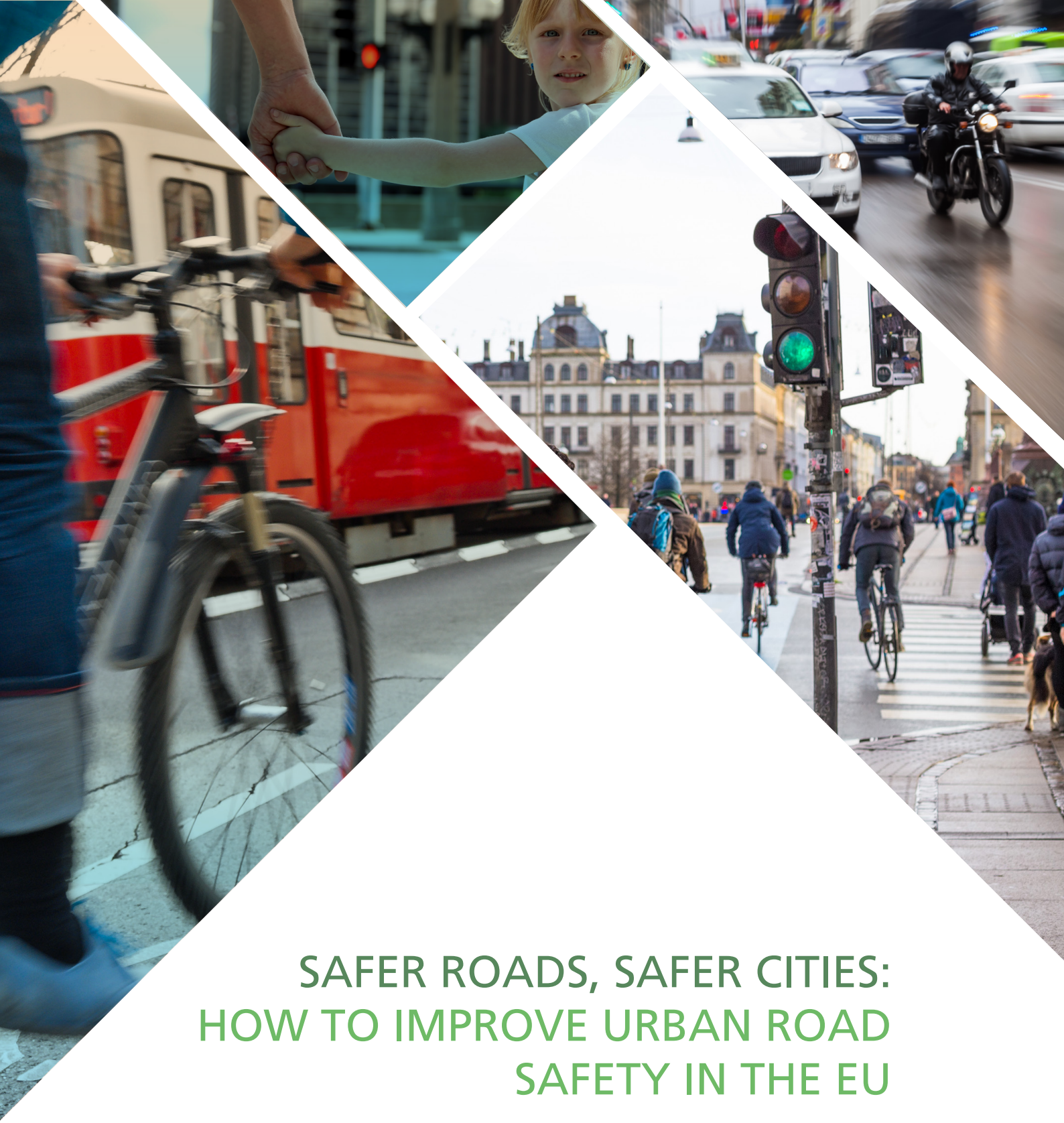

SAFER ROADS, SAFER CITIES: HOW TO IMPROVE URBAN ROAD SAFETY IN THE EU

PIN Flash Report 37

June 2019

ETSC
European Transport Safety Council

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SAFER ROADS, SAFER CITIES: HOW TO IMPROVE URBAN ROAD SAFETY IN THE EU

PIN Flash Report 37

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The PIN programme relies on panellists in the participating countries to provide data for their countries and to carry out quality assurance of the figures provided. This forms the basis for the PIN Flash reports and other PIN publications. In addition, all PIN panellists are involved in the review process of the reports to ensure the accuracy and reliability of the findings.

ETSC is grateful for the financial support for the PIN programme provided by the German Road Safety Council (DVR), Toyota Motor Europe, the Swedish Transport Administration, the Draeger Foundation, the Norwegian Public Roads Administration and CITA, the International Motor Vehicle Inspection Committee.

ABOUT THE EUROPEAN TRANSPORT SAFETY COUNCIL (ETSC)

ETSC is a Brussels-based independent non-profit organisation dedicated to reducing the numbers of deaths and injuries in transport in Europe. Founded in 1993, ETSC provides an impartial source of expert advice on transport safety matters to the European Commission, the European Parliament and Member States. It maintains its independence through funding from a variety of sources including membership subscriptions, the European Commission, and public and private sector support.

ABOUT THE ROAD SAFETY PERFORMANCE INDEX PROJECT

ETSC's Road Safety Performance Index (PIN) programme was set up in 2006 as a response to the first road safety target set by the European Union to halve road deaths between 2001 and 2010. In 2010, the European Union renewed its commitment to reduce road deaths by 50% by 2020, compared to 2010 levels.

By comparing Member State performance, the PIN serves to identify and promote best practice and inspire the kind of political leadership needed to deliver a road transport system that is as safe as possible.

The PIN covers all relevant areas of road safety including road user behaviour, infrastructure and vehicles, as well as road safety policymaking. Each year ETSC publishes PIN Flash reports on specific areas of road safety. A list of topics covered by the PIN programme can be found on http://etsc.eu/projects/pin/.

"Safer roads, safer cities: how to improve urban road safety" is the 37th PIN Flash report. The report covers 32 countries: the 28 Member States of the European Union together with Israel, Norway, the Republic of Serbia and Switzerland.

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ROAD SAFETY
IS AN ESSENTIAL COMPONENT IN
SUSTAINABLE
URBAN MOBILITY

SAFE ROAD DESIGN FOR WALKING AND CYCLING IS LIKELY TO ENHANCE THESE MODES AND REDUCE THEIR RISK

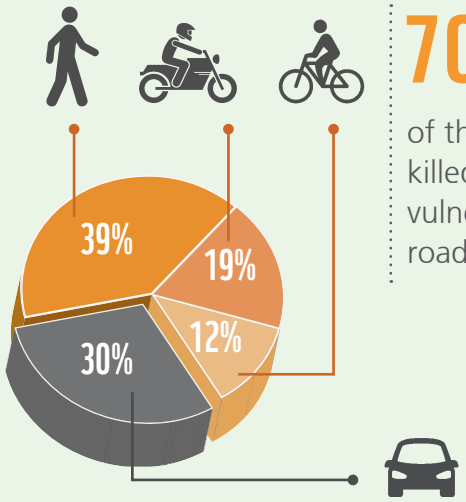
ROAD DEATHS IN THE EU

8% MOTORWAYS

38% URBAN ROADS

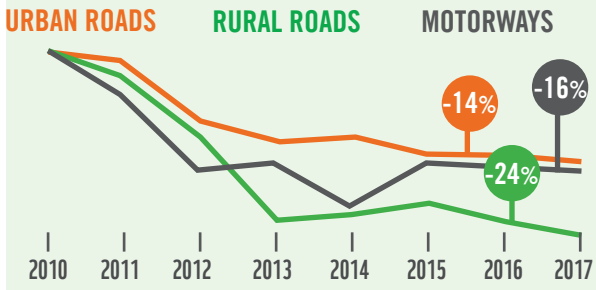
54% RURAL ROADS

9500 PEOPLE KILLED EACH YEAR ON URBAN ROADS IN THE EU



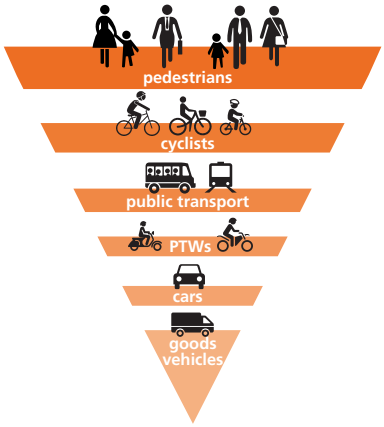
70% of these killed are vulnerable road users

DEATHS ON URBAN ROADS ARE DECLINING MORE SLOWLY THAN ON OTHER ROAD TYPES



35%-75% of observed vehicle speeds in free-flowing traffic in urban areas are higher than the legal speed limit

MODAL PRIORITY BASED ON VULNERABILITY OF ROAD USERS CAN IMPROVE ROAD SAFETY IN CITIES



CITIES CAN BE ROAD SAFETY LEADERS.
THE WAY FORWARD:

EXECUTIVE SUMMARY

This report analyses the latest data on urban road safety across the EU and other countries that form part of the ETSC Road Safety Performance Index (PIN) programme.

Part I looks at progress in reducing deaths on urban roads, and how that progress compares to other road types. Part II looks at serious injury data, still an often overlooked issue despite the life-long challenges that such injuries can cause. Part III looks at the main risks, and how urban areas can overcome them. Throughout the report we have included case studies and other input from national and local authorities that are tackling these issues.

9500 people were killed on urban roads in the EU in 2017, accounting for 38% of all road deaths. 70% of those killed on urban roads are vulnerable road users: 39% are pedestrians, 12% cyclists and 19% powered-two-wheeler (PTW) riders. Car occupants account for 25% of all roads deaths on urban roads.

In the EU, 70% of all road users killed on urban roads are vulnerable road users

Road deaths on urban roads decreased, on average, by 2.2% each year between 2010 and 2017, compared to 3.9% on rural roads, i.e. an average difference of 1.7 percentage points.

In the EU, on average, 26 people are killed on urban roads per million urban inhabitants.

Around five people per million urban inhabitants are killed on urban roads in Norway, nine in Sweden, 11 in the UK, 13 in the Netherlands and 14 in Ireland and Spain. Countries with a good overall road safety record tend to have lower mortality on urban roads too.

Mortality on urban roads is highest in Romania with 105 road users killed per million urban inhabitants – four times the EU average. Urban road mortality in Croatia is 88 deaths per million, in Serbia 74, in Cyprus 60, in Greece 58 and in Poland 57.

Over 100,000 people were seriously injured on urban roads in the EU21[1] in 2017, accounting for over 50% of all serious road traffic injuries. The number of recorded serious road traffic injuries on urban roads decreased between 2010 and 2017 in 15 out of 23 PIN countries that could provide data. However, in the EU21 the annual progress in reducing serious injuries on urban roads has been just 0.6% since 2010, compared to a 2.2% annual reduction in the number of road deaths on those roads.

The European Commission is currently updating its Sustainable Urban Mobility Plan (SUMP) guidelines to identify emerging needs. Road safety should be considered as an essential component in the updated SUMP guidelines.

In attempting to secure change in urban mobility patterns, road safety should be regarded as a critical challenge. There is widespread evidence that European citizens see road safety in their cities as a problem and in particular they say that traffic safety is a barrier to taking up cycling. It is important to recognise that safer roads also mean more sustainable roads. If groups of road users are deterred from using unsafe roads, they might shift to other less sustainable modes of transport.

At a city or town level a road safety strategy with a dedicated budget and collaboration between different departments and stakeholders can help a lot to achieve high levels of road safety

[1] In 21 EU countries that collect data. Serious injury data based on national serious injury definitions..

Just like at the national level, at a city or town level a road safety strategy and action plan with a dedicated budget and collaboration between different departments and stakeholders can help a lot to achieve high levels of road safety. It is therefore important to organise clear institutional roles and responsibilities and coordination between all relevant stakeholders, from municipal institutions, road user representatives, police, emergency services to the responsible authorities at a national level. Political leadership is essential to coordinate different administrations and to mobilise the public budgets necessary for the implementation of the action plan.

Providing safe mobility, in particular to vulnerable road users, presents a major challenge - a challenge which has been taken up strongly by authorities in a number of cities and towns, and particularly vigorously by some mayors.

Effective road safety work requires appropriate and stable funding, long term planning and targets. Local authorities should dedicate funds for road safety from their budgets for the implementation of SUMPs and road safety plans. Additional funding opportunities should also be made available from central government and EU funds.

Speed limits should be supported by infrastructure measures to be credible. Some cities and towns have successfully introduced a speed hierarchy system across their networks where vehicles are permitted to travel at 50 km/h on major through-traffic roads whereas other roads are designed and built or adapted as 30 km/h zones or shopping areas. Some cities have gone even further by adopting the 30 km/h or 40 km/h speed limit as standard.

Speed compliance on urban roads remains a challenge. Among the countries that monitor levels of speed compliance on urban roads countrywide, between 35% and 75% of observed vehicle speeds in free-flowing traffic are higher than the 50 km/h limit.

Heavy traffic flows are a major deterrent to cycling. Conflicts between vulnerable road users and motor vehicles with lethal speeds need to be reduced by the introduction of specific bicycle lanes for 50 km/h roads.

Traffic may be reduced by road closures and car-free areas. The closure of minor streets can offer lightly-trafficked routes for cyclists. An area-wide approach should be adopted to avoid displaced traffic leading to more collisions elsewhere. Even at low speeds, mixing with heavy traffic, especially HGVs, can be hazardous.

To support local authorities, road managers and road safety professionals in making urban road infrastructure safer, some PIN countries have adopted various guidelines, including for traffic calming measures, intersections, pedestrian crossings or cycling infrastructure design. If implemented they can make an important contribution to gradually bringing urban road infrastructure to desirable safety standards.

Some cities and towns are facing mobility challenges related to rapidly changing ways in which people get around in urban environments, including the emergence of e-bicycle and e-scooter sharing schemes, a growing uptake of active modes of travel and an increasing use of new delivery and transport services. The uptake of e-scooters might require new national legislation or city-level regulations, infrastructure adjustments and educational activities, similar to the road safety adaptations required for more cycling. A lack of data and regulation is hindering progress in this area at the present time.

The changes in mobility patterns might have a profound effect on urban mobility and urban road safety. The restricted space in urban areas must be used intelligently and effectively to enable increased mobility without putting road users in danger. This might require dedicating some of the space currently reserved for motor vehicles, to walking and cycling.

MAIN RECOMMENDATIONS TO CITIES AND TOWNS

- Adopt a local road safety strategy based on the Safe System approach, set road safety targets and dedicate an appropriate budget.
- Include road safety as an essential component in developing and implementing Sustainable Urban Mobility Plans (SUMPs).
- Adopt and promote a policy of modal priority for road users, the hierarchy being based on safety, vulnerability and sustainability. Walking should be at the top of the hierarchy, followed by cycling and use of public transport.[2]
- Establish clear urban road hierarchies which better match road function to speed limit, layout and design based on the principles of the Safe System approach.
- Adopt 30 km/h zones supported by traffic calming measures in residential areas, areas used by many pedestrians and cyclists and on the way to schools.
- Introduce vehicle safety requirements, such as direct vision, Intelligent Speed Assistance, Automated Emergency Braking with pedestrian and cyclist detection and alcohol interlocks in public procurement requirements for city services (e.g. waste trucks, public transport buses).
- Urgently apply to use the remaining funds from the EU's 2014-2020 budget for improving urban road infrastructure safety.

MAIN RECOMMENDATIONS TO MEMBER STATES

- Involve city representatives in the setting up of national road safety strategies, road safety targets and their implementation.
- Encourage local authorities to adopt zones with a speed limit of 30 km/h supported by traffic calming measures in residential areas, areas used by many pedestrians and cyclists and on the way to schools.
- Develop and encourage cities to apply safe infrastructure design guidelines, such as guidelines for traffic calming measures, intersections, pedestrian crossings or cycling infrastructure design. Renew the guidelines regularly based on the latest research and innovation.
- Design and implement walking and cycling safety strategies which include targets and infrastructural measures to improve safety of cyclists and promote cycling. Nominate ambassadors and set up centres of excellence for knowledge sharing at national level.
- Earmark national funds for improving urban road safety.

MAIN RECOMMENDATIONS TO EU INSTITUTIONS

- Develop a label to track the investment of EU funds that improve urban road safety.
- Create an EU fund to support priority measures such as for cities to introduce 30 km/h zones supported by traffic calming measures, particularly in residential areas and where there are a high number of pedestrians and cyclists and on the way to schools.
- Any funds destined to support urban mobility should also comply with the principles of road infrastructure safety management Directive 2008/96.[3]
- Integrate road safety and EU road safety targets into the Guidelines of Sustainable Urban Mobility Plans (SUMPs).[4]
- Set up a mechanism to monitor and promote best practice in the takeup of road safety as a horizontal issue within SUMPs.[5]
- Create a mechanism for co-operation between the Member State Expert Group on Urban Mobility and the High Level Group on Road Safety.[6]
- Recognise the positive impact that urban access regulations can have to increase road safety and include this in the upcoming EC Recommendation on Urban Access Schemes.
- Extend the principles of infrastructure safety management set out in the Directive 2008/96[7] to cover main urban roads.
- Following the adoption of the new minimum safety standards for new vehicles[8], work towards the adoption of technical specification to:
  - allow a high level of performance of Intelligent Speed Assistance systems to be fitted in all new vehicles;
  - match the level of ambition of the Regulation "so as to enhance the direct visibility of vulnerable road users from the driver seat, by reducing to the greatest possible extent the blind spots in front and to the side of the driver, while taking into account the specificities of different categories of vehicles". The standard for direct vision will have to be stricter for trucks between 3.5t and 12t (N2 category).
- Revise the Directive 2015/413 concerning cross-border exchange of information on road safety related traffic offences to strengthen the enforcement chain, with the priority on speeding.[9]

[2] ETSC (2016), Position paper, A Proposal for a strategy to reduce the number of people seriously injured on EU roads, https://goo.gl/DWbTFv
[3] Proposal for a Directive of the European Parliament and of the Council amending Directive 2008/96/EC on road infrastructure safety management, https://bit.ly/2X2Vx1W
[4] Ibid
[5] Ibid
[6] ETSC (2014), Integrating safety into the EU's urban transport policy. ETSC's reponse to the EC's Urban Mobility package, https://bit.ly/2I7J1dQ
[7] Proposal for a Directive of the European Parliament and of the Council amending Directive 2008/96/EC on road infrastructure safety management, https://bit.ly/2X2Vx1W
[8] Regulation (EU) 2019/… of the European Parliament and of the Council of on type-approval requirements for motor vehicles and their trailers, and systems, components and separate technical units intended for such vehicles, as regards their general safety and the protection of vehicle occupants and vulnerable road users, amending Regulation (EU) 2018/858 and repealing Regulations (EC) No 78/2009, (EC) No 79/2009 and (EC) No 661/2009, https://bit.ly/2CRJWe6
[9] Directive (EU) 2015/413 of the European Parliament and of the Council of 11 March 2015 facilitating cross-border exchange of information on road-safety-related traffic offences Text with EEA relevance, https://bit.ly/2Vlvsnm

INTRODUCTION

Cities and towns are home to 72% of the population of the European Union.[10] These are the places where the majority of journeys begin and end.[11]

These urban centres face multiple, often conflicting needs and challenges when it comes to managing the way people and goods move around. The nature of these challenges is also evolving.

Urban populations are increasing, the population is ageing, people are being encouraged to walk and cycle more as concerns over congestion and air pollution move up the political agenda. New forms of mobility are popping up increasingly.

Road safety is not always the top priority. As this report will show, deaths and serious injuries on urban roads are not declining as fast as on other types of roads in many countries.

Another related trend is that deaths of vulnerable road users are not declining as fast as those of motor vehicle occupants. In urban centres, the statistics are stark, 70% of reported road deaths are pedestrians, cyclists and power-two-wheeler (PTW) riders.

While new vehicle technologies such as Intelligent Speed Assistance (ISA), Automated Emergency Braking (AEB) with pedestrian and cyclist detection and turning assistance systems on heavy goods vehicles may help reduce these numbers in the future – it will take decades for the full benefits to become apparent.

In the meantime, it will be up to national and local authorities, with support from the European Union to address the main causes of deaths and serious injuries on roads in our urban centres. Infrastructure changes will be central to this challenge, but enforcement of speed limits, drink-driving laws and other key risk factors are also crucial.

Cities can be dynamic and innovative environments. Many have welcomed the dazzling array of new mobility options that have launched in just the last few years. Shared bicycle and e-bicycle schemes, shared e-scooters that can be left anywhere, app-based taxi services, bicycle and motorcycle food delivery companies – these are just a few of the services that have developed increasingly over the last decade. But policy and regulation are slow to catch-up. Most countries do not have clear laws about where and how e-scooters should operate. None collect consistent data on serious injuries and deaths involving these vehicles. That must change.

Innovation can also be harnessed for the purpose of improving the safety of the people who live and work in cities. There are towns and cities in Europe that are getting close to Vision Zero or have a clear strategy on how to get there, but they are few and far between. In most European cities and towns, the transport modes that cause the least risk to other people, i.e. walking and cycling, carry the highest risks for those that use them. What can be done to make our urban roads safe for all road users, not just those in cars fitted with the latest safety technology?

This report analyses the latest data urban road safety across the EU and other countries that form part of the ETSC Road Safety Performance Index (PIN) programme. It looks at progress in reducing deaths on urban roads, and how that progress compares to progress on other road types. Part II looks at serious injury data, still an often overlooked issue despite the life-long challenges that such injuries can cause.

Part III looks at the main risks, and how urban areas can overcome them. Throughout the report we have included case studies and other input from national and local authorities that are tackling these issues. It is clear that the problems can be addressed with the right political leadership, resources and energy. But while the EU, national governments and other actors can help provide the knowledge, finance and guidelines to implement the necessary changes, it will often be up to local authorities to implement them effectively.

[10] European Commission, the State of European Cities (2016), https://bit.ly/2Umg2Fu
[11] European Commission, Together towards competitive and resource-efficient urban mobility, https://bit.ly/2Wt93eT

INDICATOR

According to the CaDaA glossary, deaths on urban roads are those that occur inside urban area boundary signs.[12] This definition is applied in the majority of countries that provide data to the ETSC Road Safety Performance Index (Pin) Programme. Certain countries, cotably Cyprus and the UK, do not have boundary signs to distinguish between urban and rural road sections. In the UK, the boundaries are defined for planning purposes as well as by the number of inhabitants, but in road safety work, roads are designated as being in "built-up" or "non-built-up" areas According to the prevailing speed limit. A road is defined as non-built-up if the speed limit is above 40 mph (64 km/h), or as built-up if the speed limit is 40 mph or lower.

