion and economic growth. Plans for the next decade should highlight safe speed as a pillar of action.

Sadly, there is resistance to speed management. It is often based on misunderstandings, such as:

**Increasing speed reduces congestion:** In some cases, higher speeds increase congestion because longer headways between vehicles reduce the number of vehicles that can travel on a road.

**Increasing speed helps the economy:** Shorter travel times

is only one effect of increased speed. Others include costly crashes, noise and pollution diseases, fuel and maintenance costs, and greenhouse emissions. Managing speed is a strong policy for creating sustainable mobility.

**Speed can only be managed through enforcement and education:** Speed can be managed through interventions such as infrastructure (speed bumps, well-designed roundabouts, etc.) and vehicle technology.

Road safety is massively under-funded. Donor funding provides vital resources though the World Bank and other development banks. However, the scale of the problem requires more funding, both from governments and from donors. Given the negative effects of road crashes on the economy, healthcare systems, and labour market, additional funding should be considered from car and tire manufacturers and insurance companies. On top of the human loss and suffering, the economic case for investment is compelling: crash deaths and injuries limit the economic growth of low and middle-income countries. Strong cost-benefit ratios make it a sound investment.”



## ADDRESSING THE ISSUE

In May 2011, the UN launched the Decade of Action for Road Safety. At the time, the UN General Assembly described global road death and injury as a “major public health problem with social and economic consequences which, if unaddressed, may affect the sustainable development of countries and hinder progress towards the Millennium Development Goals”.

So far, the Decade of Action for Road Safety has failed to remain on course to meet its goals. The biggest challenge in improving road safety is that there is no one cure; the solution lies in a cocktail of medicines.

Technology has an undoubted role to play. According to research by the Rand Corporation conducted in 2017, even if slightly safer highly automated vehicles are deployed, many lives will be saved – up to half a million in some scenarios.<sup>9</sup>

According to IRTAD’s 2018 annual report, the reduction of deaths of car occupants can be attributed to “the addition of safer vehicles to the fleets, equipped with technologies that prevent crashes (such as Electronic Stability Control) or mitigate their consequences (e.g. airbags).”<sup>3</sup>

We now have independently audited standards for vehicles which address a far wider range of safety-related issues. To gain a higher rating under the European New Car Assessment Programme (Euro NCAP), for example, new cars have to have

given consideration to pedestrian/vulnerable road user safety, as well as the use of Advanced Driver Assistance Systems (ADAS), some of which are also oriented towards pedestrian/vulnerable road user safety and are not just concerned with vehicle stability and integrity. The emphasis has shifted from a sole focus on vehicle-on-vehicle collisions.

However, the Transport Accident Commission of Victoria in Australia has shown that measures on the infrastructure side also bring safety benefits. A reduction of speed limits from 110km/h to 100km/h together with the implementation of speed enforcement cameras and bicycle helmet laws has significantly reduced casualties. Casualties fell from 776 in 1989 to 396 in 1992 – the first time the annual figure had been below 400 since 1948, when there were 87 percent fewer registered vehicles (in 2018, the figure was 213).<sup>10</sup>

Australia is one of several countries which have taken a very uncompromising approach to safer driving, driven in part by public concern over road casualties. Other countries around the world have also adopted vigorous policies on road safety.

## VISION ZERO

Sweden led the way in 1997 with its Vision Zero initiative, which adopts a zero-casualty approach. Vision Zero places paramount importance on human life and health over all other aspects of a road system’s operation. The Netherlands, UK and other

countries have adopted similar strategies, as have some major cities in the US and Canada.

Vision Zero initiatives seem to work in some of the places they were implemented in. However, not all cities and countries will meet their targets in due time. In the U.S, some cities are struggling to prioritize safety over ease of driving, and face challenges because of popularity of ride-hailing services.<sup>11</sup>

Properly orchestrated road safety campaigns demonstrate what is achievable. Collectively, the IRTAD member countries have achieved a reduction in road casualties of almost 40 percent over the period from 2000 to 2012, equating to some 45,000 fewer people killed annually in those countries. By 2016, Norway, Switzerland, Sweden and the United Kingdom have managed to reduce their mortality rates to fewer than three per 100,000 inhabitants, demonstrating how even the best-performing countries in terms of safety can continue to make improvements. Common themes include well-defined and targeted measures to manage inappropriate speed, curb alcohol/drug driving and promote greater use of seatbelts.