This report uses as the main indicators the annual average change in the number of recorded road deaths (Fig.1) and the annual average change in the number of recorded serious road traffic injuries (Fig.9) on urban roads since 2010. Countries are also compared on the difference between this change in recorded road deaths and serious injuries on urban roads and the corresponding change in recorded road deaths and serious injuries on rural non-motorway roads since 2010 in Fig.3 and Fig.11 respectively.

Country progress is compared since the year 2010. The years 2008 to 2010 saw exceptionally sharp reductions in recorded road deaths, partly due to the economic slowdown[13]. Road deaths on urban roads decreased on average each year by 14% in the EU between 2008 and 2010, compared to 2.2% over the period 2010-2017. It was therefore decided to compare progress since 2010, the baseline year of the EU target for 2020.

Countries are also compared according to the road mortality rate on urban roads, i.e. the number of road deaths in urban areas per million urban inhabitants (Fig.4). Readers should bear in mind the limitations of this exercise as our data do not take into account the daytime urban population (i.e. the number of road users who live in rural areas and commute to urban areas to work, study or for other reasons), commuting patterns, public transport availability, settlement structures or modal split that could partly explain the position in the ranking of some countries.

Austria, France, Israel, Slovenia, Switzerland and Great Britain provided estimates of distance travelled by motorised vehicles on urban and rural non-motorway roads (Fig.5). Countries use different methodologies to make these estimates, short descriptions of the methodologies are provided in the annexes.

Road death and serious injury data on different road types were retrieved by the European Commission from the CARE database on ETSC's request. Additional data were provided by the PIN panellists. The full dataset is available in the annexes. Data from Slovakia are not available. This report makes use of the number of reported road deaths and reported serious road traffic injuries and therefore does not take into account underreporting. Past studies have shown that underreporting is higher for vulnerable road users.[14]

In preparation for this report, a questionnaire was sent to the members of Polis.[15] Some of the information provided by Polis members is presented below.

[12] European Commission, Directorate-General for Mobility and Transport (2017), CARE database, Common Accident Data Set (CaDaS), https://bit.ly/2KkmM64

[13] Wegman F. et al., Accident Analysis and Prevention (2017), How did the economic recession (2008–2010) influence traffic fatalities in OECD-countries?; OECD-ITF-IRTAD (2015), Why Does Road Safety Improve When Economic Times Are Hard? https://goo.gl/DdTjKz

[14] For more information, see for instance ETSC (2018), An Overview of Road Death Data Collection in the EU, PIN Flash 35, https://etsc.eu/pinflash35/

[15] POLIS, a European non-governmental organisation of cities and regions for transport innovation, https://www.polisnetwork.eu/

PART I

9500

People were killed in 2017
in urban areas in the EU
70% were vulnerable road users

01

1.1 PROGRESS IN REDUCING REPORTED ROAD DEATHS ON URBAN ROADS

On average, reported road deaths on urban roads decreased by 2.2% annually in the EU since 2010 (Fig.1).

In Latvia, there was an 8% annual reduction since 2010. Greece, Serbia, Portugal and Poland follow closely with 7%.

Romania is the only country that saw an increase in reported road deaths on urban roads of 7% annually since 2010, compared to 11% decrease on rural roads (Fig.3).

Progress has stagnated in the UK, Spain and Cyprus. The progress was below the EU average in Israel, Lithuania, Finland, Hungary, Germany, Ireland, France, Sweden and the Netherlands.[16]

On average, reported road deaths on urban roads decreased by 2.2% annually in the EU since 2010

LATVIA
GENERAL ROAD SAFETY CAMPAIGNS AND TARGETED INFRASTRUCTURE IMPROVEMENTS LED TO PROGRESS ON URBAN ROADS

In Latvia, road deaths on urban roads decreased from 78 in 2010 to 44 in 2017. The estimated annual average decrease in the number of deaths on urban roads over the period 2010-2017 was 8% compared to 2.7% annual decrease on rural roads.

"The progress on urban roads is a result of the implementation of a comprehensive set of general road safety measures since 2001. Our government also funded three or four big road safety campaigns each year. As a result, attitudes towards road safety are slowly changing."

"There is also action in built up areas: gradual implementation of 30 km/h zones, installation of speed humps, management of high risk sites and construction of pedestrian and bicycle infrastructure. There is still a lot to do, as overall road mortality in Latvia, as well as in urban areas, is still one of the highest in the EU."

Aldis Lāma, Road Traffic Safety Directorate, Latvia

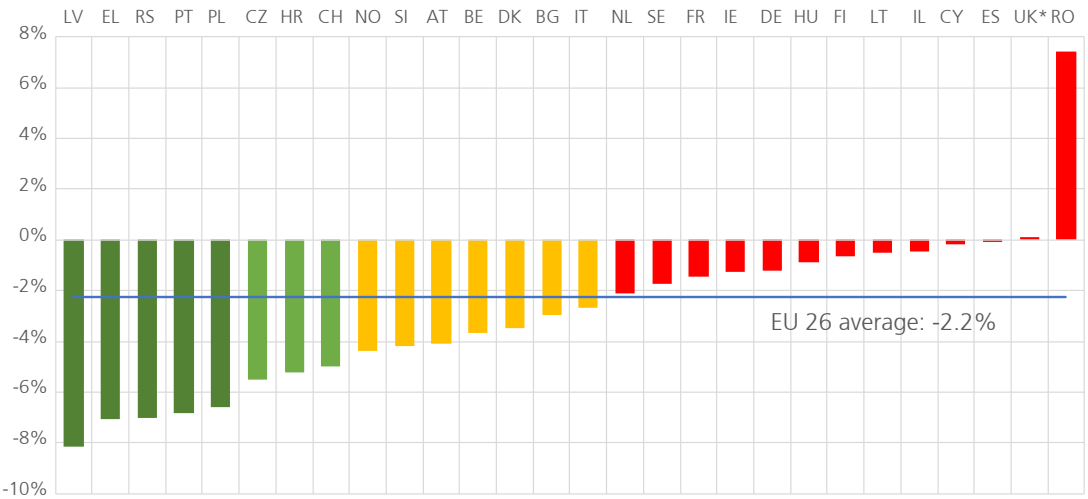


Figure 1. Average annual change in the number of recorded road deaths on urban roads over the period 2010-2017.
UK* – 2010-2016. EU26: MT and SK are excluded from the EU average and the figure due to insufficient data. LU is excluded from the figure as the numbers of road deaths are relatively small and subject to substantial annual fluctuations, LU data are available in the annexes and are included in the EU26 average. EE is excluded from the figure due lack of data for some years but EE data are included in the EU26 average.

[16] The average annual decrease is based on the entire time series of all the eight annual numbers of road deaths on urban roads between 2010 and 2017, and estimates the average exponential trend. For more informationjiii: methodological note, PIN Flash 6: https://bit.ly/2LVVUtY

THE CZECH REPUBLIC

A COMBINATION OF MEASURES HAVE CONTRIBUTED TO IMPROVED URBAN ROAD SAFETY

In the Czech Republic, the number of people killed on urban roads has decreased from 291 in 2010 to 193 in 2017. The estimated annual average decrease in the number of deaths on urban roads over the same period was 5.5% compared to 3.7% annual decrease on rural roads.

"There are several possible reasons behind the progress, including gradual implementation of traffic calming measures, upgrades of pavements, building of cycling infrastructure and illumination of pedestrian crossings. In addition, speed enforcement by safety cameras and police roadside checks had an important contribution – the proportion of drivers going above the speed limit in urban areas by more than 10 km/h decreased from 9% in 2014 to 6% in 2018."
Jiří Ambros, Transport Research Centre (CDV), the Czech Republic

POLAND

PROGRESS IN REDUCING ROAD DEATHS ON URBAN ROADS MIGHT BE RELATED TO THE LOWER DRIVING SPEEDS DUE TO CONGESTION

1238 people died on urban roads in Poland in 2017 compared to 1813 in 2010. The estimated annual average decrease in the number of deaths on urban roads over the period 2010-2017 was 6.6% compared to 4.5% on rural roads.

"It is very difficult to refer to specific programs or solutions when explaining the progress in reducing the number of road deaths in urban areas in Poland as the implemented preventive measures have not been assessed."

"Numerous alternative means of transport are emerging in many Polish cities (e.g. bicycle sharing schemes and e-scooters) and citizens are also encouraged to walk more often. However, these changes are not accompanied by parallel measures to reduce the use of passenger cars. The number of passenger cars and the level of congestion in urban areas is growing. This, in turn, may paradoxically affect the driving speed and lower the severity of collisions. Poland is facing a huge challenge in organising the traffic in built-up areas."
Ilona Buttler, Motor Transport Research Institute (ITS), Poland

PORTUGAL

THE GREATEST PROGRESS IN REDUCING OVERALL AND URBAN ROAD DEATHS WAS ACHIEVED DURING THE PERIOD OF ECONOMIC SLOWDOWN

328 people lost their lives on urban roads in Portugal in 2017 compared to 484 in 2010. The estimated average annual reduction in road deaths on urban roads was 6.8% compared to 6% on rural roads. The largest decrease on both, urban and rural roads, was observed over the period 2011-2013.

"The reductions in urban road deaths were most noticeable on through roads, possibly due to improvements in road infrastructure, traffic diversion from national roads to new motorways or other major roads and lower traffic volumes related to the economic slowdown."
João Cardoso, National Laboratory of Civil Engineering (LNEC), Portugal

ROMANIA

LACK OF BYPASS ROADS AND ILLEGAL PARKING CREATE RISKS FOR URBAN ROAD USERS

Road deaths in Romania increased from 866 in 2010 to 1221 in 2017. The estimated average annual increase was 7.4% compared to an 11.3% annual decrease on rural roads.

The high road mortality on urban roads can be partially attributed to the road infrastructure. Many cities do not have bypass roads to redirect the vehicles that are transiting the cities, leading to increased traffic and interactions between all types of road users on urban roads.[17]

There has been a rapid development of big urban centres that has led to an increase in the car fleet while road infrastructure developments are lagging behind. There is a lack of parking spaces and so drivers park on

[17] Information source: Romanian police.

pedestrians' pavements, forcing pedestrians to walk on the roads which increases pedestrian road risk. At the same time, the lack of efficient mechanisms to enforce traffic laws results in road users breaking the traffic law systematically.[18]

1.2 PROGRESS IN REDUCING ROAD DEATHS ON URBAN ROADS IS SLOWER COMPARED TO OTHER ROADS

On average in the 27 EU countries that provided data, road deaths on urban roads have decreased by 14% since 2010, compared to reductions of 16% on motorways and 24% on rural roads (Fig.2).

Road deaths on urban roads decreased on average by 2.2% each year between 2010 and 2017, compared to 3.9% on rural roads, i.e. an average difference of 1.7 percentage points (Fig.3).

In seven out of 30 PIN countries, progress in reducing road deaths on urban roads was faster than the corresponding progress on rural roads. Road deaths on urban roads were reduced by around 11% faster annually than on rural roads in Serbia, 6% in Latvia, 4% in Bulgaria, 3% in Croatia and 2% in Poland and the Czech Republic (Fig.3).

In 13 countries, the progress in reducing road deaths on urban roads was slower than the progress on rural roads.

In 13 PIN countries, the progress in reducing road deaths on urban roads was slower than the progress on rural roads. Road deaths on urban roads were reduced by 9% more slowly annually than on rural roads in Lithuania, 8% in Norway, 7% in Cyprus and Estonia, 5% in Spain, 2% in Germany, Switzerland, Ireland and Finland and 1% in France and Belgium.

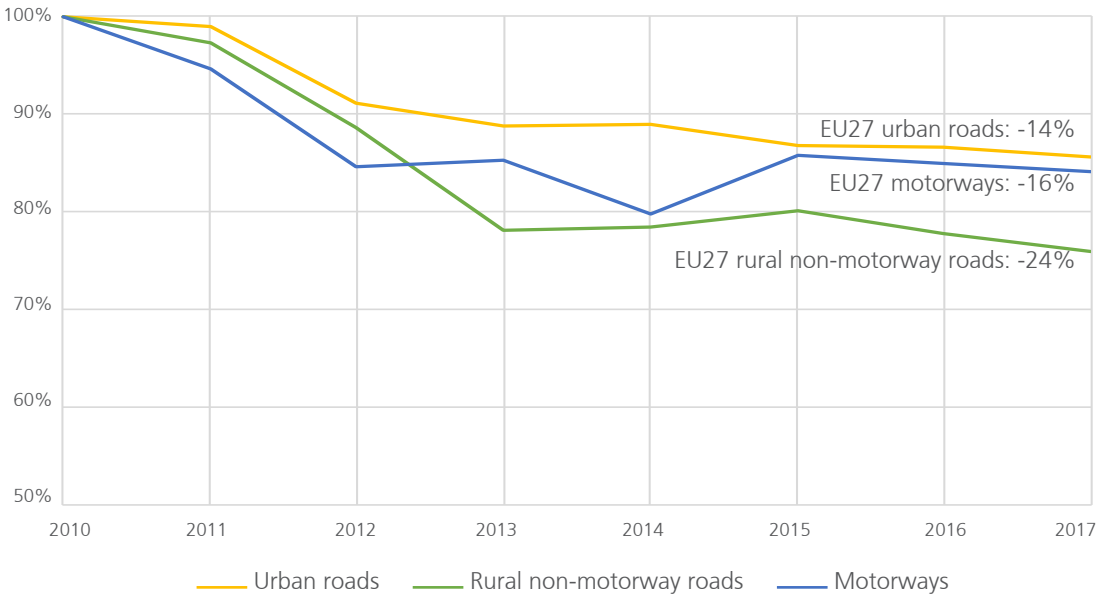


Figure 2. Progress in reducing in the number of reported road deaths on urban roads, rural non-motorway roads and motorways in 27 EU countries for which data are available. SK is excluded from the EU average due to insufficient data.

[18] Information source: Romanian police.

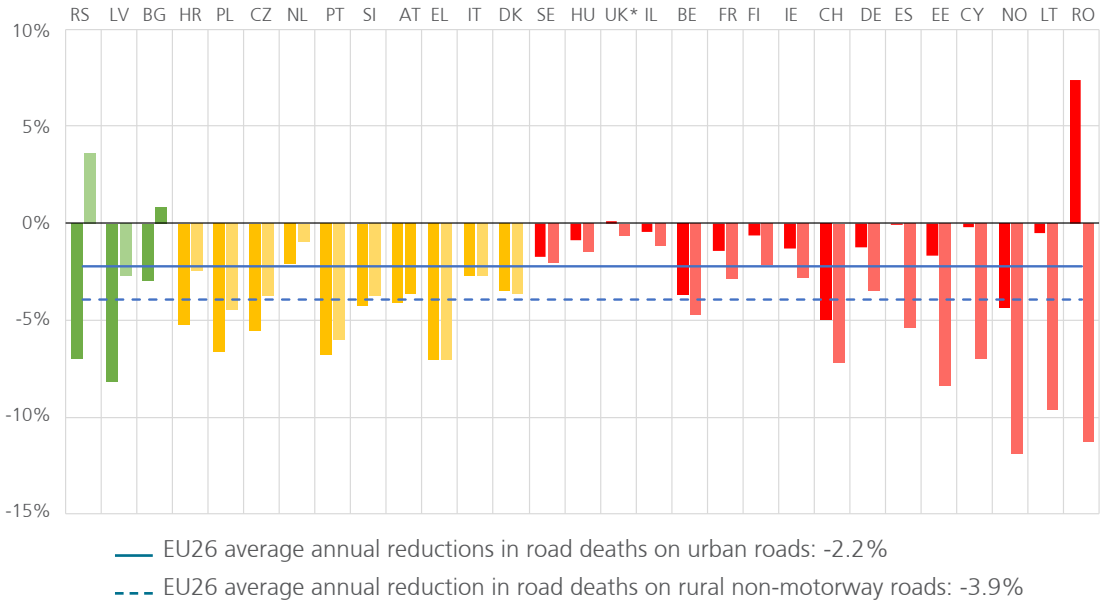


Figure 3. Difference between the average annual reduction in the number of reported road deaths on urban roads (first country column) and the annual reduction in the number of reported road deaths on rural non-motorway roads (second country column) over the period 2010-2017. Countries are ranked and the colour codes are applied based on the amount by which the annual average percentage reduction in deaths on urban roads exceeds the corresponding reduction on rural non-motorway roads.[18]
LU is excluded from the figure as the numbers of road deaths are relatively small and subject to substantial fluctuations, LU data are available in the annexes and are included in the EU26 average. SK and MT are excluded from the EU average due to insufficient data.

In Romania, road deaths on urban roads have increased on average by 7.4% each year since 2010 compared to an 11.3% annual decrease in deaths on rural roads resulting in the 18.7 percentage points difference presented in Figure 3.

Progress in reducing road deaths on urban roads and on rural roads since 2010 was similar in Portugal, Slovenia, Austria, Greece, Italy, Denmark and Sweden.

1.3 MORTALITY ON URBAN ROADS DIFFERS BY A FACTOR OF NINE BETWEEN COUNTRIES

In the EU on average, 26 people are killed on urban roads per million urban inhabitants annually compared to overall road mortality of 50. This indicates how greatly the number of road deaths outside urban areas among residents of urban areas outweighs the number of road deaths in urban areas among visitors from outside urban areas.

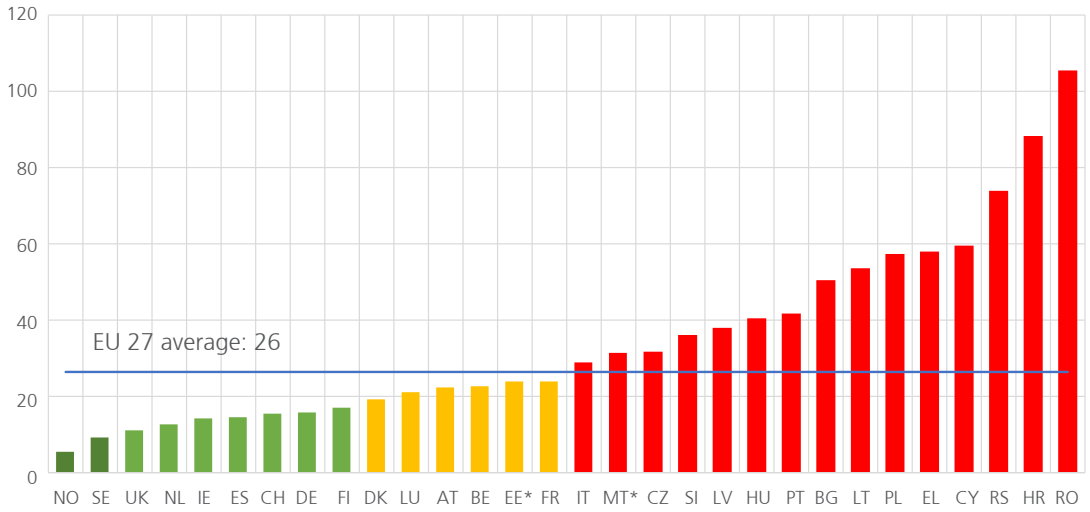
Mortality on urban roads is nine times higher in the group of countries listed at the bottom of the ranking compared to the top group.

Around five people per million urban inhabitants are killed on urban roads in Norway, nine in Sweden, 11 in the UK, 13 in the Netherlands, 14 in Ireland and Spain (Fig.4) annually. Countries with a good overall road safety record tend to have lower mortality on urban roads too.

Mortality on urban roads is highest in Romania with 105 road users killed per million urban inhabitants – four times the EU average. Road mortality in Croatia is 88 deaths per million, in Serbia 74, in Cyprus 60, in Greece 58 and in Poland 57.

[19] The average annual decrease is based on the entire time series of all the eight annual numbers of road deaths on urban roads and rural non-motorway roads between 2010 and 2017, and estimates the average exponential trend. For more information: methodological note, PIN Flash 6: https://bit.ly/2LVVUtY

Figure 4. Reported road deaths on urban roads per million urban inhabitants. Average number of deaths in 2015-2017, urban population data in 2017[19]. *MT – 2015-2016, *EE – 2016-2017. SK is excluded from the figure and the EU average due to insufficient data. IL is excluded from the figure as data on proportion of inhabitants living in urban areas is not available on Eurostat.



1.4 ROAD DEATHS PER VEHICLE-DISTANCE TRAVELLED

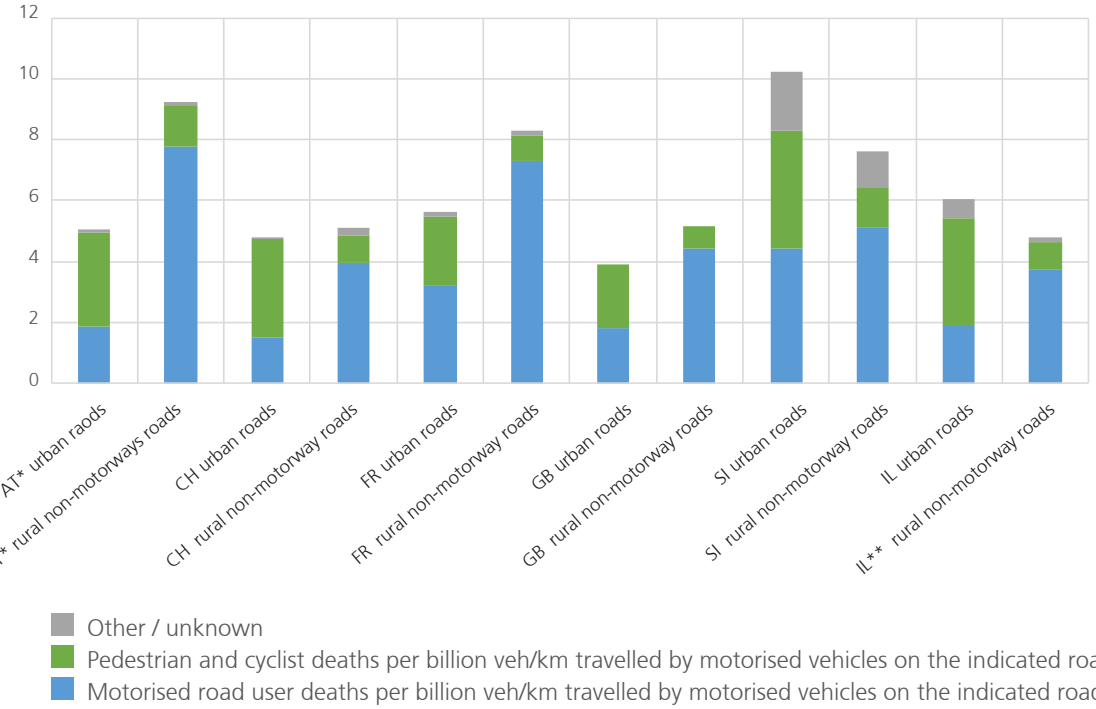
Fig.5 shows the road risk measured in deaths per billion vehicle-km travelled for the five countries that could provide data on distance travelled on urban and rural roads separately.