One area where major improvement could be felt in the next few years is collision prediction. Recently developed technologies now allow to investigate “what if...?” scenarios, in terms of predicted locations of collisions. It seems to be of great interest to cities who need to test which scenarios would lead to collision reduction, for example under a Vision Zero strategy.

## MAIN CHALLENGES

According to IRTAD, the main challenges in reducing road traffic accidents and fatalities are:<sup>3</sup>

1

**Speed Management** is a critical element of any road safety strategy.

2

Setting and enforcing limits for drivers on **blood alcohol content** prevents drink-driving crashes.

3

**Seat belts** are among the most effective tools to save the lives of vehicle occupants.

4

**Helmets** protect a particularly fragile and critical body part of users of two-wheelers.

## ROAD SAFETY TRENDS

In its annual report, IRTAD found that road deaths fell between 2010 and 2016 in most member countries. This is attributed to several trends:<sup>3</sup>

1

The decline of economic activity due to the **economic downturn and recovery** contributed to the reduction in road deaths since 2008.

2

Despite higher numbers of fatal cycling crashes, the public health benefits of an **increased popularity of cycling** outweigh its risks.

3

**Less strict enforcement of traffic rules** in some countries likely encourages speeding and drink-driving, thereby leading to more crashes.

4

**Distracted driving** due to the use of mobile phones is suspected to develop into a major road safety risk.





**Michael Replogle**

Deputy Commissioner for Policy,  
New York City Department of Transportation

**Michael, from your point of view, how do we deal with road safety today?**

There are huge disparities in road safety practice worldwide. In many parts of the world, road safety takes a back seat to boosting traffic speed and vehicular mobility. Expanding highways often takes precedence, rather than modernizing roads to safely accommodate walking, cycling, public transportation, and green freight systems. Unless pressed by regulators, motor vehicle manufacturers often omit proven safety features while designing for excess speed and acceleration, sacrificing the safety of occupants and vulnerable road users. Furthermore, there is widespread cultural acceptance that traffic laws can be routinely violated without consequence. Safety education is neglected. As a result, the epidemic of road traffic injuries and deaths continues to increase, except in some wealthy countries that have adopted a safe systems approach to road safety. Over 1.2 million people die each year on the world's roads and 20 to 50 million suffer non-fatal injuries, with 90% of casualties in developing countries.

**What has to be done to change the situation globally?**

Some countries and cities have shown ways to sharply boost road traffic safety. These best practice approaches deserve closer

attention and replication. We need to learn from the commercial airline sector, where a safe systems approach has turned once frequent fatal crashes into uncommon events. All stakeholders in transportation need to support a Vision Zero approach to transportation design, operations, and management, setting sights on reducing to zero the number of people killed or seriously injured in the traffic system. With this datadriven approach, Sweden has sharply cut road deaths since the mid-1990s. New York City adopted Vision Zero in 2013 and by 2018 had cut road traffic deaths by almost one-third, thanks to reduced speed limits, improved road designs, stronger enforcement with cops and cameras, safety education, and intense inter-agency collaboration. Successful integration of these strategies can strengthen a culture of compliance with traffic laws and discourage aggressive driving that results in death.

**Are there differences between developed and developing countries regarding the progress?**

» Yes. As we approach the end of the UN Decade of Action on Road Safety, we've seen good progress in most wealthy countries, but road traffic deaths continue to rise sharply in most low- and middle income countries. Pedestrian and cyclist fatalities have been rising sharply in the U.S., due to lax federal regulation of vehicle design and poor speed management. Some parts of the developing world, like Bogota, Columbia, have

shown significant safety improvements by improving pedestrian and bicycle infrastructure, adopting better road design, and enhanced enforcement.

**Earlier, you pointed out the Swedish example. What can we learn from it?**

Sweden's Vision Zero approach is especially noteworthy because it stresses the importance of developing transport infrastructures in which the protection of human life and health takes precedent over all other transportation infrastructure goals. It recognizes that humans are fallible and looks to redesign facilities and their operation to take account of this. Where similar strategies have been adopted in other parts of the world, they have helped to bring about major improvements in safety and there are a number of pillars of success. Design, enforcement, improved incident response and management, and training are all key. Speed management is a key strategy, especially in urban areas. If a pedestrian is hit by a motor vehicle at 30 km/hour, there's a 10-20% risk of death; that rises to 80% at 40-50 km/hour. The price of making a mistake in the traffic system should not be a death penalty.