Comparison between countries is difficult due to differences in modal share and different data collection methodologies for vehicle-km travelled.

In all six countries pedestrians and cyclists have a higher risk of being killed on urban roads, than the risk of being killed on rural roads when calculating the risk by vehicle-km travelled (Fig.5), in part because there are more cyclists and pedestrians on urban roads.

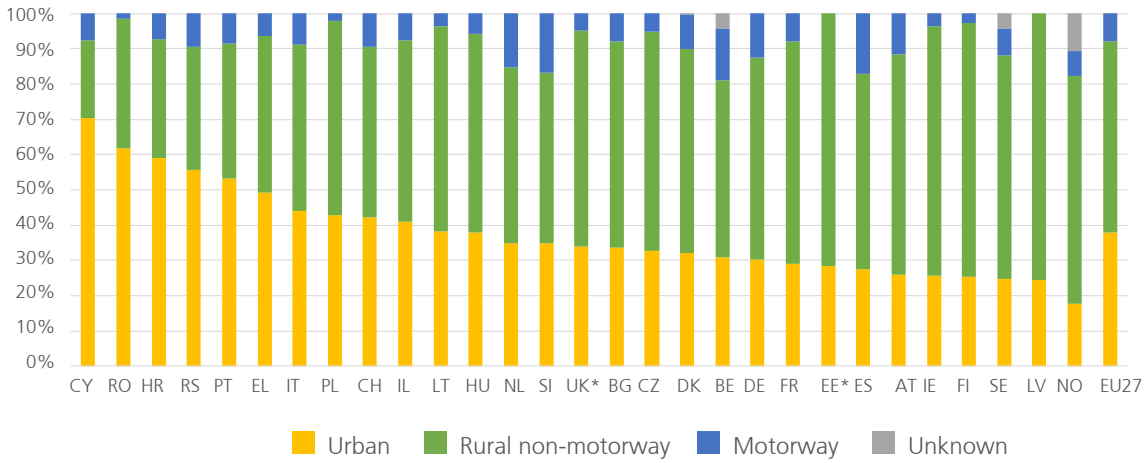
There are 2.1 pedestrians and cyclists killed per billion vehicle-km travelled on urban roads in Great Britain, 2.3 in France, 3.1 in Austria, 3.2 in Switzerland, 3.5 in Israel and 3.9 in Slovenia. The value is not related to the traffic volume of walking or cycling, but the traffic volume of motor-vehicles.

Figure 5. Reported road deaths per billion vehicle-km on urban roads and rural non-motorway roads (for comparison) over the period 2015-2017. The urban roads column presents road deaths on urban roads per billion vehicle km travelled on urban roads and the rural non-motorway column presents road deaths on rural non-motorway roads per billion vehicle km travelled on rural non-motorway roads. AT* - 2014-2016.



[20] The number of urban population in 2017 was calculated by applying the Eurostat data on the proportion of urban population in 2014 (the latest data available) to 2017 population figures assuming the proportions of urban population have not changed significantly from 2014 to 2017.

Figure 6. Proportion of all reported road deaths by road type, average years 2015-2017. UK*- 2014-2016; EE* - 2014, 2015-2016; SK is excluded from the figure and the EU average due to insufficient data. LU and MT are excluded from the figure as the numbers of road deaths are relatively small and subject to substantial fluctuations, LU and MT data are available in the annexes and are included in the EU27 average. There are no motorways in EE, LV and MT.



1.5. 38% OF ALL ROAD DEATHS OCCUR ON URBAN ROADS

38% of all road deaths in the EU occur on urban roads, 54% on rural roads and 8% on motorways (Fig.6).

More than 50% of all road deaths occur on the road network inside urban areas in Cyprus, Romania, Croatia, Serbia and Portugal and nearly 50% in Greece. Further research would be needed to explain these high proportions.

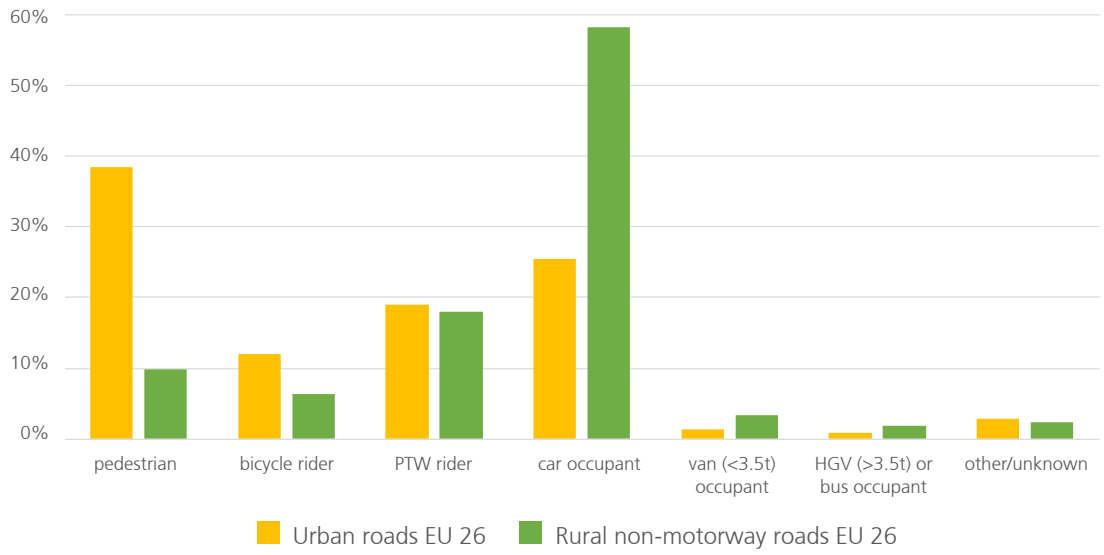
1.6. 70% OF THOSE KILLED ON URBAN ROADS ARE VULNERABLE ROAD USERS

In the EU, 70% of all road users killed on urban roads are vulnerable road users: 39% are pedestrians, 12% cyclists and 19% powered-two-wheeler (PTW) riders. Car occupants account for 25% of all roads deaths on urban roads (Fig.7).

For comparison, VRUs account for 34% of all road deaths on rural non-motorway roads: 10% are pedestrians, 6% cyclists and 18% PTW riders. Car occupants account for 58% of all road deaths on rural roads (Fig.7).[21]

These differences are not surprising due to the traffic composition on urban roads, where VRUs frequently and closely interact with motorised vehicles, and on rural roads that are mostly used by motorised vehicles.

Figure 7. Proportion of reported road deaths by road user group on urban roads and rural-non motorway roads (for comparison) in the EU, average of years 2015-2017. BG and SK are excluded from the EU average due to insufficient data.



[21] Another indicator would have been interesting, i.e. numbers of vulnerable road users killed in collisions involving a motor vehicle, but CARE estimates that the accuracy of the data by country is not high enough in urban areas.

Pedestrians account for 58% of all road deaths on urban roads in Latvia, 54% in Israel, 51% in Spain, 48% in Romania, 47% in Poland and 46% in the UK (Fig.8).

The proportion of cyclists among those reported killed on urban roads is 31% in the Netherlands, 29% in Denmark and Finland, 27% in Switzerland and 25% in Germany. This can be partially explained by a higher modal share of cycling in these countries. According to the 2013 Eurobarometer survey, 71% of respondents cycle at least few times per week in the Netherlands, 57% in Finland, 56% in Denmark, 45% in Hungary, 44% in Germany and 43% in Sweden.[22]

PTW riders account for 43% of all deaths on urban roads in Greece, 31% in Cyprus, 29% in Italy, 28% in France, 26% in Spain and 25% in Portugal, a high proportion partially explained by a wider use of PTWs and a higher modal share of PTW use on urban roads in these countries. According to the 2013 Eurobarometer survey, 17% of respondents use a PTW at least a few times per week in Greece, 13% in Italy, 9% in Cyprus, 7% in Portugal, Finland, Hungary, Slovenia and Austria, 6% in France, Spain and Croatia.[23]

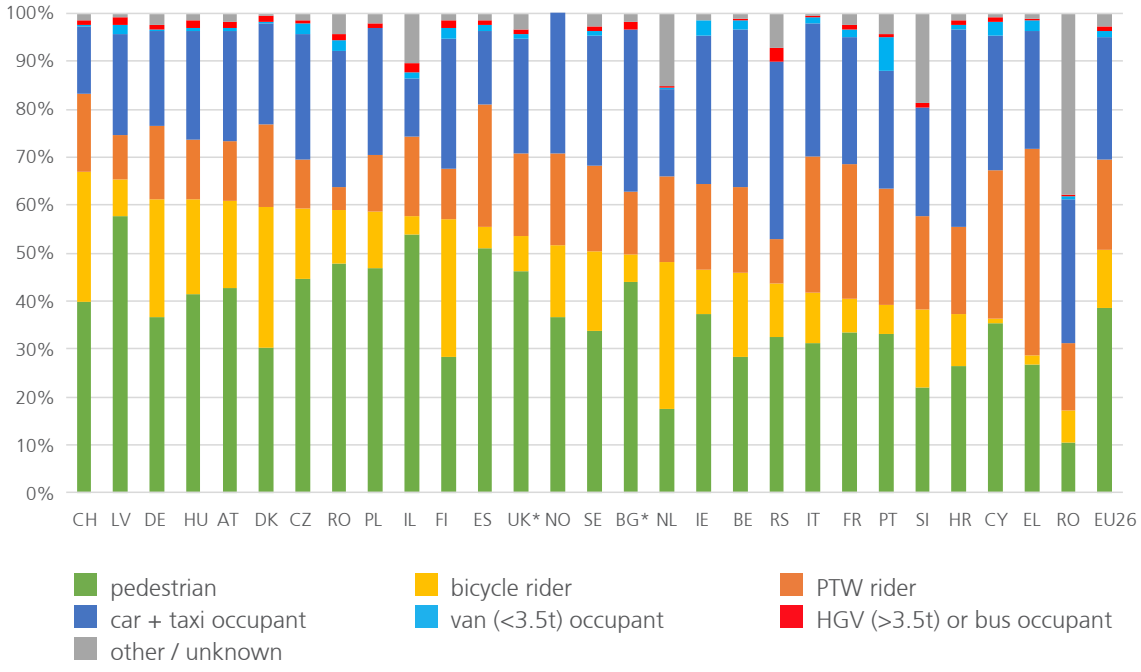
FINLAND:
62% OF VEHICLE OCCUPANT DEATHS IN URBAN AREAS ARE RELATED TO SPEEDING BY AT LEAST 10 KM/H ABOVE THE SPEED LIMIT; 55% OF KILLED CYCLISTS AND PEDESTRIANS ARE OVER 64 YEARS OLD

The number of road users killed on urban roads decreased by around 0.5% annually in Finland since 2010. A steeper decline in the future would require strong action on drink-driving, speeding and improving the safety of elderly pedestrians and cyclists.

In-depth accident investigations carried out over the period 2010-2017 in Finland reveal that 27% of all road deaths of vehicle occupants on urban roads are linked to drink-driving and 62% with speeding by at least 10 km/h over the limit. As many as 43% of all car occupant deaths in urban areas occurred when the driver was going at least 30 km/h above the speed limit.[24]

Killed pedestrians and cyclists in Finland are typically above 44 years old – they account for 80% of all pedestrian and cyclist deaths in urban areas, 55% of all killed pedestrians and cyclists on urban roads are above 64 years old.

Figure 8. Proportion of reported road deaths on urban roads by road user group, average years 2015-2017. Countries are ranked based on the proportion of pedestrian and cyclist deaths.
BG* – 2015;
UK* - 2015-2016.
EE, LU and MT are excluded from the figure due to relatively small numbers of road deaths. SK is excluded from the figure as the data are not available.



[22] European Commission, Eurobarometer (2013), Attitudes of Europeans Towards Urban Mobility, https://bit.ly/2TcEe0k
[23] Ibid
[24] Data provided by the PIN panellist based on in-depth accident investigation findings in Finland.

SPAIN

ELDERLY PEDESTRIANS ACCOUNT FOR 59% OF ALL PEDESTRIAN DEATHS IN URBAN AREAS

In total, vulnerable road users account for 81% of all road deaths on urban roads in Spain: 51% of those killed are pedestrians, 4% cyclists and 26% PTW riders. In 2017, 59% of all pedestrians killed on urban roads died in collisions with a car, and 53% of all pedestrians killed on urban roads were above 74 years old. Out of all motorcyclists deaths that occurred in 2017, 43% were single motorcycle collisions without any other vehicle or pedestrian involved.

GREECE

19% OF ALL REGISTERED VEHICLES ARE MOTORCYCLES

43% of all road user deaths on urban roads in Greece are PTW riders: 38% are motorcyclists and 5% moped riders. The high proportion of PTW rider deaths on urban roads is partially due to high modal share of PTWs. 19% of all registered vehicles in Greece in 2018 were motorcycles, mopeds are not included in the vehicle registry.

CYPRUS

A HIGH LEVEL OF TRAFFIC LAW VIOLATIONS LEADS, IN PARTICULAR, TO DEATHS OF PTW RIDERS

PTW riders account for 31% of all road deaths in urban areas in Cyprus.

"Mopeds are widely used on urban roads by young and inexperienced people who are mostly students or delivery service providers. Most of the young moped users ride with a learners licence and they lack proper training. The use of safety helmets is not as widespread as desired and often helmets are used they are not properly strapped."

"Moreover, a culture of respect to PTW riders is lacking among other vehicle drivers. Significant speed limit violation or inappropriate driving speeds by car drivers, motorcycle riders and occasionally moped riders contribute to the high toll. High level of other traffic code violations by all road users on urban roads, including extensive illegal parking which hinders visibility, or parking on the wrong side of the street, is another problem."

"Notwithstanding the above, an in-depth study is required to provide evidence for the actual reasons for the large number of PTW deaths in Cyprus."
George Morfakis, Road Safety Expert, Cyprus

ITALY

IN-DEPTH RESEARCH HIGHLIGHTS KEY RISKS RELATED TO MOTORCYCLE RIDER SAFETY IN ROME

28% of all road deaths in urban areas in Italy are PTW riders – 24% are motorcyclists and 4% moped riders.

The number of motorcycle riders is growing in Italy. The motorcycle fleet increased by 3.6% since 2015 and by 7.5% since 2010 while the number of registered mopeds remains stable. There is one motorcycle per every nine inhabitants and one PTW per every seven inhabitants if mopeds are included. 36% of all motorcycles are registered in the main cities (provincial capitals) meaning there is one motorcycle for every 7.4 inhabitants.

Although active mobility is on the rise in urban centres, as many as 85% of journeys in cities in 2017 were made by private motor vehicles of which trips by PTWs accounted for 9% of journeys in large cities (250,000 inhabitants) and 4% in medium-sized cities (50,000 - 250,000 inhabitants) in Italy.

In-depth research carried out by ACI - Fondazione Caracciolo on PTW safety in Rome highlights the need for coordinated road safety actions on vehicles, infrastructure and rider behaviour.[25]

[25] Automobile Club d'Italia, Fondazione Filippo Caracciolo (2018), La sicurezza stradale della capitale delle due route, https://bit.ly/2V7ewvs

About 70% of motorcycles registered in Italy are more than 10 years old and do not have safety systems such as anti-lock braking (ABS), which is highly effective in reducing certain types of motorcycle collisions.[26]

Lack of road maintenance, in particular the presence of potholes and manholes, is identified as a major risk factor by almost all motorcyclists in Rome.[27]

Moreover, riders tend to underestimate the importance of protective equipment. Whilst helmet wearing rates are 99%, 67% use open helmets. Based on a road user attitude survey, 44% of respondents do not use protective gloves - or use them only occasionally, 75% do not wear a jacket, 93% do not wear boots and trousers.

Motorcycle riders in Rome commonly exceed the speed limits, have a habit of crossing continuous lines, zigzagging through the traffic, and going through amber traffic lights. In addition, one in four motorcyclists admit to using a smartphone whilst riding. Three out of four motorcyclists recognise the need for improved rider training to obtain a driving license.[28]

[26] Automobile Club d'Italia, Fondazione Filippo Caracciolo (2018), La sicurezza stradale della capitale delle due route, https://bit.ly/2V7ewvs
[27] Ibid
[28] Ibid

PART II

100,000

People seriously injured in 2017 in urban areas - of which at least 70% were vulnerable road users

02

The new EU strategic action plan for road safety for 2030 includes the first EU target for reducing serious road traffic injuries by 50% between 2020 and 2030.[29] The announcement followed the adoption of the Valletta declaration in 2017 by EU transport ministers who formally called for an EU-wide serious injury reduction target.[30]

There is a higher level of underreporting of collisions involving pedestrians, cyclists and PTW riders

Over 100,000 people were seriously injured on urban roads in the EU21[31], accounting for over 50% of all serious road traffic injuries. At least 70% of the victims are vulnerable road users: 25% are pedestrians, 23% cyclists and 22% PTW riders. However, it is known that there is a higher level of underreporting of collisions involving pedestrians, cyclists and PTW riders. New measures are needed urgently as the progress in reducing serious road traffic injuries on urban roads has largely stalled since the beginning of the decade.

2.1 LACK OF PROGRESS IN REDUCING REPORTED SERIOUS ROAD TRAFFIC INJURIES ON URBAN ROADS

The numbers of seriously injured according to the MAIS3+ definition[32] are not available for all countries, and are often not broken down by road types. This is a consequence of the fact that these data are based on hospital records and those records usually do not contain information on the location of a collision.

It is also not possible to compare the number of seriously injured between PIN countries according to national definitions of serious injury, as both the definitions and the levels of reporting vary widely. In most of the PIN countries, serious road injuries based on the national definition are recorded by the police.

Sample studies have shown that the actual number of serious injuries is often considerably higher than the officially recorded number based on police reports, especially for vulnerable road users. In general, the lower the injury severity, the higher the underreporting in police accident statistics tends to be.[33]

Our comparison therefore takes as a starting point the average annual change in the number of seriously injured on urban roads since 2010 according to the national definitions of serious injuries (Fig.9). Doing so implies that we accept the possibility that these changes are partly due to reporting rate changes. National definitions supplied by PIN panellists are available in the annexes.

The number of recorded serious road traffic injuries on urban roads decreased in 15 out of 23 countries that could provide data (Fig.9). However, in the EU21 the annual progress in reducing serious injuries on urban roads has been just 0.6% since 2010, compared to a 2.2% annual reduction in the number of road deaths on those roads.

Recorded serious road traffic injuries were reduced on average by 6% annually in Cyprus and around 3% in the Czech Republic, Serbia, Denmark and Croatia. Greece has seen a 12% annual reduction in the number of recorded serious injuries since 2010 which might be attributed to serious road traffic injury recording rates.

Serious road traffic injuries increased by on average 10% annually in Norway, 5% in Israel and 1% in Spain and Hungary.

[29] Communication from the Commission, Europe on the Move, Sustainable Mobility for Europe: safe, connected, and clean, https://goo.gl/cEL1Cr
[30] ETSC (2018), 12th PIN annual report, Ranking EU progress on improving road safety, https://goo.gl/eZxyTv

[31] In 21EU countries that collect data.
[32] The Maximum Abbreviated Injury Scale (MAIS) is a globally accepted and widely used trauma scale used by medical professionals. The injury score is determined at the hospital with the help of a detailed classification key. The score ranges from 1 to 6, with levels 3 to 6 considered as serious injuries in the EU.
[33] Ibid

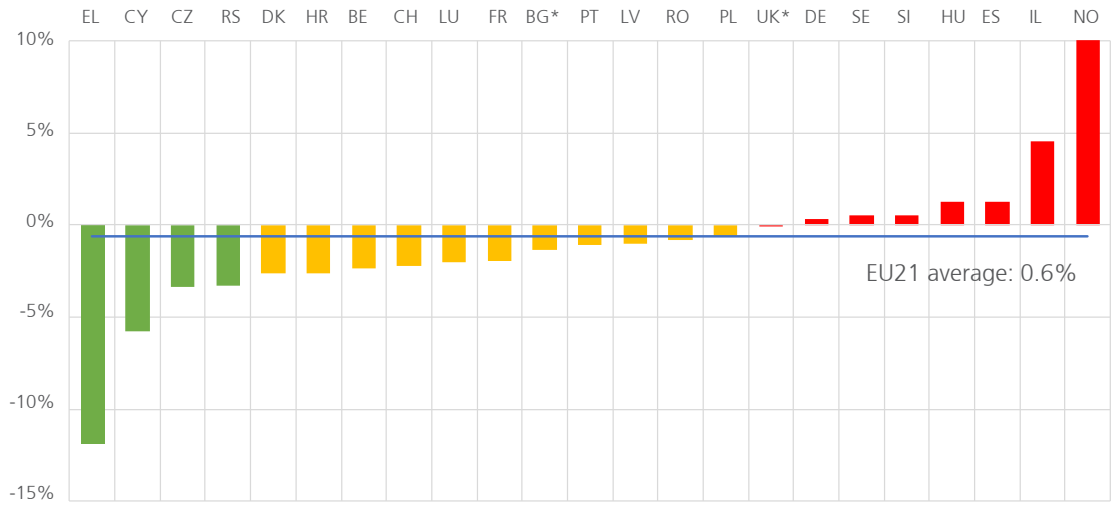


Figure 9. Average annual change in the reported number of seriously injured on urban roads over the period 2010-2017 based on national definitions of a serious injury.[32] UK* - 2008-2016. Substantial changes in the reporting system were introduced in AT in 2012 and in IE in 2014, therefore AT and IE are excluded from the figure. Numbers of serious injuries from AT and IE are included in the EU average. EU countries using a definition of seriously injured similar to having injuries requiring at least one night in hospital as an in-patient: BE, CY, DE, EE, ES, FR, EL, LV, LU, PT, UK, CH, IL. EE, FI, IT, LT, MT, NL and SK are excluded from the figure due to insufficient data.

INDICATOR: SERIOUS INJURIES

In spring 2016, the European Commission, for the first time, published an estimate for the number of people seriously injured on Europe's roads: 135,000 in 2014. This move required the adoption by all EU Member States of a common definition of what constitutes a serious road injury, i.e. an in-patient with an injury level of MAIS 3 or more[33] Only a few countries have MAIS 3+ data for earlier years or by road user, therefore Member States should also continue collecting data based on their previous definitions so as to be able to monitor rates of progress at least until these rates of progress can be compared with those under the new definition.