**What has to be done to move towards to Vision Zero?**

We need to see road safety as a key element of sustainable development. Infrastructure designers, operators, and

enforcement agencies bear the ultimate responsibility for safety but industry must do more too. Governments should ensure good licensing and registration systems and adopt speed management initiatives, including much wider use of speed cameras, design streets to protect pedestrians and cyclists, and improve the effectiveness of traffic law enforcement. The European Union requirements is requiring all new motor vehicles starting in 2022 to include automated braking, pedestrian and cyclist recognition systems, and intelligent speed assistance, which can cut road crashes by nearly one-third. These requirements should become global standards.

### **What should the transport sector do to improve the situation?**

Most of all, we have to break out of the institutional silos which have developed around transportation. The reality is that in most parts of the world we have several groups of people involved in transportation who all manage to exist separately. We have those who build, those who provide services, those who police, and those in the health services. We need better integrated institutional structures accountable for pulling all of these authorities and stakeholders together to yield improvements in safety, access to mobility, and environmental progress. This requires governmental leadership, stronger regulation, and effective public-private partnerships. By working together, we can achieve Vision Zeros.



## SAFETY MEETS STRATEGIC PLANNING

Consideration of safety at an earlier stage of infrastructure development is also highly relevant and projects such as the European Commission's RiPCORD-iSEREST have looked to provide guidelines and tools which will support those involved in road design and traffic safety.

At the earliest stages of planning and development, Road Safety Impact Assessments (RIAs) have been proven to be inexpensive but highly effective at improving safety. Small improvements to infrastructure design can have significant and prolonged positive effects once in operation. RIAs can look at, for instance, the safety impact of a proposed new city bypass that will have also an effect on the bypassed city centre. Potential problems can be identified and de-risked before construction even starts.

For several reasons, road layouts can be implemented which are less than optimal in safety terms and it can become necessary to make changes. At this stage, a Road Safety Audit (RSA) can be carried out. A RSA will look at the effects of any proposed changes from a safety perspective and suggest changes.

At any stage in a road's life, a Road Safety Inspection (RSI) can be carried out. An RSI is a systematic assessment of the safety standard of an existing road, in particular with respect to hazards related to traffic signs, roadside features, environmental risk factors and road surface condition. How and when these are carried out varies. In Germany, for example, distinctions are made between periodic and ad hoc RSIs, with safety-related signs and characteristics being inspected more frequently than destination signage. In Norway, by contrast, the safety record of a road is assessed in terms of its expected injury severity density. Safety inspections are carried out on the most dangerous roads first and then proceed onto the others.

Black Spot Management (BSM) and its successor in some countries Network Safety Management (NSM) are well-established means of redressing issues where unexpected levels occur at given points on a road network. Factors which give rise to poor safety are identified in a nine-point process which involves defining the hazardous road section, analyzing incidents and risk factors to identify contributing factors, and then implementing and evaluating the solutions.





## ● — REFERENCES

1. Decade of Action for Road Safety 2011-2020, Saving millions of lives.
2. WHO, Global status report on road safety, 2018
3. IRTAD 2018 Road Safety Annual Report
4. European Transport Safety Council, Social and Economic Consequences of Road Traffic Injury in Europe, Brussels 2007
5. IRTAD 2014 Road Safety Annual Report
6. United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects: The 2010 revision
7. OECD/ITF, Transport Outlook 2011: Meeting the Needs of 9 Billion People, Paris, 2011
8. European Road Safety Observatory, Annual Accident Report, 2018
9. RAND Corporation, The Enemy of Good, Estimating the Cost of Waiting for Nearly Perfect Automated Vehicles, 2017
10. Transport Accident Commission, Lives Lost Annual, 2018
11. <https://www.citylab.com/transportation/2019/11/vision-zero-data-traffic-deaths-pedestrians-cyclistsafety/601831/>

## ● — OUR ENGAGEMENT

PTV Group supports the European Safety Charter and the Global Decade of Action.

We bring Vision Zero to life with technology to analyze crash data. It integrates aspects of traffic safety into strategic transport planning decisions.

More about PTV's software for improving road safety within strategic transport planning at:

[safemobility.ptvgroup.com](https://safemobility.ptvgroup.com)



## ABOUT PTV GROUP

Recognized as global market leader, PTV Group develops intelligent software solutions for transport logistics, traffic planning and traffic management. Thus cities, companies and people save time and money, enhance road safety and minimize the impact on the environment. PTV plans and optimizes everything that moves people and goods in more than 2,500 cities worldwide – it's the central idea which has accompanied PTV since its foundation in 1979.