The number of seriously injured road users, based on national definition, were supplied by the European Commission from its CARE database upon ETSC's request and complemented if needed by the PIN panellists.

Serious injury definitions are provided in the Annexes. Fourteen countries (BE, CY, DE, EE, ES, FR, EL, IE, LV, LU, PT, UK, CH, IL) use similar definitions for serious injuries: spending at least one night in hospital as an in-patient or a close variant of this. In practice, however, in most European countries, there is unfortunately no standardised communication between police and hospitals and the qualification of injuries as "serious" is often made by the police.

Within each country using police records, a wide range of injuries are categorised by the police as serious under the applicable definition. They range from lifelong disability with severe damage to the brain or other vital parts of the body to injuries whose treatment takes only a few days and which have no longer-term consequences.

2.2 PROGRESS IN REDUCING SERIOUS ROAD TRAFFIC INJURIES ON URBAN ROADS IS SLOWER COMPARED TO PROGRESS ON RURAL NON-MOTORWAY ROADS

On average in the 21 EU countries that provided data, serious injuries on urban roads decreased by just 2% since 2010 compared to 7% on rural roads (Fig.10).

The number of seriously injured has decreased on average by 0.6% every year compared to the 1.1% reduction on rural roads since 2010, i.e. an average difference of 0.5 percentage points (Fig.11).

In 15 out of 23 PIN countries that could provide data, the progress in reducing serious road traffic injuries on urban roads was slower than the progress on rural roads (Fig.11).

[32] The average annual decrease is based on the entire time series of all the eight annual numbers of road deaths on urban roads between 2010 and 2017, and estimates the average exponential trend. For more information on methodology: methodological note, PIN Flash 6: https://bit.ly/2LVVUtY

[33] The Maximum Abbreviated Injury Scale (MAIS) is a globally accepted and widely used trauma scale used by medical professionals. The injury score is determined at the hospital with the help of a detailed classification key. The score ranges from 1 to 6, with levels 3 to 6 considered as serious injuries in the EU.

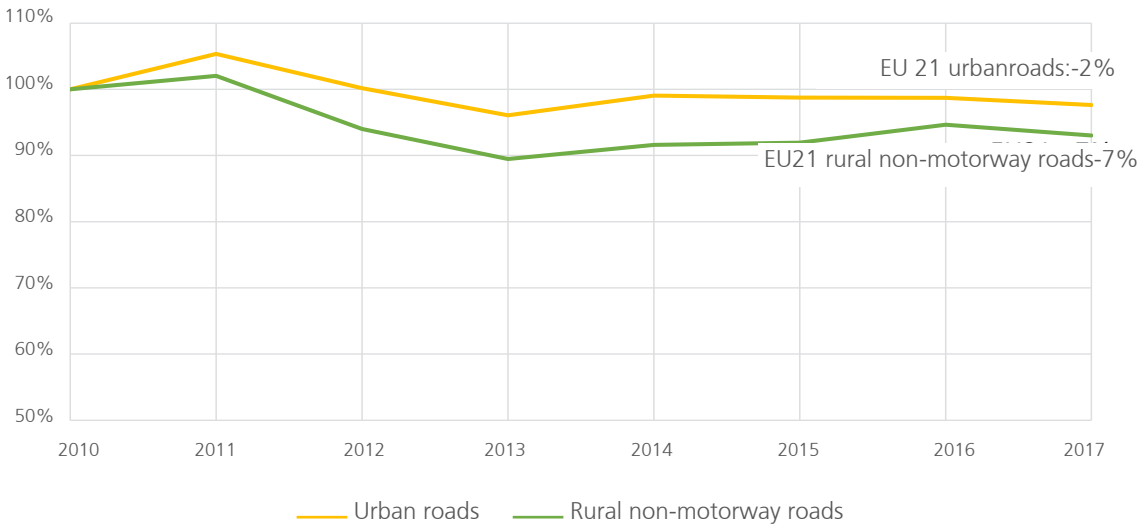


Figure 10. Progress in reducing in the number of recorded serious injuries on urban roads and rural non-motorway roads for comparison in the 21 EU countries for which data are available. EE, FI, IT, LT, MT, NL and SK are excluded from the EU average due to insufficient data. Note: data on serious injuries on motorways were not requested and are therefore not included in the figure.

In four out of 23 PIN countries, the progress in reducing serious road traffic injuries was slightly faster than the progress in reducing serious road traffic injuries on rural roads. Serious injuries were reduced by around 1% faster annually on urban roads compared to rural roads in France, Greece, Romania and the UK.

In Serbia, reported serious injuries on urban roads were reduced by 7% faster annually compared to rural roads since 2010.

In Sweden, serious road traffic injuries on urban roads increased by 0.5% annually and serious injuries on rural road increased by 1.6% annually creating a one percentage point difference presented in Fig.11.

In the UK, the progress in reducing recorded serious injuries stagnated on urban roads while recorded serious injuries on rural roads have decreased on average by 0.6% annually, creating a 0.6 percentage points difference.

In Norway, serious road traffic injuries on urban roads increased by 10% annually and serious injuries on rural roads decreased by 8% annually creating an 18 percentage points difference.

In Spain, recorded serious road traffic injuries on urban roads increased by 1.3% annually while serious injuries on rural roads decreased on average by 7% annually creating an 8 percentage point difference.

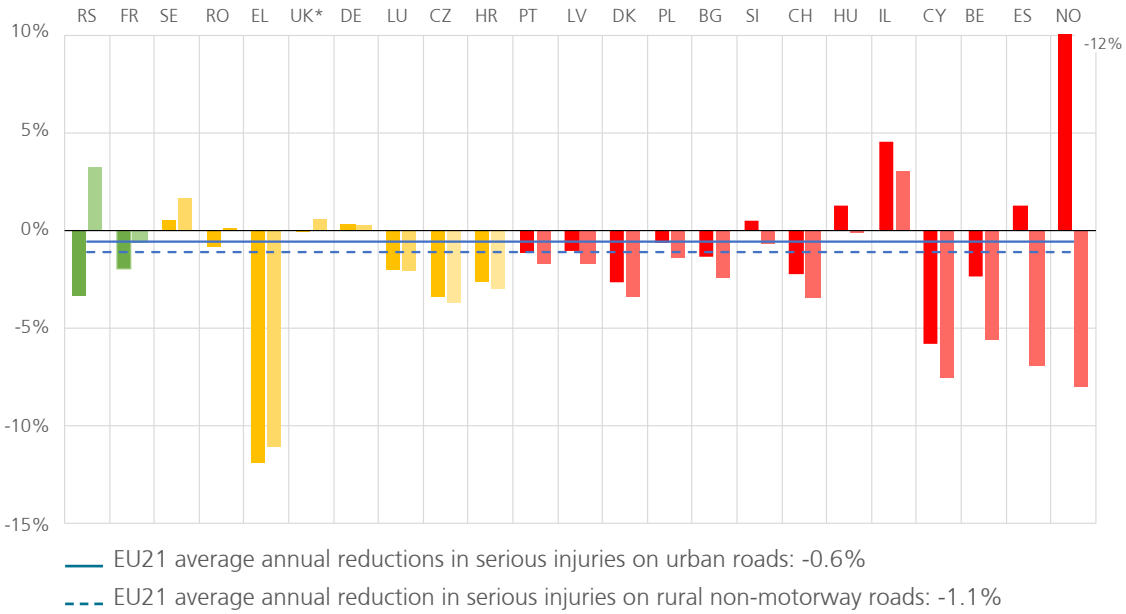


Figure 11. Average annual reduction in the number of reported serious road traffic injuries on urban roads (first country column) and the annual reduction in the number of reported serious road traffic injuries on rural non-motorway roads (second country column) for comparison over the period 2010-2017. Countries are ranked and the colour codes are applied based on the amount by which the annual average percentage reduction in serious injuries on urban roads exceeds the corresponding reduction on rural non-motorway roads. UK* - 2008-2016. Substantial changes in reporting system were introduced in AT in 2012 and in IE in 2014, therefore AT and IE are excluded from the figure. Numbers of serious injuries from AT and IE are included in the EU average. BE, CY, DE, EE, ES, FR, EL, LV, LU, PT, UK, CH, IL.
EE, FI, IT, LT, MT, NL and SK are excluded from the figure due to insufficient data. EU countries using a definition of seriously injured similar to having injuries requiring at least one night in a hospital as an in-patient: BE, CY, DE, EE, ES, FR, EL, IE, LV, LU, PT, UK, CH, IL.

2.3 AT LEAST 70% OF THOSE SERIOUSLY INJURED ON URBAN ROADS ARE VULNERABLE ROAD USERS

On urban roads in the EU, 70% of all those recorded as seriously injured are vulnerable road users: 25% are pedestrians, 23% cyclists and 22% PTW riders (Fig.12). Car occupants account for 23% of all serious injuries in urban areas.

For comparison, vulnerable road users account for 35% of all serious injuries on rural roads, the largest proportion being PTW riders (22%). With 58%, car occupants account for the majority of those seriously injured on rural roads.

Fig.13 shows the proportion of recorded serious road traffic injuries by road user group based on the national definition of different PIN countries. However, fig.13 should be interpreted with caution. The level of serious road traffic injury reporting tends to be lower for pedestrians, cyclists and PTW users than for vehicle occupants. This is especially the case when no motor vehicle is involved in a collision. Underreporting also occurs when a collision between one motor vehicle and a vulnerable road user does not result in the immediate death

Figure 12. Proportion of serious road traffic injuries by road user group on urban roads and rural-non motorway roads (for comparison) in the EU, average years 2015-2017. Serious injury data are based on national definitions. BG, EE, IT, and SK are excluded from the EU average due to insufficient data.

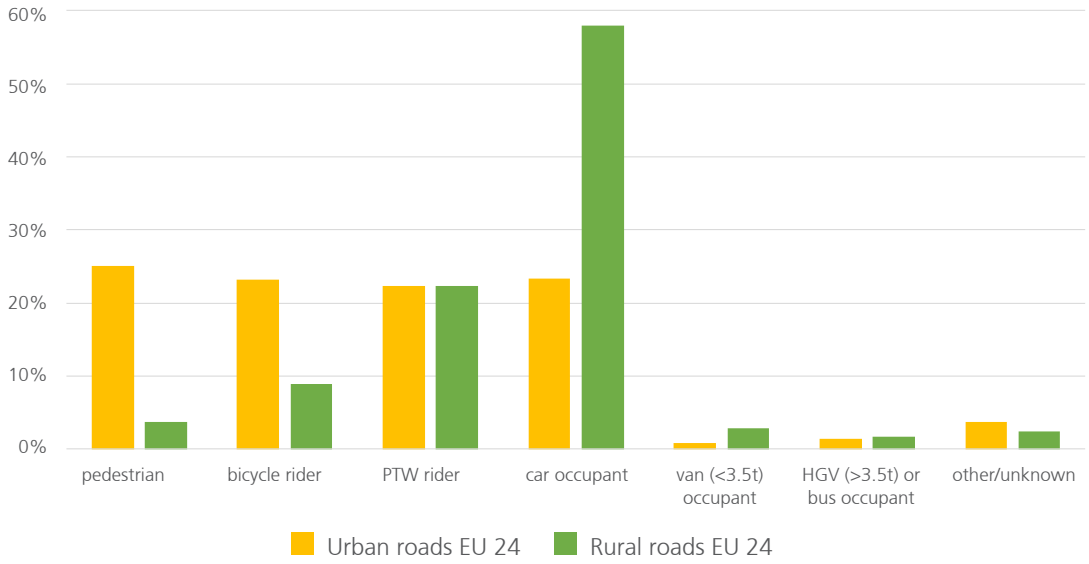
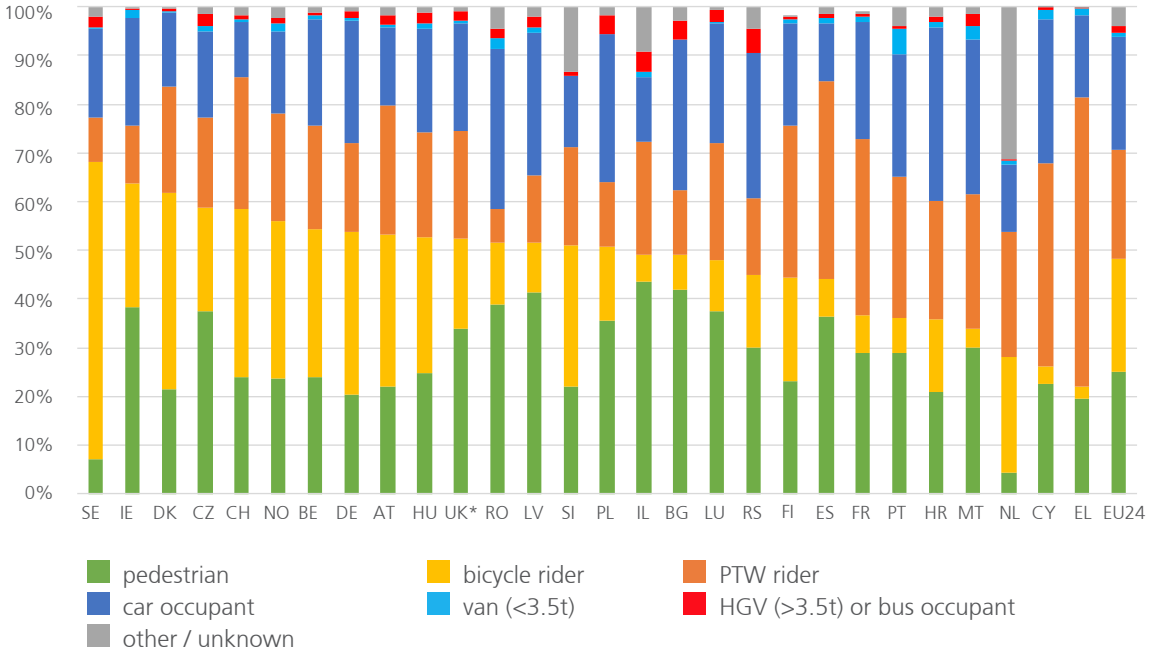


Figure 13. Proportion of serious road traffic injuries on urban roads by road user group, average for years 2015-2017 ranked based on the proportion of serious injuries of pedestrians and cyclists. Serious injury data are based on national definitions. BG – 2015; UK* - 2015-2016. BG, EE, IT and SK are excluded from the figure and the EU average as the data are not available. Countries are ranked by proportion of serious injuries of pedestrians. LT is excluded from the figure due to insufficient data.



of a victim. In such cases, the driver involved or eyewitnesses call the emergency services but not necessarily the police. Single vehicle collisions with no other road users involved may also be underreported. As active modes of transport are being encouraged, the number of collisions involving vulnerable road users and resulting in serious injuries might be increasing.

Pedestrians account for 44% of all seriously injured on urban roads in Israel, 42% in Bulgaria, 41% in Latvia and 39% in Romania.

Pedestrians account for just 7% of all recorded serious injuries in Sweden, cyclists for as many as 61%. In Sweden, both police and hospitals record serious road traffic injuries. Hospital records are used in Fig.13. Serious injuries sustained in single bicycle collisions, which comprise a substantial part of cyclist injuries, are more likely to be recorded by hospitals where the injuries are treated. Injuries sustained in single bicycle collisions are likely to be underreported in countries using data recorded by the police.

According to a 2016 study made on behalf of the European Commission, from 82 to 93% of severe cyclist and pedestrian injuries occur in urban areas on roads with a speed limit of 50 km/h. In most countries, intersections are, in 39% to 61% of cases, found to be the common kind of location where cyclists are severely injured.[36]

[36] SWOV, Loughborough University, BASt (2016), Study on Serious Road Traffic Injuries in the EU, https://bit.ly/2Uy4AKn

PART III

HOW TO IMPROVE **URBAN ROAD SAFETY?**

03

3.1 MANAGEMENT

3.1.1 Road safety - a critical prerequisite in sustainable urban mobility planning

Since the adoption of the European Commission's Urban Mobility Package in 2013, the Sustainable Urban Mobility Plan (SUMP) concept has been promoted as a strategic planning instrument for local authorities. The European Commission is currently updating the SUMP guidelines to identify emerging needs to improve the existing guidelines.[37]

The aim of the original package was to foster a balanced development and integration of all transport modes and create harmonised transport options, whilst encouraging a shift towards more sustainable modes and improving transport accessibility for all.[38] The guidelines highlight that SUMPs contribute to reaching the European climate and energy targets, but do not mention the EU target of halving the number of road deaths.[39] Road safety was included in a non-binding annex of the proposal for the "Concept for Sustainable Urban Mobility Plans"[40] as a horizontal issue. That was a missed opportunity.

Sustainable urban mobility plans should be closely linked with road safety priorities.

Sustainable urban mobility plans should be closely linked with road safety priorities and improvements are needed to ensure that this is the case in all European cities and towns that have adopted SUMPs. Including road safety in all the steps of a planning and implementation cycle would ensure that the main road safety problems and the key stakeholders necessary to tackle them are identified.

Road safety should be considered as an essential component in the updated SUMP guidelines, due for publication in autumn 2019. In attempting to secure change in urban mobility patterns, road safety should be regarded as a critical challenge. Real and perceived safety has a profound effect on modal choice especially in terms of the most sustainable modes of travel - walking and cycling and the ability to access public transport. It is important to recognise that safer roads also mean more sustainable roads. If groups of road users are deterred from using unsafe roads, they might shift to other less sustainable modes of transport.

Safety fears are a major barrier to the uptake of cycling. A Eurobarometer survey shows that 73% of European citizens consider road safety to be a serious problem in cities.[41] A survey in London showed that 59% of potential cyclists cited safety concerns as a key barrier preventing them from cycling.[42] Traffic safety was also the main barrier to taking up cycling identified in a recent survey undertaken in nine European cities.[43]

It is vital that road safety is integrated as a main issue in the common vision of mobility. This vision should have vulnerable road users as a focus. Meeting the demands of the most vulnerable road users – the elderly, children and people with reduced mobility – will not only help to achieve the highest safety standards but also help all road users to profit from a much safer urban environment.

Urban mobility is a story of conflicting demands. One needs a policy that would address multiple demands, and at the same time would encourage cycling and walking. Almost half of all car trips in urban areas in the EU are over distances shorter than 5 km and many of these can be replaced by walking or cycling.[44]

As a recent OECD report concluded, modal shift away from private motor vehicles could significantly improve road safety in dense urban areas.[45] Making active travel an attractive and safe alternative to motorised transport will result

[37] Civitas, SUMPS-UP, SUMPs status report (2018), https://goo.gl/MeFBnD
[38] European Commission (2013), Guidelines, Developing and implementing a sustainable urban mobility plan, https://goo.gl/WtJ5oL
[39] Ibid
[40] European Commission (2013) Annex: A Concept for Sustainable Urban Mobility Plans to the EC, Communication: Together towards competitive and resource-efficient urban mobility, https://bit.ly/2fBNZR6
[41] European Commission (2013), Attitudes of Europeans Towards Urban Mobility, https://bit.ly/1fPbjlQ
[42] Transport for London (2014) Attitudes to Cycling Report http://goo.gl/pjNdJd
[43] SWOV, VIAS, TOI, TU Dresden and POLIS, (2019) Stimulating safe walking and cycling within a multimodal transport environment, in preparation.
[44] European Commission, Clean transport, urban transport, https://bit.ly/2I77OOO
[45] OECD- ITF (2019), Road Safety in European Cities, https://www.itf-oecd.org/road-safety-european-cities

in decreased traffic noise, CO_2 emissions (and sea level rise), pollution and congestion in urban areas and at the same time improve health and quality of life. Such a policy requires taking road space from motorised traffic and transforming it into space to facilitate walking and cycling.

3.1.2 Potential for cities to become road safety champions

Cities have the potential to become road safety frontrunners, going beyond national or EU legislation and actions on road safety by adopting and implementing local road safety strategies and vision. Setting ambitious local targets and applying public procurement rules to require safer vehicle fleets to be used by contractors (e.g. waste trucks, public transport buses) are two examples of good initiatives already being undertaken.

At the beginning of this decade the UK abandoned road safety targets in its Strategic Framework for Road Safety, while London has set its own road safety targets, adopted an action plan and ambitious vehicle safety regulations applicable to public transport buses and heavy goods vehicles circulating in the city.

Targets motivate local stakeholders to act and help those responsible for the road transport system to be accountable for achieving defined results. This can include specific targets for the reduction of the number of road deaths and serious injuries, indicator targets (e.g. the proportion of vehicles driving within the speed limit) and road user perception surveys (e.g. whether people feel safe while using different modes of transport).

Just like at the national level, at a city or town level a road safety strategy and action plan with a dedicated budget and collaboration between different departments and stakeholders can help a lot to achieve high levels of road safety. It is therefore important to organise clear institutional roles and responsibilities and coordination between all relevant stakeholders, from municipal institutions, road user representatives, police, emergency services to the responsible authorities at a national level.Political leadership is essential to coordinate different administrations and to mobilise the public budgets necessary for the implementation of the action plan.

Providing safe mobility in particular to vulnerable road users presents a major challenge - a challenge which has been taken up strongly by authorities in a number of cities and towns, and particularly vigorously by some mayors.

3.1.3 Funds for improving urban road safety

3.1.3.1 National funds

Effective road safety work requires appropriate and stable funding. Local authorities should dedicate funds for road safety from their budgets for the implementation of SUMPs and their local road safety plans. Additional funding opportunities should also be made available from central government and EU funds.

The PIN panellists have provided several examples of how central governments fund road safety work at the municipal level. This can be done by launching projects targeting specific road user group safety, specific infrastructure or enforcement measures, sharing costs of infrastructure safety improvements between the central government and municipalities, allocating part of the money collected from automated traffic law enforcement activities, or from motorised vehicle insurance payments to municipalities' work on road safety.

In Cyprus, the Ministry of Transport, Communications and Works, allocates funding for traffic calming measures, road safety improvements and safety camera implementation on urban roads.

In 2018 and 2019, the Estonian government launched a project to improve road safety for vulnerable road users in the four largest municipalities (Tallinn, Tartu, Narva and Pärnu) providing an opportunity for these municipalities to apply for grants to reconstruct pedestrian crossings on main streets.

The Finnish Transport and Communications Agency Traficom manages state aid for road safety purposes which is part of the national budget. The state aid funds are collected from a traffic safety fee that applies to motorised

vehicle insurance payments. 1% of the annual insurance fee is dedicated to improving road safety. A major part of the fund is invested in the national road safety work. However, municipalities as well as other entities can apply to receive funding for local road safety projects. So far, the aid for local projects has been used for safety evaluation of pedestrian and cycling infrastructure near schools as well as initiatives on improving the safety of trips to schools.

In France and Serbia, part of the funds collected from enforcement by automated safety cameras is allocated to local authorities for their road safety work. According to Serbian law, 30% of the funds collected from fines goes to local governments on whose territory the offences were committed. The local governments must spend 50% of the funds on improving road infrastructure.

In Slovenia, according to national law, investments in urban infrastructure are shared between the central government and the municipalities. The central government invests in the national roads crossing urban areas while pedestrian and cyclist infrastructure developments along these roads are covered by municipal budgets. This way, municipalities are encouraged to plan infrastructure developments simultaneously with the central government.

In Sweden, local authorities are given national financial support for improving cycling and public transport infrastructure, the current annual budget is around € 100 million.

In Switzerland, the Federal State supports urban projects that enable cantons and municipalities to coordinate transport and urbanisation developments, and to plan investments in transport infrastructure jointly. Some transport projects are supported with federal contributions of between 30 to 50% of the total investment costs. Some projects related to pedestrian and cycling infrastructure can only be carried out because of the federal government contribution.

3.1.3.2 EU funds

Recently, the European Commission launched a "Safe Transport Platform – Road Safety Advisory" to promote safety as a key element for transport investment, and to provide technical or financial advice for potential applicants who have ideas for the projects but face difficulties in finding information on appropriate EU funding or EU financial instruments. The advisory support addresses the public and private sector. Examples of eligible projects include traffic calming measures, facilities for cyclists and pedestrians and – on an experimental basis – measures to improve the safety of vehicle fleets (e.g. pooled procurement of safe public transport buses).[46]

The European Regional Development funds provide an opportunity for cities and towns to apply for financial support in developing urban transport, as well as cycling and pedestrian infrastructure. Under the current financial framework 2014-2020, € 70.1 billion are dedicated for regional investment to transport, of which € 12.7 billion for urban transport and € 2 billion for walking and cycling infrastructure. The budgets have increased compared to the financial framework 2007-2013 when € 8.1 billion were allocated for urban transport and € 0.7 billion for pedestrian and cycling infrastructure.[47] Cities and towns should actively apply for EU funds to improve urban road safety as the available funds from the current budgetary framework 2014-2020 are not yet fully exhausted.

Some cities and towns are using the financial support opportunities provided by the EU, including the Polish city of Jeworzno described below. More cities and towns across the EU should follow this example.

[46] European Commission (2019), Safer Transport Platform: European Investment Bank and European Commission join forces to support investment in transport safety with special focus on roads, https://bit.ly/2CRsAxN, European investment advisory hub, https://bit.ly/2uBIoQ

[47] Vincent Leiner, European Commission, PPT presentation, More walking and cycling please: Growing Active mobility Through EU Funds.

RECOMMENDATIONS TO CITIES AND TOWNS

- Adopt a local road safety strategy based on the Safe System approach and set road safety targets.
- Adopt and promote a policy of modal priority for road users, the hierarchy being based on safety, vulnerability and sustainability. Walking should be at the top of the hierarchy, followed by cycling and use of public transport.[48]
- Relate road safety objectives to other policy objectives for the city.
- Include road safety as an essential component in developing and implementing Sustainable Urban Mobility Plans (SUMPs). Prioritise the safety of pedestrians and cyclists.
- Involve road safety experts in preparation and implementation of SUMPs.
- Encourage all professional sectors (such as NGOs, private companies) to help achieve the road safety objectives.
- Integrate safety not only into the Sustainable Urban Mobility Plans but also common targets.[49]
- Urgently apply to use the remaining funds from the EU's 2014-2020 budget for improving urban road infrastructure safety.

RECOMMENDATIONS TO MEMBER STATES

- Involve city representatives in the setting up of national road safety strategies, road safety targets and their implementation.
- Design and implement walking and cycling safety strategies which include targets and infrastructural measures to improve safety of cyclists and promote cycling. Nominate ambassadors and set up centres of excellence for knowledge sharing at national level.
- Earmark national funds for improving urban road safety.
- Prioritise improving urban road safety with priority for VRUs in the "sectoral operational" programs for the next funding period and encourage the cities to make use of the funds.
- Enable cities to act by providing expertees and a framework legislation that aids all actors to implement road safety measures at local level.
- Prepare national enforcement plans with yearly targets for compliance in the areas of speeding, including targets in urban areas, where there are high numbers of pedestrians and cyclists.
- Enable cities to act by providing expertees and a framework legislation that aids all actors to implement road safety measures at local level.
- Tackle high levels of underreporting in pedestrian and cyclist deaths and injuries.

RECOMMENDATIONS TO EU INSTITUTIONS

- Integrate road safety and EU road safety targets into the Guidelines of Sustainable Urban Mobility Plans (SUMPs).[50]
- Recognise the synergies and benefits to road safety in preparing EU guidelines on urban access and on urban logistics.
- Within the context of the Urban Mobility Action Plan, draft guidelines for promoting best practice in traffic calming measures, based upon physical measures and techniques of space-sharing in line with Connected Intelligent Transport Systems developments, to support area-wide urban safety management, in particular when 30km/h zones are introduced.[51]
- Set up a mechanism to monitor and promote best practice in the takeup of road safety as a horizontal issue within SUMPs.[52]
- Create a mechanism for co-operation between the Member State Expert Group on Urban Mobility and the High Level Group on Road Safety.[53]
- Encourage EU Member States in identifying national representatives in the Member State Expert Group on Urban Mobility with knowledge on road safety and better engage city representatives in work on road safety.[54]
- Channel EU funds for urban mobility into support for increasing the safety of pedestrians and cyclists as a priority.[55]
- Create an indicator for the reporting of use of EU funds on improving urban road safety.
- Apply conditionality for compliance with road safety infrastructure legislation in all use of EU funds.
- Dedicate funds for road safety research and involve cities as partners.

[48] ETSC (2016), Position paper, A Proposal for a strategy to reduce the number of people seriously injured on EU roads, https://goo.gl/DWbTFv
[49] Ibid
[50] Ibid
[51] Ibid
[52] Ibid
[53] ETSC (2014), Integrating safety into the EU's urban transport policy. ETSC's reponse to the EC's Urban Mobility package, https://bit.ly/2I7J1dQ
[54] Ibid
[55] ETSC (2018), Briefing: 5th EU Road Safety Action Programme 2020-2030, https://bit.ly/2LuTDBW

3.1.4 Examples on road safety management

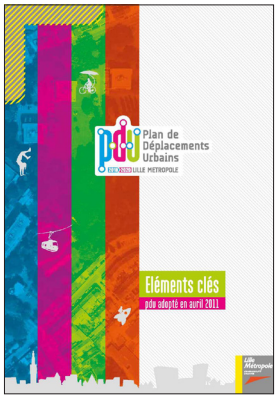
FRANCE

ROAD SAFETY AMONG THE KEY PRIORITIES IN URBAN MOBILITY PLANS, ROAD SAFETY WORK PARTIALLY FUNDED BY THE MONEY COLLECTED FROM TICKETS OF AUTOMATED CAMERAS

In 1996, the French Air Quality Act made Urban Mobility Plans (PDUs – Plan de déplacements urbains) mandatory for municipalities of more than 100,000 people.[56] Currently there are 60 such municipalities and they are home to half of the French population. A PDU covers the area under the jurisdiction of the Urban Transport Authority and generally involves more than one municipality. Smaller municipalities are encouraged to adopt PDUs on a voluntary basis.[57]

The PDUs are built around a number of major strategic objectives, including promotion of less polluting and more energy-efficient transport and coordination between different modes of transport. To achieve these objectives, three major interconnected areas are incorporated: improving road safety, environmental protection and access to transport for people with reduced mobility.[58]

Road safety in PDUs was indicated as one of the major objectives set by the French Solidarity and Urban Renewal Act in 2000



Road safety in PDUs was indicated as one of the major objectives set by the French Solidarity and Urban Renewal Act in 2000. It foresees that PDUs should include measures to improve safety for the most vulnerable road users, in particular by monitoring collisions involving pedestrians and cyclists and by developing road safety observatories at municipal level.[59]

PDUs often reflect national targets for reducing the number of road deaths but, can also be more ambitious. The urban community of Lille has set itself the target of zero vulnerable users killed or seriously injured by 2020.[60]

Road safety work by local authorities is partially funded by the money collected from safety camera ticket fines.

PORTUGAL

INVOLVEMENT OF ROAD SAFETY EXPERTS TO PROPERLY INTEGRATE ROAD SAFETY IN SUMPS IS NEEDED

"According to the Portuguese manual for Sustainable Urban Mobility Plans (SUMPs), road safety is one of the areas to be integrated. In practice, road safety problems are not always sufficiently addressed in SUMPs. Actual participation of road safety experts in preparing and implementing SUMPs is rare, resulting in deficient identification of road safety problems, weak assessments of the safety impact of proposed mobility measures and the absence of SMART (Specific; Measurable; Achievable; Realistic and Time bound) road safety objectives."

João Cardoso, National Laboratory of Civil Engineering (LNEC), Portugal

POLAND

THE TOWN OF JAWORZNO IMPROVED ROAD SAFETY USING EU FUNDS

Home of 90,000 inhabitants, the town of Jaworzno, in the south of Poland, did not have a road death for two and half years. Unfortunately, four deaths occurred in 2018.

Since 2007, improvements to road infrastructure design have been gradually introduced to an estimated 30% of all the city network, for a total budget of about € 115-140 million. 26% of the invested amount was supported by the EU Regional Development and Cohesion funds, 46% by various funds available from the national budget and the remaining amount was covered by the municipality budget.

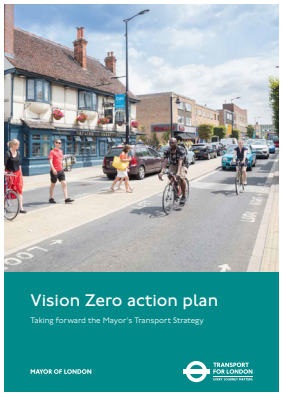
[56] Certu (2012), Mobility and transport, Tools and Methods, PDU: the French urban mobility plan, Integrating transport policies, https://bit.ly/2U1xlui
[57] Ibid
[58] Ibid
[59] Ibid
[60] Ibid

The town's streets were narrowed, traffic calming measures installed and 30 km/h zones created. Through traffic going through the city was redirected. At the beginning of 2018, about 30% of all the town's streets were reconstructed. As a result, the amount of trips by cars decreased by 31%. 32% of all the trips within the town are now done by walking and 28% by cycling.

LONDON'S VISION ZERO

LOWER SPEED LIMITS, IMPROVED ROAD INFRASTRUCTURE, SAFETY STANDARDS FOR HEAVY GOODS VEHICLES AND PUBLIC TRANSPORT BUSES

In 2018, the Mayor of London, Transport for London (TfL) and the Metropolitan Police Service (MPS) published London's first "Vision Zero" action plan



In 2018, the Mayor of London, Transport for London (TfL) and the Metropolitan Police Service (MPS) published London's first "Vision Zero" action plan.[61] Each year over 2000 people are killed or seriously injured on London's roads, 80% of them are vulnerable road users.[62]

London set the interim targets to reduce the number of road deaths and serious injuries by 65% on the city's roads and to reduce the number of people killed or seriously injured by London buses by 70% by 2020 against 2005-2009 levels.[63]

In addition to road safety targets, London also adopted a target to increase the proportion of people walking, cycling and taking public transport to 80% of all journeys by 2041 compared to 63% currently. A record 2.2 billion £ is being invested in streets across London to make them safer for walking and cycling and to improve the environment.[64]

The action plan includes the introduction of lower speed limits on TfL's road network, the transformation of dangerous junctions, new safety standards for the design of heavy goods vehicles, a comprehensive bus safety programme which requires Intelligent Speed Assistance and other safety technologies in public transport buses and a new training course for all drivers.[65]

London has already taken action to reduce speeds; and around a third of streets in London now has a 32 km/h (20 mph) speed limit. The Vision Zero action plan foresees the extension of the lower speed limit. Transport for London (TfL) proposes to make 32 km/h (20 mph) the new general speed limit on all TfL roads within the Congestion Charging Zone by 2020, prioritising the part of the capital with a high volume of vulnerable road users. The 32 km/h speed limit should be further extended to other town centres and high-risk locations across London by 2024. While the TfL Road Network makes up only 5% of London's roads, it carries one third of traffic and 37% of all road deaths occur on these roads.[66] To support the speed limit, streets will be redesigned and police enforcement activities intensified.[67]

TfL's "Direct Vision Standard" for heavy goods vehicles categorises HGVs depending on the level of a driver's direct vision from the vehicle cab. This scheme is due to be introduced in 2020 to increase visibility of vulnerable road

[61] Mayor of London, Transport for London, Vision Zero action plan, Taking forward the Mayor's Transport Strategy, https://bit.ly/2LwzPAR
[62] Ibid
[63] Ibid
[64] Ibid
[65] Mayor of London (2018), Mayor launches boldest ever plan to eliminate deaths on London's roads, https://bit.ly/2OeT4xh
[66] Mayor of London, Transport for London, Vision Zero action plan, Taking forward the Mayor's Transport Strategy, https://bit.ly/2LwzPAR
[67] Ibid

users. HGVs will be given a rating between zero-stars (lowest) and five-stars (highest), with only those HGVs rated three-stars and above, or which have comprehensive safety systems, able to operate in London from 2024.[68]

SAFER CITY STREETS

is a global traffic safety network of liveable cities. In the network, cities improve their urban road safety performance by sharing data, experience and knowledge by learning from each other. The network is managed by the International Transport Forum (ITF), which collects, validates and analyses relevant data from cities in a dedicated database.[67]

3.2 INFRASTRUCTURE AND SPEED

Speed governs the relationship between road users, and determines road user safety, especially for the most vulnerable road users – children, the elderly, pedestrians and cyclists.

Urban roads have multiple movement and access functions, they range from arterial roads to residential streets. Speeds on urban roads should, therefore, be set according to the road function. It is essential that roads with different functions have a consistent and recognisable layout.[70]

Among the PIN countries that monitor levels of speed compliance on urban roads countrywide, between 35% and 75% of observed vehicle speeds are higher than the 50 km/h legal speed limit. There has been mixed progress in reducing mean speeds on urban roads in the PIN countries that collect data, according to the latest analysis by ETSC.[71] As concluded by the OECD report, the effects of speed in reducing travel time are generally overestimated by road users and in urban areas the time savings are particularly small or negligible because of intersections, traffic lights, congestion and relatively short distances.[72] While exceeding the speed limit on urban roads brings no time gains, the excess speed in case of a collision increases the risk of a road death or serious injury exponentially, especially in collisions with vulnerable road users.

Speed limits should be supported by infrastructure measures to be credible. Some cities and towns have successfully introduced a speed hierarchy system across their networks where vehicles are permitted to travel at 50 km/h on major through-traffic roads whereas other roads are designed and built or adapted as 30 km/h zones. Some cities have gone even further by adopting 30 km/h speed limit as standard, such as Grenoble in France.[73] The Welsh government announced plans to set a 32 km/h (20 mph) default speed limit on urban roads throughout the country.[74] In Sweden, many cities have adopted the urban speed limit of 40 km/h instead of 50 km/h. One such example is the city of Malmö where almost all roads in the city have speed limit 40 km/h.

Some new cars have safety system for protecting vulnerable road users. These are both active like Automated Emergency Braking (AEB) systems, and passive like energy absorbing areas sometimes including airbags. These systems are tested and optimised for 40 km/h. It is important to have speeds in urban areas where these system work.

SPEED AND SPEEDING

For further information on speed and speeding read the ETSC PIN Flash report 36 (2018) "Reducing speeding in Europe" at https://etsc.eu/pinflash36

[68] Mayor of London, Transport for London, Vision Zero action plan, Taking forward the Mayor's Transport Strategy, https://bit.ly/2LwzPAR
[69] International Transport Forum, Safer City Streets, https://www.itf-oecd.org/safer-city-streets
[70] SWOV, Principles for safe road design, https://bit.ly/2YYyV3S
[71] ETSC (2019), Reducing Speeding in Europe, http://etsc.eu/pinflash36
[72] OECD, European Conference of Ministers of Transport (2006), Speed Management, https://bit.ly/2E9283c
[73] 30 km/h – making streets liveable, https://bit.ly/2LFSagf
[74] https://www.bbc.com/news/uk-wales-politics-48188233

3.2.1 Safety potential of 30 km/h zones

The risk of an unprotected road user being killed or seriously injured in a collision with a motorised vehicle grows substantially when the speed of the vehicle increases. At speeds of below 30 km/h pedestrians and cyclists can mix with motor vehicles in relative safety. This relative safety can be reduced if large volumes of traffic are present and particularly if there is a high proportion of HGVs.[75]

As well as reducing impact severity in the case of a collision, a maximum speed of 30 km/h creates opportunities for positive interaction among road users through visual communication, and it gives drivers more time to both make use of their visual field to see potential hazards and to react to these.[76] Lower speed also reduces feelings of danger for pedestrians and cyclists and might encourage more people to walk and cycle. Traffic calming measures are known to be very influential in encouraging drivers to comply with the 30 km/h speed limit.

A combination of traffic calming measures, such as roundabouts, road narrowing, chicanes or road humps in 30 km/h zones are essential to discouraging drivers from exceeding the speed limit, together with enforcement. Traffic calming measures should discourage motor traffic, except for traffic that needs access to that specific area.[77]

30 km/h zones have been steadily gaining popularity across Europe. Opinion polls in several countries repeatedly show a majority of the public support lower speed limits in urban areas.[78]

The reason for the rising popularity of 30 km/h zones could also be that as well as decreasing severe road collisions, 30 km/h zones can contribute to a modal shift towards walking and cycling which brings health and environmental benefits and an overall increased quality of life in urban areas.

France has set a target to have 70% of all city and town streets limited to 30 km/h; but only a few cities have reached the target. However, the network of 30 km/h speeds in France is increasing steadily, and, depending on the city or town, ranges from 10% to 90% of the urban road network.

According to expert estimations, around 15 to 20% of all urban roads are limited to a 30 km/h speed limit in Hungary and Cyprus. In Sweden, around 32% of municipal roads have a 30 km/h speed limit – the road length of 30 km/h roads increased from 9,700 km in 2010 to 13,600 km in 2018. In Switzerland, experts estimate that the proportion of 30 km/h speed limit zones out of the total urban road network is between 40% and 60%.

A study conducted by SWOV indicates that conversion from 50 km/h speed limits to 30 km/h zones in the Netherlands had a positive effect in reducing the number of pedestrian and cyclist deaths[79]. Even though it is difficult to accurately calculate the size of the reductions, this value may be more than 70% on the roads with reduced speed limit.

TRAFFIC LAW ENFORCEMENT

Traffic law enforcement has an important contribution to make in improving urban road safety and changing road user behaviour. For further information read the ETSC PIN Flash report 31 (2016) "How can traffic law enforcement contribute to safer roads?" at https://etsc.eu/pinflash31

3.2.2 Traffic reduction and urban vehicle access regulation

Promoting walking and cycling in cities was one of the priorities of the 2011 EU Transport White Paper, as those modes "could readily substitute the large share of trips which cover less than 5 km".[80]

Heavy traffic flows are a major deterrent to cycling. Conflict between vulnerable road users and motor vehicles can be reduced by the introduction of specific bicycle lanes or even car-free areas.[81] Traffic and speeds may also

[75] ETSC (2016), The European Union's role in promoting the safety of cycling, https://bit.ly/2PqFruY
[76] OECD and ECMT (2006), Speed Management, https://goo.gl/27Deui
[77] ETSC (2015), 30 km/h limits gaining rapid acceptance across Europe, https://bit.ly/2D3lhll
[78] Umweltbundesamt, Cities quieter thanks to 30km/h speed limit, https://bit.ly/2VzJ7Os
[79] SWOV (2009), Berends E., Stipdonk H., De veiligheid van voetgangers en fietsers op 30 km/uur- erftoegangswegen. https://bit.ly/2I6MhFY
[80] EU Transport White Paper 2011, http://goo.gl/Ki6jM3
[81] ETSC (2016) The European Union's Role in Promoting the Safety of Cycling, https://bit.ly/2PqFruY and ETSC (1999) Safety of

be reduced by road closures. The closure of minor streets to motor vehicles can offer lightly trafficked routes for cyclists. An area-wide approach should be adopted to avoid displaced traffic leading to more collisions elsewhere. Even at low speeds, mixing with heavy traffic, especially HGVs, is hazardous.

Another way to reduce motorised traffic is to introduce urban vehicle access regulations. Research indicates that transport pricing reforms including introducing urban access restrictions, can significantly increase traffic safety.[82] Following up on its commitment in the Urban Mobility Package in 2013, the EC published a study in 2018 on "Urban Vehicle Access Regulations (UVRS)"[83]. The EC is currently developing a recommendation to encourage the implementation of its findings. The study included the benefits of urban access regulation to road safety. It states that where UVARs schemes are working regularly, new pedestrian sub-areas have been created, vehicle speed has been reduced and road safety improvements as well as the promotion of cycling and walking are carried out, attracting new users willing to move into these no longer congested zones.[84]

Examples include the Stockholm scheme (2005) which demonstrated a decline in the number of injury collisions because of congestion charging. A cautious estimate is that the Stockholm trial has entailed a decline in the number of personal injury accidents of 5-10% within the congestion tax area.

3.2.3 Guidelines for infrastructure measures

To support local authorities, road managers and road safety professionals in making urban road infrastructure safer, some PIN countries have adopted various guidelines, including for traffic calming measures, intersections, pedestrian crossings or cycling infrastructure design (see table 1 in the annexes).

Guidelines provide a summary of the current road safety and urban road network development knowledge and expertise. Guidelines are non-binding, but if implemented they can have an important contribution in gradually bringing urban road infrastructure to desirable safety standards. The guidelines outline methodologies to be used in the selection of different infrastructure design options and provide the geometric layouts of typical measures. Related general management and maintenance information as well as recommendations might be included.

3.2.4 Infrastructure safety management: extension of the principles of the RISM Directive to main urban roads on a voluntary basis

The EU Directive 2008/96 on Road Infrastructure Safety Management already requires EU Member States to integrate safety in all phases of planning, design and operation of road infrastructure on the Trans European Road Network (TERN). Following a deal reached earlier this year on a revision of the Directive, those safety principles will also have to be applied on all motorways and all designated primary roads across the EU, as well as all EU-funded roads (except urban roads) as from 2024.[85]

Although not mandatory, EU Member States are encouraged to extend the safe management principles to main urban roads. As has been done in Slovakia, where cohesion funds were used to introduce audits on roads which are beyond the scope of the directive. [86]

The infrastructure safety management procedures include regular road safety audits, identification and treatment of high-risk sites and prioritisation of safety when building new roads and network-wide road safety assessment, including the need to consider the needs of all vulnerable road users[87].

Pedestrians and Cyclists in Urban Areas, http://goo.gl/1S8hKo

[82] Litman, T., (2012) Pricing for Traffic Safety-How Efficient Transport Pricing Can Reduce Roadway Crash Risks Victoria Transport Policy Institute http://www.vtpi.org/price_safe.pdf

[83] European Commissoin (2018), Urban Vehicle Access Regulations, https://bit.ly/2MQlMTa

[84] Ibid

[85] ETSC Press Release (2019), ETSC Welcomes Deal on safer EU road rules, https://bit.ly/2YPYAvA

[86] Information provided by the EC, project Ruskovce - Pravotice

[87] ETSC Position The Revision of the Road Infrastructure Safety Management Directive 2008/96, https://bit.ly/2KiMg41

RECOMMENDATIONS TO CITIES AND TOWNS

- Establish clear urban road hierarchies which better match road function to speed limit, layout and design based on the principles of the Safe System approach.
- Apply the principles of safe infrastructure management enshrined in the revised Road Infrastructure Safety Directive to all main urban roads.
- Adopt 30 km/h zones supported by traffic calming measures in residential areas, areas used by many pedestrians and cyclists and on the way to schools.
- Create conditions so that cyclists can mix freely with motorised traffic where the travel speed, volume and mass of motorised traffic does not pose a risk to unprotected road users.
- Try to arrange for cycle traffic and motorised traffic to be physically separated where the speed of the latter is too great or where the traffic flow is too high to allow them to mix safely.
- Improve infrastructure safety design for VRUs, especially at junctions.
- Give priority in road maintenance to the quality of surfaces on footways, cycle paths and the parts of carriageways most used by crossing pedestrians and by cyclists.
- Discourage access by car where there are reasonable alternatives.
- Promote localisation of some activities so that they can be reached on foot, by bicycle, or by public transport.
- Provide shorter and safer routes for pedestrians and cyclists by ensuring that routes are direct and that the quickest routes are also the safest. Travel time should be increased on unsafe routes and decreased on safe routes.
- Develop safe routes to schools.
- Improve the quality of public transport.
- Strengthen enforcement against illegal parking when pedestrian and cyclist facilities are abused by parking on footpaths and cycle paths.

RECOMMENDATIONS TO MEMBER STATES

- Encourage local authorities to adopt zones with a speed limit of 30 km/h supported by traffic calming measures in residential areas, areas used by many pedestrians and cyclists and on the way to schools.
- Develop and encourage cities to apply safe infrastructure design guidelines, such as guidelines for traffic calming measures, safe intersections, pedestrian crossings or cycling infrastructure design. Involve city representatives in development of such guidelines.
- Renew the guidelines regularly based on the latest research and innovation.
- In cooperation with cities and private stakeholders, work on developing and implementing Intelligent Transport Systems that contribute to road safety.
- Develop, and encourage speed limit-setting authorities to apply national speed limit guidelines based on the Safe System approach. When developing guidelines, take into account factors such as road design, roadside (e.g. land use and topography), traffic composition and flow, presence of vulnerable road users and vehicle quality.

RECOMMENDATIONS TO EU INSTITUTIONS

- Extend the principles of safe infrastructure management set out in the Directive 2008/96[88] to cover main urban roads.
- Encourage EU Member States to make use of new EU funds for investment in new road safety measures and make regional funds for urban roads conditional on improving infrastructure safety in line with the Road Infrastructure Safety Management Directive.
- Create an EU fund to support priority measures such as for cities to introduce 30 km/h zones supported by traffic calming measures, particularly in residential areas, and where there are a high number of pedestrians and cyclists and on the way to schools.
- Any funds destined to support urban mobility should also comply with road safety standards and should therefore be identified specifically as promoting road safety, including, for example, investments in pedestrian infrastructure, cycling lanes and public transport.
- Recognise the positive impact that urban access regulations can have to increase traffic safety and include this in the upcoming EC Recommendation on Urban Access Schemes.
- Revise the Directive 2015/413 concerning cross-border exchange of information on road safety related traffic offences to strengthen the enforcement chain, with the priority on speeding.[89]

[88] Directive of the European Parliament and of the Council amending Directive 2008/96/EC on road infrastructure safety management, https://bit.ly/2X2Vx1W

[89] Directive (EU) 2015/413 of the European Parliament and of the Council of 11 March 2015 facilitating cross-border exchange of information on road-safety-related traffic offences Text with EEA relevance, https://bit.ly/2VIvsnm

3.2.5 Examples on improving road infrastructure in European cities

DENMARK

CITY OF AALBORG IMPLEMENTS NATIONAL GUIDELINES FOR SAFE URBAN ROAD INFRASTRUCTURE

The national guidelines for safe urban road design in Denmark are produced in cooperation between different public partners, including road administrators (e.g. cities), police, research institutes and the Danish Road Directorate. Every few years, the guidelines are revised to reflect the latest state of play. There are also guidelines on road safety audits and inspections for urban and rural roads to guide decision makers, road authorities and inspectors.[90]

"Aalborg and other towns in Denmark frequently use the national safe urban infrastructure guidelines in implementing various infrastructure improvements. The guidelines save time since not every city or town has the resources to keep up with the latest research. However, the guidelines require frequent updates (every 2 or 3 years) to always recommend the most innovative solutions. If the guidelines are not updated, they can also be an obstacle in trying out new ideas, since the guidelines can be perceived as the only right solution."
Camilla Andersen, Aalborg municipality

FINLAND

FINNISH TRANSPORT AGENCY GUIDELINES FOR TRAFFIC CALMING MEASURES AND NATIONAL GUIDELINES FOR WALKING AND CYCLING INFRASTRUCTURE

The Finnish Transport Agency developed national guidelines for traffic calming measures for local authority practitioners. The guidelines recognise that different urban road sections based on their function require different types of traffic calming solutions. The guidelines list various traffic calming design options for intersections, roundabouts, road furniture and markings, pedestrian crossings and other road design features. The pros and cons of each proposed measure are identified, and users of the manual are warned in what circumstances certain specific interventions are not suitable.[91]
One of the recommendations is to continuously work on implementing traffic calming measures by prioritising locations based on a scoring system which comprises different criteria, including traffic volumes of pedestrians and cyclists, collision history of the last five years, proximity of schools and kindergartens and levels of speeding.[92]

In the National Cycling Strategy 2020, the Ministry of Transport and Communications set a target to increase the proportion of cycling and walking trips by 20% (from 32% to 38%) over the period 2005 to 2020. It is stated that these active modes should be treated on equal basis with other modes of transport.

The national guidelines for walking and cycling infrastructure were published to establish similar design principles for safe pedestrian and cyclist infrastructure in similar traffic environments and similar towns.[93] The guidelines cover different solutions for urban roads taking into account factors such as the size of a town and different urban structures.

The goal of the Finnish government is to encourage walking and cycling by providing safe infrastructure, and establish these modes as competitive alternatives to car trips.

SWEDEN

IN THE CITY OF GOTHENBURG THREE QUARTERS OF SERIOUS ROAD INJURY REDUCTIONS ATTRIBUTED TO IMPROVEMENTS IN TRAFFIC CALMING AND VRU INFRASTRUCTURE

Gothenburg, a city of 570,000 inhabitants, along with the rest of Sweden, adopted a long-term "Vision Zero" approach to road deaths and serious injuries. The city's intermediate targets are to reduce the annual number of road deaths from 9 to 3, and serious and moderate injuries from 227 to 75 over the period 2010-2020.

In 1978, Gothenburg had one speed-hump. In 2019, there are around 2500 traffic calming measures, and citizens are asking for more, especially in residential areas where the recommended speed limit is 30 km/h.[94]

[90] Vejregler (2014), Road safety inspection, https://bit.ly/2VHyLfs
[91] Liikenneviraston (2017), Hidasteiden suunnittelu, https://bit.ly/2OVP9WU
[92] Ibid
[93] Liikenneviraston (2014), Jalankulku- ja pyöräilyväylien suunnittelu, https://bit.ly/2UDXy6J
[94] Information provided by the City of Gothenburg

A study conducted by the Swedish Transport Research Institute (VTI)[95] estimated that traffic calming, together with separation of vulnerable road users from motorised traffic, contributed to three quarters of all reductions in serious road traffic injuries on Gothenburg's roads from 1990 to 2003. Over the same period, the investment and maintenance costs of traffic calming measures were € 21 million while the socio-economic benefits achieved through a reduction of road deaths and serious injuries has been estimated at € 1 billion. Every € 1 invested brought 48 € in socio-economic benefits.[96]

Traffic calming measures helped to shift around 650,000 kilometers travelled by motor vehicles per day from local city roads to arterial or national roads where vehicles can travel at higher speeds, and where possible conflicts with pedestrians or cyclists are less frequent.[97]

Lower speeds and reductions in motorised traffic achieved through traffic calming interventions encouraged citizens to walk and cycle more often. Currently, four out of the five injuries sustained on the city's roads do not involve a car.[98] Single bicycle or single pedestrian injuries accounted for 80% of all serious or moderate injuries sustained.

TESTING GEOFENCING TO MAKE CITIES SAFER

In 2017, the Swedish government started a project to create safer and more sustainable cities using geofencing. The joint project, involving the national government, cities and private stakeholders resulted in an action plan foreseeing the future development of this ITS system.

Geofencing refers to a geographic zone where the entry, speed and fuel use of connected vehicles can be controlled digitally. The system can be used, for example, to only allow certified vehicles to enter certain areas. It is today being tested in Sweden, especially in public transport systems.

"In Sweden, local authorities are supported by the national government in implementing and testing geofencing systems as there are both technical and legal challenges which cannot be tackled by cities alone. When implemented, geofencing will offer an excellent solution for the speeding problem."
Anna Vadeby, National road and Transport Research Institute

GERMANY
SHARING GOOD PRACTICE IN IMPLEMENTING ROAD INFRASTRUCTURE SAFETY MEASURES IN CITIES

The German Road Safety Council (DVR) has compiled a list of good practice examples for road infrastructure measures to serve as an inspiration for towns and cities.[99] The examples highlight individual infrastructure changes that have been implemented in cities which can step-by-step help to create safer urban environments for most vulnerable road users, and encourage people to walk and cycle.

One of the highlighted cases is the Severinstrasse in the city of Cologne,[100] where the speed limit was reduced to 20 km/h on one way road stretch in the southern part of the city centre. Cyclists are allowed to cycle contra-flow on this streed. Due to traffic calming measures and high number of pedestrians and cyclists on this road, most drivers comply with the speed limit.

Another example is the city of Oldenburg, which is working to increase both the attractiveness of cycling and cycling safety. One significant technical development has been the installation of cyclist sensors at junctions with traffic lights. Traditional sensors were designed to detect large vehicles such as cars and lorries, but do not work for bicycles. The new system can detect a cyclist and extend the green light timing to give the cyclist enough time to pass through the junction. This marks a change of a mindset in traffic management as cyclist mobility needs are considered as important as those of motorised road users.

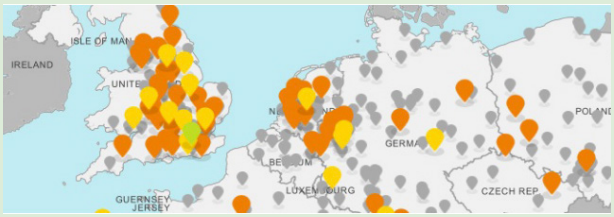
[95] VTI (2013), Evaluation of speed reducing measures in Gothenburg, https://bit.ly/2IpKfjA
[96] Calm, safe and secure Gothenburg, Positive effects of traffic calming countermeasures (2007), https://goo.gl/Y1Trr2
[97] Ibid
[98] Ibid
[99] DVR, Gute Straßen in Stadt und Dorf, https://bit.ly/2M4ofhN
[100] DVR-Beispielsammlung Gute Straßen in Stadt und Dorf, https://bit.ly/2VVa42v

NETHERLANDS
AMSTERDAM PLANS TO ELIMINATE 11,200 URBAN PARKING SPOTS TO MAKE WAY FOR BICYCLES

Amsterdam is planning to systematically strip its inner city parking spaces. Starting in the summer of 2019, the city plans to reduce the number of people permitted to park in the city core by around 1,500 per year. By reducing the permits steadily, the city will remove up to 11,200 parking spaces from its streets by the end of 2025. The cleared spaces will be replaced by bike parking, wider sidewalks and trees.[101]

SPAIN
A SHIFT TO SUSTAINABLE MODES OF TRANSPORT IN TORREJÓN DE ARDÓZ

Torrejón de Ardóz in Spain is a municipality of around 130,000 inhabitants located near the capital Madrid. The municipality has started working on improving the safety of pedestrians by providing lighting at pedestrian crossings.[102] To encourage citizens to cycle safely, a dedicated infrastructure called the cyclist ring, connecting different neighbourhoods was created, and it has reached a length of 13.4 km in 2018.[103] Free-of-charge bicycle parking facilities were also established at railway stations. In addition, the municipality runs two programms with dedicated budgets: the "Operación Asfalto" which annually reviews the roads condition and identifies stretches that need to be repaired, and the roundabout scheme under which intersections that should be redesigned to roundabouts are identified and treated.[104] There have been no road deaths in Torrejón between 2009 and 2016, and the town received the Vision Zero Award from DEKRA, being the only city in this size category with no one killed in traffic over a long period of time.



In 2014, DEKRA launched an online vision zero map. It shows that 922 towns or cities in Europe and beyond, with over 50,000 inhabitants, recorded at least one year without a road death between 2009 and 2015; while 16 towns and cities had zero road deaths for six or seven years.[103] Overall it shows that "Vision Zero" is attainable in urban environments, and is already a reality in many towns and cities.

3.3 VEHICLES

Collisions with motorised vehicles account for an overwhelming proportion of pedestrian and cyclist deaths. Different factors influence impact severity between motor vehicles and cyclists or pedestrians, the most important being speed of travel, the vehicle mass, and the level of protection provided by the vehicle for those outside the vehicle.

3.3.1 Heavy goods vehicles

Heavy goods vehicles (HGVs) are involved in 10% of all fatal collisions on urban roads in the EU. Out of this 10%, 46% of the victims are pedestrians, and 9% are cyclists.[106] In 2017, around 426 pedestrians and 83 cyclists were killed on urban roads by HGVs, accounting for 12% and 7.5% of all pedestrian and cyclist deaths respectively, on these roads.

Even though they are less frequent than collisions with light motorised vehicles, those involving goods vehicles or buses and pedestrians or cyclists tend to be more severe because of the vehicles' size and mass.

[101] Citylab (2019), A modest proposal to eliminate 11,000 urban parking spots, https://bit.ly/2I3B2xh
[102] Ayuntamiento de Torrejón de Ardoz (2018), El alcalde decide iluminar los pasos de peatones de la ciudad para mejorar la seguridad vial de los torrejoneros, https://bit.ly/2vWS6hl
[103] Ayuntamiento de Torrejón de Ardoz (2018), Finalizada la 4ª fase del gran Anillo Ciclista – Carril Bici de Torrejón de Ardoz, https://bit.ly/2Jo53JM
[104] Ayuntamiento de Torrejón de Ardoz (2018), Se aumenta la seguridad de los viandantes iluminando los pasos de peatones y se mejora el tráfico sustituyendo semáforos por rotondas, https://bit.ly/2vXkpw
[105] DEKRA (2017), Road Safety report 2017, Steps towards making vision Zero a Global Reality, https://bit.ly/2Krg12G
[106] CARE data

As pedestrians and cyclists are among the road users which occupy the smallest amounts of road space, they are particularly prone to being involved in collisions where an HGV or a bus driver simply does not see them due to a reduced field of direct vision.[107] The dimension of the windows, as well as the height of the cabin, can lead to large blind areas in an HGV or bus driver's field of view. The blind areas change when the vehicle is turning, particularly because the trailer unit always turns along a shorter path than the cabin unit. That results in the driver being unable to see pedestrians or cyclists who are close to the side of the vehicle, particularly when turning.[108]

A study from Norway analysed bicycle collisions with heavy goods vehicles (HGVs) with the focus on urban environments. The most frequent collision type was an HGV driving on the right and turning right and a cyclist riding next to the truck on the same road or on parallel sidewalk/ cycle, path and consequently crossing the road the truck is turning into. These collisions mostly occurred at signalised intersections or roundabouts in mix-use environments. Among the identified risk factors are HGVs blind spots, unsafe infrastructure layouts (e.g. simultaneous green light for vehicles turning right and cyclist/ pedestrian crossing) and risky road user behavior (e.g. cyclist using a phone; cyclists overtaking the truck from the right; lack of visual contact between driver and cyclist; unexpected turning manoeuver of truck without indicating a direction). The study also showed that even very slow manoeuvers by HGVs can be fatal to cyclists. One out of ten cyclist collisions with HGVs are fatal in Norway compared to only 1.2% of other bicycle collisions.[109] This difference may be affected by differences in underreporting, but seems unlikely to have been exaggerated.[110]

The European Parliament and the EU Council reached an agreement on new EU vehicle safety standards in March 2019. The legislation mandates a range of new vehicle safety features such as Automated Emergency Braking (AEB) and overridable Intelligent Speed Assistance (ISA) as standard on all new vehicles sold in the EU. New heavy goods vehicles will have to comply with direct vision requirements as of 2028. Systems at the front and side of the vehicle to detect and warn of vulnerable road users, especially when making turns will also be made mandatory.[111]

In the meantime, cities and towns can apply direct vision policies sooner by setting direct vision requirements in public procurement for city service vehicles - some cities are already doing this.

The HGV problem is also being addressed by limiting HGV circulation hours in cities and improving intersection safety. London has become the first city worldwide to develop direct vision standards for HGVs operating in the city.

ETSC ran a project on work related road safety with a specific report on HGV safety which includes a range of recommendations on route planning and avoiding areas and times when vulnerable road users are most present.[110]

[107] Havarikommissionen for Vejtrafikulykker (2006), Ulykker mellem højresvingende lastbiler og ligeudkørende cyklister
[108] ETSC (2014), Weights and dimensions of heavy goods vehicles – maximising safety, https://bit.ly/2U0KwvO
[109] Pokorny P. et al. Transportation Research Procedia (2017), Accidents between freight vehicles and bicycles, with a focus on urban areas, https://goo.gl/ueKAam
[110] Ibid
[111] European Commission (2019), Road safety: Commission welcomes agreement on new EU rules to help save lives, https://bit.ly/2HRLQi0
[112] ETSC (2012), PRAISE Report, EU Social Rules and Heavy Goods Vehicle Drivers, https://bit.ly/2OXbKT4

RECOMMENDATIONS TO CITIES AND TOWNS

- Restrict heavy goods vehicle circulation in urban areas at certain peak times when there are high numbers of pedestrians and cyclists and develop recommended routes for heavy goods vehicles.
- Introduce vehicle safety requirements, such as direct vision, Intelligent Speed Assistance, Automated Emergency Braking with pedestrian and cyclist detection and alcohol interlocks in public procurement requirements for city services (e.g. waste trucks, public transport buses).
- Improve safety at junctions: improve infrastructure safety at dangerous junctions and introduce technology to inform HGV drivers if a cyclist is approaching at junctions on roads frequently used by cyclists.

RECOMMENDATIONS TO MEMBER STATES

- Enable support for cities in restricting heavy goods vehicle circulation in urban areas at certain peak times when there are high numbers of pedestrians and cyclists and develop recommended routes for heavy goods vehicles.

RECOMMENDATIONS TO EU INSTITUTIONS

- Following the adoption of the new minimum safety standards for new vehicles , work towards the adoption of technical specification to:
  - allow a high level of performance of Intelligent Speed Assistance systems to be fitted in all new vehicles;[111]
  - match the level of ambition of the Regulation *"so as to enhance the direct visibility of vulnerable road users from the driver seat, by reducing to the greatest possible extent the blind spots in front and to the side of the driver, while taking into account the specificities of different categories of vehicles".* The standard for direct vision will have to be stricter for trucks between 3.5t and 12t (N2 category).
- Look at the effectiveness of measures to reduce blind-spot areas around HGVs, and to alert road users to impending near-side turning collisions, with the goal of achieving higher safety levels for cyclists, pedestrians and PTWs.

BELGIUM
TRIAL OF LORRY BAN AT THE BEGINNING AND END OF A SCHOOL DAY

The Belgian city of Antwerp has announced a trial of restrictions on heavy goods vehicles in two areas during the early morning and afternoon on school days.

Lorries will be prohibited from circulating between 7.30h and 9.00h and between 15.00h and 17.00 when children are travelling to and from school.[114]

GERMANY
FINANCIAL SUPPORT FOR COMPANIES RETROFITTING HGV FLEET WITH TURNING ASSISTANCE

Since the beginning of 2019, the Ministry of Transport and Digital Infrastructure has offered financial support for companies that retrofit their HGVs (over 7.5t) with turning assistance systems. Research from the German Insurers Association has shown that 60% of all severe accidents due to right-turning HGVs could be prevented with this device.[115]

UNITED KINGDOM
CLOCS AND FORS CAMPAIGNS TO IMPROVE HGV SAFETY IN LONDON

Two campaigns called CLOCS and FORS were launched to improve HGV standards to prevent fatal or serious collisions between HGVs and pedestrians, cyclists and motorcyclists.

CLOCS focuses on construction vehicles which account for a disproportionate number of cyclist deaths and serious injuries in London. The project encourages a wider adoption of best safety practice across the construction sector and aims at developing a national construction

[113]Proposal for a regulation of the European Parliament and of the Council on type-approval requirements for motor vehicles and their trailers, and systems, components and separate technical units intended for such vehicles, as regards their general safety and the protection of vehicle occupants and vulnerable road users, amending Regulation (EU) 2018/… and repealing Regulations (EC) No 78/2009, (EC) No 79/2009 and (EC) No 661/2009, https://bit.ly/2QiUV5M

[114]ETSC (2018), Antwerp to trial lorry ban at the beginning and end of school day, https://bit.ly/2Kk1i9q

[115]UDV (2016), Lkw-Abbiegeassistent gegen Radfahrerunfälle, https://bit.ly/2wfiy64

vehicle safety standard which would help to reduce the risk of collision between construction vehicles and vulnerable road users.[116]

The FORS project aims at raising the level of quality within fleet operators, which also includes better protection for vulnerable road users. The project has developed standard safety equipment for vehicles over 3.5 tonnes to increase vulnerable road user protection which includes side underrun protection, Class V and Class VI mirrors, giving the driver a better view of cyclists and pedestrians around the vehicle, and warning signage on the rear of the vehicle to warn vulnerable road users not to get too close.[117]

3.4 ROAD USER BEHAVIOUR

Road user behaviour is largely determined by a combination of factors, including the road infrastructure, road traffic regulations, levels of traffic law enforcement, in-vehicle safety technology, behavior of other road traffic participants and traffic education.

Road traffic system designers should support and guide road users to act safely in traffic by designing self-explaining and self-enforcing roads, as well as safe vehicles based on the Safe System approach. Yet, the infrastructure and vehicle developments presented in the foregoing sections can deliver the highest levels of road safety if all road users, including vehicle drivers, cyclists and pedestrians act safely. Whilst people, by nature, will make mistakes in road traffic, road user education should be integrated in road safety policies so that all road users are informed on how to act in different traffic situations, and are aware of risks related to participation in traffic.

Pedestrians, cyclists or e-scooter riders do not need a licence to travel on the roads, but it is important that they have at least a minimum of road safety education. Knowledge of road signs and signals is necessary if pedestrians, cyclists and e-scooter riders are to correctly assess and predict traffic situations, and assess other users' behaviour.[118] Education activities are also needed to inform about the risks in traffic related to distraction by mobile devices. Education activities have to be supported by traffic law enforcement, where appropriate.

For more information read ETSC's reports "The European Union's Role in Promoting the Safety of Cycling (2016) https://etsc.eu/the-european-unions-role-in-promoting-the-safety-of-cycling/ and "The status of traffic safety and mobility education in Europe" (2019) https://etsc.eu/the-status-of-traffic-safety-and-mobility-education-in-europe/

RECOMMENDATIONS TO MEMBER STATES

- Ensure that cyclists and pedestrians have a minimum level of traffic education and awareness of the risks imposed by the current traffic system through training and education.
- Introduce and enforce sanctions on pedestrians and cyclists for exposing themselves or other road users to unnecessary risks.
- Encourage a Zero Tolerance approach to use of drugs and alcohol to cover all road users, including cyclists.
- Encourage cyclists to wear helmets and to have adequate lighting when cycling in the dark.

[116] CLOCS Standard,
[117] FORS (2015), Fleet operator recognition scheme standards, https://bit.ly/2GjgLCQ
[118] Ibid

3.5 MOBILITY CHANGES IN CITIES – E-SCOOTERS

Cities can be dynamic and innovative environments. Many have welcomed the array of new mobility options that have been launched in just the last few years. The ways in which people get around in urban environments are changing rapidly; and this is fostered by an emergence of e-bicycle and e-scooter sharing schemes, growing uptake of active modes of travel and an increasing use of new delivery and transport services. These changes might have a profound effect on urban mobility and urban road safety. The restricted space in urban areas must be used wisely and effectively to enable increased mobility without putting road users in danger.

A particular matter of concern for the road safety community and some cities has been a rise of e-scooter sharing schemes. The uptake of e-scooters might require new national legislation which enables cities to establish and enforce local regulation, and introduce possible infrastructure adjustments and educational activities.

It is still not clear what effect the increasing use and popularity of e-scooters has and will have on road safety. Some of the potential road safety challenges related to e-scooters, which can go at up to 25 km/h, are the conflicts with pedestrians, especially when e-scooters are ridden on pavements, possible conflicts with cyclists when using cycling infrastructure, and with motorised vehicle drivers when sharing the road, as these drivers might face difficulties noticing a small but fast moving e-scooter rider. E-scooter riders might be affected more than other road users by road infrastructure defects such as potholes.

All these issues require data and extensive research. In the meantime, it is important to define traffic regulations on space sharing - whether e-scooters should compete for space on pavements with pedestrians, share cycling paths with cyclists or use roads together with motorised traffic.

At the moment, there is a legislative gap in regulating e-scooters as they are covered by neither EU regulation on type approval, nor national legislation in many European countries. Austria[119], France[120] and Germany[121] have recently adopted e-scooter legislations that will come into force in the coming months.

Currently there are no reliable data in Europe on collisions involving e-scooters that resulted in road deaths or serious injuries. Data collection is hindered by the fact that e-scooters are mostly not regulated under the traffic code and not even categorised as vehicles. In cases where collisions with e-scooters do not involve a motorised vehicle, police may not be called to the scene and, as a result, such collisions might not be registered in the police database. Even in cases where the police are called, there is no field in the police report form indicating e-scooters as a vehicle category involved in a collision, which further limits data collection.

RECOMMENDATIONS TO MEMBER STATES

- Legislate highway code rules for e-scooters.
- Add new field categories in police reports to distinguish collisions involving e-scooters and electrically assisted bicycles.
- Collect data on serious and fatal collisions involving an e-scooter.

RECOMMENDATIONS TO EU INSTITUTIONS

- Conduct research on the road safety implications of e-scooters and electrically assisted cycles including infrastructure needs.
- Consider developing guidance on managing safety aspects of personal e-transporters based on existing European best practice.

[119] OTS, StVO-Novelle bringt klare Regeln für E-Scooter, https://bit.ly/2HUbl0K
[120] LCI (2019), Trottinettes électriques : vitesse maximale, âge, ... les 7 règles que prévoit la nouvelle réglementation, https://bit. ly/2Yn9ckx
[121] Die Bundesregierung, Die Bundesregierung macht den Weg frei für E-Scooter, https://bit.ly/2JyPlX1

ANNEXES

ANNEXES

COUNTRY	ISO CODE
Austria	AT
Belgium	BE
Bulgaria	BG
Croatia	HR
Cyprus	CY
Czech Republic	CZ
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France	FR
Germany	DE
Greece	EL
Hungary	HU
Ireland	IE
Israel	IL
Italy	IT
Latvia	LV
Lithuania	LT
Luxembourg	LU
Malta	MT
Norway	NO
Poland	PL
Portugal	PT
Romania	RO
Serbia	RS
Slovakia	SK
Slovenia	SI
Spain	ES
Sweden	SE
Switzerland	CH
The Netherlands	NL
United Kingdom	UK

	Are there national guidelines dedicated to local authorities on e.g. traffic calming measures, proper 30 km/h zone design, cycling and pedestrian infrastructure?	Please share any available information on agreed standards for pedestrian crossings design in your country. What are the standards?
AT	n/a	Regulated in the Austrian Design Guideline RVS 03.02.12 ("Fussgängerverkehr")
BE	Yes: guidelines for the design of 30 km/h zones, pedestrian crossings and pedestrian infrastructure.	Flanders has guidelines on pedestrian crossing design. In Wallonia, a new website was launched recently addressing road managers, several topics about infrastructure are covered on the website, including guidelines for pedestrian crossing.
BG	n/a	n/a
CY	Yes: guidelines for urban road design, for the design of 30 km/h zones, pedestrian crossings and pedestrian infrastructure.	Yes: standards are used when designing zebra crossings, pelican crossings or crossings on signalized junctions (use of red/green man).
CZ	Yes: guidelines for urban road design, traffic calming and 30 km/h zones. CDV is active in their promotion and consults local authorities. Evaluations show guidelines are beneficial, in particular for speed reductions.	Czech national standard CSN 73 6110 includes pedestrian crossing design.
DE	FGSV Richtlinie für die Anlage von Stadtstraßen. RASt06 FGSV Empfehlung für Radverkehrsanlagen	The Road Construction Code consists of a set of technical rules and regulations for the design, construction and maintenance of roads and their components. Guidelines for the planning, design and operation of cycling facilities.
DK	Yes	n/a
EE	n/a	Pedestrian crossing design standards. Main requirements for pedestrian crossings are listed in various other guidelines (Estonian Standard EVS843:2016 Urban streets; Highway design statute). Estonia prepared a safety risk assessment methodology for various pedestrian crossing facilities.
ES	n/a	n/a
FI	Yes: guidelines for the design of pedestrian and cycling infrastructure and guidelines for traffic calming measures.	There are no agreed standards for pedestrian crossing design. However, there are several guides and recommendations which should be followed.
FR	Yes: there is a number of national guidelines, including for traffic calming measures. They are followed to different extent depending on municipality.	The rules of the Vienna Convention are strictly followed. Since 1996, France also has had national guidelines specifying the measurements of the pedestrian crossings and stripes, they specify that there should be no visual obstacles around the crossing. The guidelines also include a criterion for reflective and non-gliding paint. A central refuge can be installed to provide better visibility. In 2007, additional criteria were introduced to address the needs of people with disabilities (e.g specifications for ramps for mobility-impaired people, specifications for rumble strips for people with impaired vision). However, guidelines are followed to different extents depending on municipality.
EL	n/a	n/a
HR	No: traffic calming measures are implemented based on Road Traffic Safety Law, where local authorities decide upon installation of traffic calming measures with mandatory approval by Ministry of the Interior (traffic police). Mostly, those measures are installed in areas near schools and kindergartens, but we don't have guidelines for it.	n/a
HU	Yes: there are several guidelines in this field. The most important are on the calming of road traffic, speed moderating infrastructure for public roads. In general, 30 km/h zones are well designed, supported by infrastructure measures	Several rules and prescriptions deal with this topic. 20/1984. (XII.21.) decree of the KM (Ministry of Traffic) about the regulation of road traffic and placement of road traffic signs; 04.00.12.(ÚT 1-1.160) Road traffic signs. Requirements against design, application and placement of road traffic signs (JETSZ); 04.00.04. (ÚT 1-1. 149) Rules about road markings (ÚBJSZ); 03.07.23. (ÚT 2-1. 211) Design of public facilities for pedestrian traffic.

IE	Yes: for e.g. Design Manual for Urban Roads and Streets.	Regulations and guidelines are provided in a number of areas, for e.g. 1997 Road Traffic (Signs) Regulations and Traffic Signs Manual give details of the requirements for signs and road markings at pedestrian crossings.
IT	Zone 30 km/h design to be referred (National documents) : Guidelines for Urban Traffic Plans (Ministero Lavori Pubblici, 1995) and Guidelines for Urban Road Safety Plans (Ispettorato generale per la sicurezza e la circolazione stradale, 2001).	Highway code art.40 and Regulations of the Highway Code art.145, 135 c.3, 162 - ACI following the EPCA project European Pedestrian Crossing Assessment has published Guidelines for pedestrian crossings.
LU	n/a	n/a
LV	Usually with sign and speed hump (or humps)	With signs and zebra marking on road
LT	n/a	n/a
MT	Traffic Calming Measures: Yes, guidelines are outlined in the advisory document "Permanent traffic management policies and guidelines – directorate operating procedures".[120] 30km/h zones: Guidelines for 30km/h are outlined in the Speed Management Policy. It is the jurisdiction of Transport Malta to determine speed limits on all categories of roads. However, Local Councils can specifically identify potential areas for 30km/h zones and request TM to assess these areas. Cycling: A new policy has been issued in regards to cycling.[121] Currently the Authority is designing the technical design guidance supporting the strategy document. Pedestrian Infrastructure - "Permanent traffic management policies and guidelines – directorate operating procedures" is also applicable together with the Accessible Public Transport Infrastructure Policy. It is to be noted that the CRPD (Commission for the Rights of Persons with Disability) is also currently working on a revised document called "streets for all" which shall also cover pedestrian infrastructure and its accessibility.	These standards are defined in the Road Construction Details covered by Design and Construction Standards for Road Works[122] At times we might also refer to British documentation mainly Manual for Streets, if applicable.
NL	n/a	n/a
PL	n/a	n/a
PT	Yes. 30 km/h design guidelines are recent.	There are no standards. Currently there are two documents which LNEC has been assigned to combine in a single guidelines.
RO	n/a	n/a
SE	No: speed calming measures are implemented but there are no specific guidelines for 30 km/h zones	Agreed standards for pedestrian crossing design is stated in the document "Design of streets and roads".
SI	n/a	Yes. Rules on Traffic Signaling and Traffic Equipment (Proposal TSC 02.201 Pedestrian crossings).
SK	n/a	n/a
UK	n/a	n/a
CH	Yes: guidelines for traffic calming measures, BFU-model Tempo 50/30 in urban areas and guidelines for the design of pedestrian and cycling infrastructure from the point of view of road safety	Yes: the standards are described in the VSS Norm 640 241
IL	Yes: guidelines on 30 km/h zones. However, studies showed that the whole concept of 30 km/h zones is not applied sufficiently. Separate speed calming measures are used widely but not the whole concept.	Yes: there are design guidelines on pedestrian facilities. Typical crosswalks have zebra marking and signs.
NO	n/a	n/a
RS		Yes: SRPS U.S4_227:2014

[120] https://bit.ly/2mRHI5N
[121] https://bit.ly/2Y0YTCF
[122] https://bit.ly/2ZFpBSS

Table 2. Total number of road deaths on urban roads over the period 2010-2017.

	2010	2011	2012	2013	2014	2015	2016	2017	Fig.1 Average annual change in road deaths on urban roads 2010-2017
AT	141	139	151	115	123	128	110	107	-4.1%
BE	249	285	231	199	231	231	194	205	-3.7%
BG	312	235	233	227	251	269	238	200	-2.9%
CY	42	40	31	17	34	37	35	38	-0.2%
CZ	291	280	265	241	234	221	215	193	-5.5%
DE	1,011	1,115	1,062	977	983	1,048	960	976	-1.2%
DK	78	69	58	59	46	62	66	53	-3.5%
EE	14	25	n/a	n/a	22	n/a	20	14	n/a
ES	550	457	461	450	441	441	519	509	-0.1%
FI	63	74	56	57	62	75	63	57	-0.7%
FR	1,133	1,095	1,026	930	992	988	1,019	1,010	-1.4%
EL	593	559	499	464	401	388	427	340	-7.1%
HR	265	252	230	213	191	220	176	186	-5.2%
HU	272	234	210	232	237	261	224	229	-0.9%
IE	49	47	46	45	61	34	53	42	-1.3%
IT	1,782	1,744	1,562	1,421	1,505	1,502	1,463	1,467	-2.7%
LU	3	7	7	15	9	5	8	6	4.9%
LV	78	53	53	53	69	44	30	44	-8.2%
LT	75	82	102	120	102	84	76	83	-0.5%
MT	13	n/a	n/a	n/a	n/a	10	14	19	n/a
NL	199	233	208	201	158	126	204	217	-2.1%
PL	1,813	1,959	1,652	1,581	1,466	1,248	1,275	1,238	-6.6%
PT	484	487	397	352	347	304	302	328	-6.8%
RO	866	731	779	1,160	1,146	1,154	1,189	1,221	7.4%
SE	66	79	86	52	67	58	74	64	-1.7%
SI	60	47	42	53	40	39	43	41	-4.2%
SK	157	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
UK*	597	645	632	553	631	618	618	n/a	0.1%
CH	114	133	125	113	93	119	88	87	-5.0%
IL	150	137	117	131	128	129	124	147	-0.4%
NO	23	26	28	28	23	20	22	18	-4.4%
RS	448	516	489	455	432	374	326	294	-7.0%
EU 26	**11,086**	**10,973**	**10,102**	**9,832**	**9,849**	**9,626**	**9,615**	**9,486**	**-2.24%**

	Estimated number of people living in urban areas in 2017**	Fig.4 Road deaths on urban roads per million urban inhabitants. Average number of deaths in 2015-2017
NO	3,791,247	5.3
SE	7,146,534	9.1
UK	56,889,339	10.9
NL	14,570,525	12.5
IE	3,062,005	14.0
ES	34,244,626	14.3
CH	6,348,341	15.4
DE	63,376,630	15.7
FI	3,846,805	16.9
DK	3,150,325	19.2
LU	301,831	21.0
AT	5,193,536	22.1
BE	9,308,416	22.6
EE	773,593	23.7
FR	42,261,762	23.8
IT	51,198,081	28.9
MT	459,376	31.2
CZ	6,632,920	31.6
SI	1,140,374	36.0
LV	1,035,512	38.0
HU	5,878,537	40.5
PT	7,505,369	41.5
BG	4,680,125	50.4
LT	1,517,933	53.4
PL	21,910,400	57.2
EL	6,665,511	57.8
CY	616,312	59.5
RS	4,491,694	73.8
HR	2,205,887	87.9
RO	11,295,501	105.2
IL**	n/a	n/a
SK	3,190,546	n/a
EU 26	**366,014,287**	**26.1**

Data source: EU CARE data, Eurostat and PIN panellists.
EU26: MT and SK are excluded from the EU average and the Fig.1 due to insufficient data.
LU is excluded from the Figure 1 as the numbers of road deaths are relatively small and subject to substantial annual fluctuations but LU data are included in the EU26 average.
*UK - average annual change in road deaths on urban roads over the period 2010-2016.
**The number of urban population in 2017 was calculated by applying the Eurostat data on the proportion of urban population in 2014 (the latest data available) to 2017 population figures assuming the proportions of urban population have not changed significantly from 2014 to 2017.
***IL - excluded from Fig.4 as the proportion of inhabitnats in urban areas was not available on Eurostat.

Table 3. Total number of road deaths on rural non-motorway roads over the period 2010-2017.

	2010	2011	2012	2013	2014	2015	2016	2017	Fig.3 Average annual change in road deaths on rural non-motorway roads 2010-2017
AT	333	325	316	303	259	301	276	251	-3.6%
BE	459	444	373	348	354	384	336	308	-4.7%
BG	427	385	348	354	371	379	428	420	0.9%
CY	10	24	17	25	8	14	10	10	-7.0%
CZ	483	472	455	388	431	483	356	359	-3.7%
DE	2,207	2,441	2,151	1,934	2,019	1,997	1,853	1,795	-3.5%
DK	153	137	100	119	121	100	119	108	-3.7%
EE	65	76	n/a	n/a	56	n/a	51	34	n/a
ES	1,516	1,266	1,144	940	957	971	964	1,013	-5.4%
FI	205	207	186	193	159	189	188	173	-2.1%
FR	2,621	2,599	2,385	2,077	2,171	2,175	2,188	2,156	-2.9%
EL	578	501	432	336	338	352	352	337	-7.1%
HR	123	138	118	113	95	112	97	123	-2.5%
HU	424	355	364	328	362	349	346	362	-1.5%
IE	154	130	112	135	127	121	126	109	-2.8%
IT	1,956	1,778	1,761	1,643	1,589	1,621	1,546	1,615	-2.7%
LU	22	22	20	24	23	28	19	16	-2.3%
LV	140	126	124	126	143	144	128	92	-2.7%
LT	216	205	188	125	153	155	110	106	-9.6%
MT	n/a	n/a	n/a	n/a	n/a	1	9	0	n/a
NL	254	266	280	203	205	305	239	236	-0.9%
PL	2,067	2,193	1,875	1,736	1,680	1,629	1,701	1,523	-4.5%
PT	342	320	263	241	241	228	223	223	-6.0%
RO	1,493	1,271	1,246	677	651	720	698	694	-11.3%
SE	167	213	174	177	155	174	168	158	-2.0%
SI	59	74	68	56	52	66	61	44	-3.7%
SK	200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
UK*	1,196	1,216	1,086	1,124	1,142	1,093	1,151	n/a	-0.6%
CH	190	165	151	133	138	113	109	118	-7.2%
IL	187	189	137	138	137	176	173	155	-1.2%
NO	163	131	103	122	96	82	84	56	-11.9%
RS	168	180	165	152	88	159	229	237	3.6%
EU 26	**17,670**	**17,184**	**15,652**	**13,791**	**13,863**	**14,143**	**13,735**	**13,416**	**-3.9%**

	Fig.3. Difference between the average annual change in the number of road deaths on urban roads and on rural non-motorway roads 2010-2017
RS	-10.6%
LV	-5.5%
BG	-3.8%
HR	-2.8%
PL	-2.1%
CZ	-1.8%
NL	-1.2%
PT	-0.8%
AT	-0.5%
SI	-0.5%
EL	0.0%
IT	0.0%
DK	0.2%
SE	0.3%
HU	0.6%
UK*	0.7%
IL	0.8%
BE	1.1%
FR	1.5%
FI	1.5%
IE	1.5%
CH	2.2%
DE	2.3%
ES	5.3%
CY	6.8%
LU	7.2%
NO	7.5%
LT	9.1%
RO	18.7%
EU 26	1.7%
EE	n/a
MT	n/a
SK	n/a

Data source: EU CARE data and PIN panellists.
EU26: MT and SK are excluded from the EU average and the figure due to insufficient data.
LU is excluded from the Fig.1 as the numbers of road deaths are relatively small and subject to substantial fluctuations but LU data are included in the EU26 average.
*UK - average annual change in road deaths on urban roads over the period 2010-2016.

Table 4. Road deaths per billion vehicle-km on urban roads and rural non-motorway roads (for comparison) over the period 2015-2017.

Million veh km travelled on urban roads

	2014	2015	2016	2017	Note on data collection methodology
AT	22,320	22,854	23,438	n/a	Source: Ergebnisse der Österreichischen Luftschadstoff-Inventur 2017 (OLI 1990-2016), Umweltbundesamt
FR		175,500	180,000	181,800	It is estimated that the share of urban non-motorway traffic is 30%. This figure has not been updated recently.
GB	183,600	184,100	184,700	184,600	
SI	3,955	3,975	4,003	4,057	Methodology based on traffic counters for state roads and estimation for local roads based on study.
CH	19,764	20,111	20,515	20,888	Included are cars and vans, ptw, coaches (just one categorie), busses and public transport (busses and trams). Estimates are provided by surveys (observational and questionnaire), data bases (vehicle stock), vehicle inspections and statistical models. These models are revised regularly and estimates are updated. The extrapolation of vehicle-kilometres for urban or rural roads as well as for motorways is based on the study "Fahrleistung des Strassenverkehrs in der Schweiz", August 2014
IL	20,438	21,622	22,943	21,745	Each vehicle reports vehicle-kms travelled while vehicle license is renewed. CBS processes the data according to vehicle types and produces annual figures.

Million veh km travelled on rural non-motorway roads
(note: only countries that could provide data on veh/km travelled on urban roads are included in fig.5)

	2014	2015	2016	2017	Note on data collection methodology
AT	29,100	29,801	30,624		
EE	5,700	5,900	6,200	6,300	Direct counting with counting systems on state roads. For the roads without counting points modeling methods are used.
ES	102,352	104,221	106,935	109,083	Traffic on the road network administrated by the City Councils is not included. According to estimatios of the Ministry of Foemneto it can be 10% of the total
FI	36,900	37,400	37,800	38,300	All vehicles, all highways (streets and private roads excluded). Finnish road statistics; Finnish Transport Agency. Estimated by using information from odometer readings and road detectors.
FR		257,400	264,000	266,640	It is estimated that the share of rural non-motorway traffic is 44%. This figure has not been updated recently.
GB	213,600	218,500	226,200	231,400	
SE	35,652	35,599	36,285	36,742	National road database (Non motorway, state roads)
SI	7,294	7,389	7,498	7,706	
CH	21,492	21,869	22,303	22,707	
IL	31,962	33,198	34,277	37,857	Total vehicle-km travelled on non-urban roads, including motorways. We do not have separate values for motorways only.

In all countries data on veh-km travelled include all motorised vehicles.

Table 5. Proportion of all road deaths by road type, average years 2015-2017.

	Fig.6 Proportion of road deaths by road type, 2015-2017			
	Proportion of road deaths on urban roads	Proportion of road deaths on rural non-motorway roads	Proportion of road deaths on motorways	Porportion of road deaths on unknown roads
MT**	74%	26%	0%	0%
CY	71%	22%	8%	0%
RO	62%	37%	1%	0%
HR	59%	34%	7%	0%
RS	56%	35%	9%	0%
PT	53%	38%	9%	0%
EL	49%	44%	6%	0%
IT	44%	47%	9%	0%
PL	43%	55%	2%	0%
CH	42%	49%	9%	0%
IL	41%	52%	8%	0%
LT	38%	58%	3%	0%
HU	38%	56%	6%	0%
NL	35%	50%	15%	0%
SI	35%	48%	17%	0%
UK*	34%	61%	5%	0%
BG	34%	58%	8%	0%
CZ	33%	62%	5%	0%
DK	32%	58%	10%	0%
BE	31%	50%	15%	4%
DE	30%	57%	12%	0%
FR	29%	63%	8%	0%
EE*	28%	72%	0%	0%
ES***	28%	55%	17%	0%
AT	26%	62%	11%	0%
IE	26%	71%	4%	0%
FI	25%	72%	3%	0%
SE	25%	63%	7%	4%
LV	24%	76%	0%	0%
LU**	20%	68%	12%	0%
NO	18%	65%	7%	11%
EU 27	**38%**	**54%**	**8%**	**0%**
SK	n/a	n/a	n/a	n/a

Data source: EU CARE data and PIN panellists.
*UK - 2014-2016
*EE - 2014, 2015-2016
SK is excluded from the Fig.6 and the EU average due to insufficient data.
**LU and **MT are excluded from the Fig.6 as the numbers of road deaths are relatively small and subject to substantial fluctuation.
***ES - deaths on motorways and autovias taken together.

Table 6. Proportion of reported road deaths on urban roads by road user group, average years 2015-2017.

	pedestrian	cyclist	PTW rider deaths	car + taxi occupant	van (<3.5t) occupant	HGV (>3.5t) or bus occupant	other/ unknown
LU**	68%	0%	0%	26%	5%	0%	0%
CH	40%	27%	16%	14%	0%	1%	1%
LV	58%	8%	9%	21%	2%	2%	1%
DE	37%	25%	15%	20%	0%	1%	2%
HU	41%	20%	13%	23%	1%	1%	2%
AT	43%	18%	12%	23%	1%	1%	2%
DK	30%	29%	17%	21%	1%	1%	1%
CZ	45%	15%	10%	26%	2%	0%	1%
RO	48%	11%	5%	28%	2%	1%	4%
PL	47%	12%	12%	27%	0%	1%	2%
IL	54%	4%	17%	12%	1%	2%	11%
EE**	54%	4%	0%	24%	1%	0%	19%
FI	28%	29%	11%	27%	2%	2%	2%
ES	51%	4%	26%	15%	1%	1%	2%
UK*	46%	7%	17%	24%	1%	1%	3%
NO	37%	15%	19%	30%	0%	0%	8%
SE	34%	17%	18%	27%	1%	1%	3%
BG*	44%	6%	13%	34%	n/a	1%	2%
NL	17%	31%	18%	18%	1%	0%	15%
IE	37%	9%	18%	31%	3%	0%	2%
BE	28%	17%	18%	33%	2%	0%	1%
MT**	50%	0%	18%	32%	0%	0%	0%
RS	32%	11%	9%	37%	0%	3%	7%
IT	31%	11%	29%	28%	1%	0%	1%
FR	33%	7%	28%	27%	2%	1%	2%
PT	33%	6%	25%	25%	7%	1%	4%
SI	22%	16%	20%	23%	0%	1%	19%
HR	26%	11%	18%	41%	1%	1%	2%
CY	35%	1%	31%	28%	3%	1%	1%
EL	27%	2%	43%	25%	2%	1%	1%
LT	10%	7%	14%	30%	0%	0%	38%
EU 26	**39%**	**12%**	**19%**	**25%**	**1%**	**1%**	**3%**
SK	n/a						

Data source: EU CARE data and PIN panellists.
EU26: BG and SK are excluded from the EU average due to insufficient data.
*BG - 2015.
**EE - 2016-2017.
*UK - 2015-2016.
**EE, **LU and **MT are excluded from the Fig.8 due to relatively small numbers of road deaths that are subject to substantial fluctuation.
SK is excluded from the Fig.8 as the data are not available.

Table 7. Average annual change in the reported number of seriously injured on urban roads over the period 2010-2017 based on national definitions of a serious injury.

	2010	2011	2012	2013	2014	2015	2016	2017	Fig.9 Average annual change in seriously injured on urban roads 2010-2017
AT**	5,213	5,452	4,095	3,773	3,975	3,907	3,960	3,940	-4.2%
BE	2,025	2,151	1,876	1,725	1,912	1,847	1,764	1,734	-2.4%
BG*	1,456	1,405	1,325	1,463	1,312	1,354	n/a	n/a	-1.3%
CY	475	444	445	324	363	314	323	333	-5.8%
CZ	1,500	1,581	1,568	1,479	1,449	1,362	1,366	1,173	-3.4%
DE	33,262	36,954	35,350	33,843	36,054	35,774	35,482	34,966	0.3%
DK	1,127	1,254	1,099	1,071	1,041	1,030	1,020	977	-2.6%
ES	4,353	4,522	4,400	4,904	4,740	4,751	4,705	4,780	1.3%
FR	15,794	15,518	14,366	13,564	13,696	13,555	13,608	13,991	-2.0%
EL	1,045	1,030	921	778	670	590	560	439	-11.9%
HR	2,281	2,488	2,234	2,084	2,041	2,119	2,027	1,969	-2.6%
HU	3,427	3,082	3,077	3,314	3,381	3,458	3,419	3,501	1.2%
IE**	207	176	172	226	361	404	492	n/a	19.6%
LU	104	143	153	130	110	134	122	99	-2.0%
LV	244	227	184	181	172	186	202	235	-1.0%
PL	7,405	8,452	8,226	7,854	7,946	7,562	8,000	7,376	-0.6%
PT	1,388	1,404	1,251	1,244	1,241	1,331	1,242	1,290	-1.1%
RO	6,412	6,611	6,758	6,196	6,094	6,863	6,128	6,094	-0.8%
SE†	2,597	2,482	2,398	2,640	2,714	2,630	2,594	2,562	0.5%
SI	491	505	491	378	469	573	506	473	0.5%
UK*	12,490	12,929	13,077	12,073	12,586	12,246	13,076	n/a	0.0%
CH	2,637	2,633	2,531	2,548	2,560	2,332	2,383	2,235	-2.2%
IL	1,028	835	1,041	1,079	1,026	1,178	1,178	1,311	4.6%
NO	113	154	133	226	221	249	215	216	10.1%
RS	3,150	3,107	2,916	2,790	2,881	2,639	2,469	2,578	-3.3%
EU 21	**103,296**	**108,810**	**103,466**	**99,244**	**102,327**	**101,990**	**101,950**	**100,854**	**-0.6%**
EE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FI	n/a	n/a	n/a	n/a	n/a	194	190	145	n/a
IT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
LT	n/a	n/a	n/a	n/a	n/a	96	52	81	n/a
MT	204	n/a	n/a	n/a	n/a	246	205	260	n/a
NL***	2,032	n/a	n/a	n/a	n/a	8,679	8,598	8,368	n/a
SK	635	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

	Fig.9 Average annual change in seriously injured on urban roads 2010-2017
EL	-11.9%
CY	-5.8%
AT**	-4.2%
CZ	-3.4%
RS	-3.3%
DK	-2.6%
HR	-2.6%
BE	-2.4%
CH	-2.2%
LU	-2.0%
FR	-2.0%
BG*	-1.3%
PT	-1.1%
LV	-1.0%
RO	-0.8%
PL	-0.6%
UK*	0.0%
DE	0.3%
SI	0.5%
SE†	0.5%
HU	1.2%
ES	1.3%
IL	4.6%
NO	10.1%
IE**	19.6%
EU 21	**-0.6%**

Data source: EU CARE data and PIN panellists.
EU21: seriously injured according to each country's national definition (definitions are available in Table 10).
*UK - 2010-2016.
*BG - 2010-2015.
†SE - hospital data.
**AT substantial changes in the serious injury reporting system were introduced in 2012, data from the previous years are not comparable, therefore AT is excluded from the Fig.9.
**IE - substantial changes in the serious injury reporting system were introduced in 2014, data from the previous years are not comparable, therefore IE is excluded from the Fig.9.
***NL serious injury data are based on police records and not on the national definition.

Table 8. Total number of seriously injured on rural non-motorway roads over the period 2010-2017.

	2010	2011	2012	2013	2014	2015	2016	2017	Fig.11 Average annual change in seriously injured on rural non-motorway roads 2010-2017
AT**	4,759	4,832	3,512	3,161	3,063	3,135	3,163	3,300	n/a
BE	2,357	2,439	1,913	1,687	1,828	1,677	1,708	1,596	-5.6%
BG*	933	868	823	773	789	844	n/a	n/a	-2.4%
CY	79	86	77	65	69	50	63	46	-7.5%
CZ	1,244	1,383	1,309	1,177	1,188	1,075	1,087	1,023	-3.7%
DE	24,434	26,808	25,766	25,046	25,971	26,098	25,841	25,573	0.3%
DK	839	807	765	736	664	646	673	688	-3.4%
ES	6,141	5,556	4,920	4,100	3,813	3,780	3,930	3,753	-6.9%
FR	12,443	12,178	10,882	10,340	10,669	11,047	11,560	11,862	-0.6%
EL	553	516	425	362	309	355	293	224	-11.1%
HR	762	795	693	626	561	601	603	698	-3.0%
HU	2,035	1,900	1,678	1,803	1,789	1,897	1,896	1,906	-0.1%
IE**	339	291	288	270	373	402	450	n/a	n/a
LU	132	143	151	158	110	163	107	129	-2.1%
LV	325	304	309	271	262	293	323	261	-1.7%
PL	4,014	4,070	3,733	3,735	3,622	3,514	3,942	3,573	-1.4%
PT	852	720	575	597	654	667	634	703	-1.7%
RO	2,017	2,119	2,045	1,914	1,980	2,119	2,070	2,016	0.0%
SE†	1,541	1,512	1,574	1,609	1,736	1,648	1,770	1,618	1.6%
SI	323	346	292	286	300	299	293	330	-0.7%
UK*	10,348	10,348	10,147	9,703	10,294	9,983	11,128	n/a	0.6%
CH	1,495	1,521	1,380	1,346	1,275	1,298	1,198	1,204	-3.4%
IL	617	461	530	500	491	571	620	690	3.0%
NO	536	442	470	343	304	323	319	297	-8.0%
RS	636	580	513	511	322	591	730	794	3.2%
EU 21	**76,470**	**78,021**	**71,877**	**68,419**	**70,044**	**70,293**	**72,378**	**71,124**	**-1.1%**

	Fig.11 Annual change urban serious injuries vs rural serious injuries 2010-2017
RS	-6.5%
SE†	-2.1%
FR	-1.4%
RO	-0.9%
EL	-0.8%
UK*	-0.6%
DE	0.0%
LU	0.0%
CZ	0.3%
HR	0.3%
PT	0.6%
LV	0.7%
DK	0.8%
PL	0.8%
BG*	1.1%
SI	1.2%
CH	1.2%
HU	1.4%
IL	1.6%
CY	1.7%
BE	3.2%
ES	8.2%
NO	18.1%
EU 21	**0.5%**

EE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FI	n/a	n/a	n/a	n/a	n/a	269	256	257
IT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
LT	n/a	n/a	n/a	n/a	n/a	46	19	46
MT	n/a	n/a	n/a	n/a	n/a	58	88	42
NL***	1,322	n/a	n/a	n/a	n/a	3,208	3,375	3,202
SK	530	n/a	n/a	n/a	n/a	n/a	n/a	n/a

AT**	n/a
IE**	n/a

Data source: EU CARE data and PIN panellists.
EU21: seriously injured according to each country's national definition (definitions are available in Table 10).
*UK - 2010-2016.
*BG - 2010-2015.
†SE - hospital data.
**AT substantial changes in the serious injury reporting system were introduced in 2012, data from the previous years are not comparable, therefore AT is excluded from the Fig.11.
**IE - substantial changes in the serious injury reporting system were introduced in 2014, data from the previous years are not comparable, therefore IE is excluded from the Fig.11
***NL serious injury data are based on police records and not on the national definition.

Table 9. Proportion of serious road traffic injuries on urban roads by road user group, average for years 2015-2017. Serious injury data are based on national definitions.

	Fig.13 2015-2017 average						
	bicycle rider	pedestrian	PTW user	car + taxi occupant	van (<3.5t)	HGV (>3.5t) or bus occupant	other/ unknown
SE	61%	7%	9%	18%	0%	2%	2%
IE	25%	38%	12%	22%	2%	0%	0%
DK	40%	22%	22%	15%	0%	0%	0%
LT	10%	50%	13%	24%	0%	2%	0%
CZ	21%	37%	18%	18%	1%	3%	1%
CH	35%	24%	27%	11%	1%	1%	2%
NO	24%	32%	22%	17%	2%	1%	2%
BE	30%	24%	21%	22%	1%	1%	1%
DE	33%	20%	18%	25%	1%	1%	1%
AT	31%	22%	26%	16%	0%	2%	2%
HU	28%	25%	21%	22%	1%	2%	1%
UK*	18%	34%	22%	22%	1%	2%	1%
RO	13%	39%	7%	33%	2%	2%	4%
LV	10%	41%	14%	29%	1%	2%	2%
SI	29%	22%	20%	14%	0%	1%	13%
PL	15%	36%	13%	30%	-	4%	2%
IL	6%	44%	23%	13%	1%	4%	9%
BG*	7%	42%	13%	31%	-	4%	3%
LU	10%	37%	24%	25%	0%	3%	1%
RS	15%	30%	16%	30%	-	5%	4%
FI	21%	23%	31%	21%	1%	0%	2%
ES	7%	37%	41%	12%	1%	1%	1%
FR	8%	29%	36%	24%	1%	1%	1%
PT	7%	29%	29%	25%	5%	1%	4%
HR	15%	21%	24%	36%	1%	1%	2%
MT	4%	29%	30%	32%	2%	2%	1%
NL***	24%	4%	26%	14%	1%	0%	31%
CY	4%	23%	42%	29%	2%	1%	0%
EL	2%	20%	59%	17%	1%	0%	0%
EU24	**23%**	**25%**	**22%**	**23%**	**1%**	**1%**	**4%**
EE	n/a						
IT	n/a						
SK	n/a						

Data source: EU CARE data and PIN panellists.
BG is excluded from the EU average.
*BG - 2015.
*UK - 2015-2016.
***NL- serious injury data are based on police records and not on the national definition.

Table 10. Current national definitions of a seriously injured person in a road collision.

	National definition of a seriously injured person (before introducing MAIS 3+ definition) in a road collision corresponding to the data Fig.9 and Fig.10
AT	Whether an injury is severe or slight is determined by §84 of the Austrian criminal code. A severe injury is one that causes a health problem or occupational disability longer than 24 days, or one that "causes personal difficulty". Police records. As of 1.1.2012, only 2 instead of 3 degrees of severities, slight, degree unknown, severe. Therefore and because of lower underreporting due to the new police recording system, the figure increased substantially.
BE*	Hospitalised more than 24 hours. In practice no communication between police and hospitals take place so in most cases allocation is made by the police without the feedback from the hospitals. Police records.
BG	The level of "body damage" is defined in the Penalty code. There are 3 – light, medium and high levels of body damage. Prior to introducing MAIS in the Police records the first level was "light injured", the second and third is "heavy injured". The medium and high level corresponded to MAIS 3+ levels, as it is defined in the CADaS Glossary.
CY*	Hospitalised for at least 24 hours. Police records.
CZ	Determined by the treating doctor, if serious health harm (specified approximatelly along the types by the law) occurs. Police records.
DE*	Hospitalised for at least 24 hours. Police records.
DK	All injuries except "slight". Police records.
EE*	Hospitalised for at least 24 hours. Hospital data are used to find out how long the person involved in collision (according to the police data) was hospitalised.
ES*	Hospitalised for at least 24 hours. Police records.
FI	Serious injury in official statistics is defined as MAIS3+ (AAAM, Association for the Advancement of Automotive Medicine). The number of seriously injured MAIS3+ is formed by combining the official road accident participant statistics maintained by Statistics Finland, and the Hospital Discharge Register (HILMO), using personal identity numbers as the link. ICD-10 codes from hospital data are converted to MAIS.
FR*	Until 2004: hospitalised for at least 6 days. From 2005: hospitalised for at least 24 hours. Police records. People injured are asked to go to the police to fill in information about the collision, in particular if they spent at least 24 hours as in-patient.
EL*	Injury and injury severity are estimated by police officers. It is presumed that all persons who spent at least one night at the hospital are recorded as seriously injured persons. Police records.
HR	ICD - International Classification of Deseases - used by medical staff exclusively, after admission to the hospital.
HU	Serious injury which necessitates hospitalisation for more than 48 hours within seven days after occurrence or caused fracture, except for finger, toe, nose fractures; or caused cut wounds, which resulted in serious bleeding or nerve, muscle or tendon injuries; or caused injury of inner organs; or caused burn of second or third degree or burn affecting more than 5% of body surface.
IE*	Hospitalised for at least 24 hours as an in-patient, or any of the following injuries whether or not detained in hospital: fractures, concussion, internal injuries, crushing, severe cuts and lacerations, several general shock requiring medical treatment.
IT	Separate statistics on serious and slight injuries are n/a in the Road accidents dataset. Despite that, Italy calculated the number of serious injured according to EU reccomendations (MAIS 3+), and using data based on hospitals discharge records where no information about the road accident are available, but only some info regarding the person.
LU*	Hospitalised for at least 24 hours as in-patient. Police records.
LV*	From 2004: hospitalised more than 24 hours as in-patient. Police records.
LT	Serious injury: seriously injured person loses more than 30% of his/her working capacity or/and his or her body is being incurably injured.
MT	An injury accident is classified as serious injury (referred to in Malta accident statistics as grievous injury) if the person does not recover his/her previous health condition with 30 days. Police records.
NL	Definition: "A serious road injury is a road crash casualty who has been admitted to hospital with a minimum MAIS (Maximum Abbreviated Injury Score5) injury severity of at least 2 on a scale of 6, and who has not died within 30 days from the consequences of the crash." Method: MAIS=2 or higher. Linked Police-Hospital records + remainder file + estimate of unobserved C/RC. MAIS3+ is a subset of MAIS2+.
PL	A person who sustained a serious disability, a serious incurable disease or a chronic life threatening disease, permanent mental disease, complete or substantial permanent incapacity to work in their current occupation or a permanent or substantial scarring or disfiguration of the body; the definition also includes persons who have suffered other injuries incapacitating their bodies or causing ill health for longer than 7 days". Police records.
PT*	Hospitalised for at least 24 hours. Police records.

RO	Person seriously injured in traffic accident, person who has suffered: a) loss of a sense or organ or cessation of their operation; b) permanent physical or mental disability; c) a serious and permanent aesthetic wound; d) an abortion; e) fractures, except for nasal or zygomatic bone fractures, fingers, claviculus, monofocal fractures of 1-3 ribs or 1-3 tooth pulsations, if they did not require hospitalization for more than 24 hours; f) shock, concussion, internal injuries, crushing, severe cuts and tears or polytrauma that required hospitalization for more than 24 hours; g) abrasions, sprains, contusions or other such injuries that required hospitalization for more than two working days. Serious shock, or any other injury which leads to death more than 30 days after the collision. Police records.
SE	The definition of seriously injured was updated in 2007. A serious injury is now defined as a health loss following a traffic injury reflecting that a person does not recover the previous health condition within a reasonable amount of time. This series is used in the national annual follow up and there is a goal for 2020 (-25% since 2007). Hospital records.
SI	Any injured persons who were involved in a road traffic accident and sustained injuries due to which their lives were in danger or due to which their health was temporarily or permanently damaged or due to which they were temporarily unable to perform any work or their ability to work was permanently reduced (Penal Code of the Republic of Slovenia). Police records.
SK	Serious bodily harm or serious disease, which is a) mutilation, b) loss or substantial impairment of work capacity, c) paralysis of a limb, d) loss or substantial impairment of the function of a sensory organ, e) damage to an important organ, f) disfigurement, g) inducing abortion or death of a foetus, h) agonising suffering, i) health impairment of longer duration. Health impairment of longer duration is an impairment, which objectively requires treatment and possibly involves work incapacity of not less than forty-two calendar days, during which it seriously affects the habitual way of life of the injured party.
UK*	Hospitalised for at least 24 hours or any of the following injuries whether or not they are detained in hospital: fractures, concussion, internal injuries, crushing, burns (excluding friction burns), severe cuts and lacerations, severe general shock.
CH*	Up to 2014: Hospitalised for at least 24 hours or if the injury prevented the person from doing its daily activity for 24 hours. Since 2015: Hospitalised for at least 24 hours. Police records. In Switzerland, injury severity is still assessed by means of a simple definition by the police force present at the scene. Nothing is known of the type and long-term outcome of injuries. In order to improve the assessment of injury severity a first step was taken: since January 2015 the definition of injury severity was further specified and the police officers were trained. Also a new category "life-threatening injury" was introduced. For a further standardization the severity scale was linked to the NACA-Codes, used by all emergency services in Switzerland.
IL*	Hospitalised more than 24 hours as in-patient. Police records. Recently, MAIS 3+ definitions were applied.
NO	Very serious injury: any injury that is life-threatening or results in permanent impairment. Serious injury: any injury from a list of specific injuries; these would normally require admission to hospital as an in-patient. Police records.
RS	Using of the ICD-International Classification of Diseases. Categorisation of an injury as a "serious injury" is made on the basis of expert assessment given by doctors during admission to hospital, during hospitalisation or after the hospitalisation. The Republic of Serbia has not yet adopted a definition for serious injury. Police records.

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