REDUCING SERIOUS INJURIES ON EUROPEAN ROADS

PIN Flash 48

March 2025

European Transport Safety Council

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The PIN programme relies on panellists in the participating countries to provide data 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 reports' review process to ensure the findings' accuracy and reliability.

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About the PIN Programme

The ETSC Road Safety Performance Index (PIN) is a policy tool to help national governments and the European Union improve road safety. By comparing performance between countries, it serves to identify and promote best practices in Europe and bring about the kind of political leadership that is needed to create a road transport system that maximises safety.

Launched in June 2006, the index covers all relevant areas of road safety including road user behaviour, infrastructure and vehicles, as well as road safety policymaking more generally. The programme covers 32 countries: the 27 Member States of the European Union, together with Israel, Norway, the Republic of Serbia, Switzerland and the United Kingdom.

National research organisations and independent researchers participate in the programme and ensure that any assessment carried out within the programme is based on scientific evidence.

About The European Transport Safety Council (ETSC)

The European Transport Safety Council is the independent voice for road safety in Europe.

We are a non-profit international organisation, with members from across Europe, dedicated to reducing deaths and injuries in transport. Founded in 1993 in Brussels, we provide an impartial source of expert advice on transport safety matters to the European Commission, the European Parliament, international organisations, and national governments.

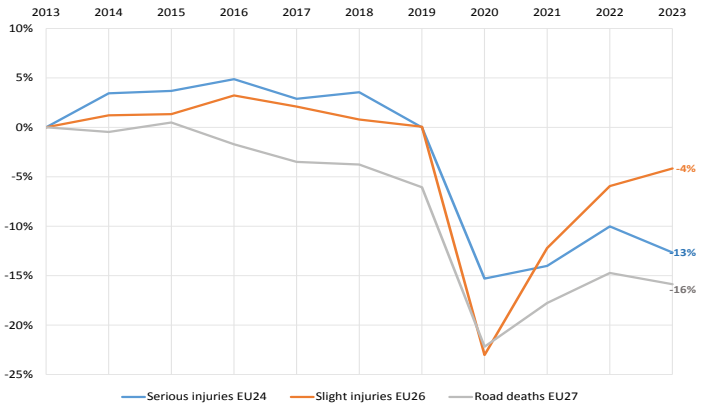
CONTENTS

CONTENTS

REDUCING SERIOUS INJURIES ON EUROPEAN ROADS

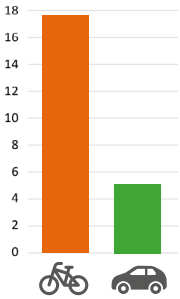
European Transport Safety Council

SERIOUS INJURIES DECLINING MORE SLOWLY THAN ROAD DEATHS

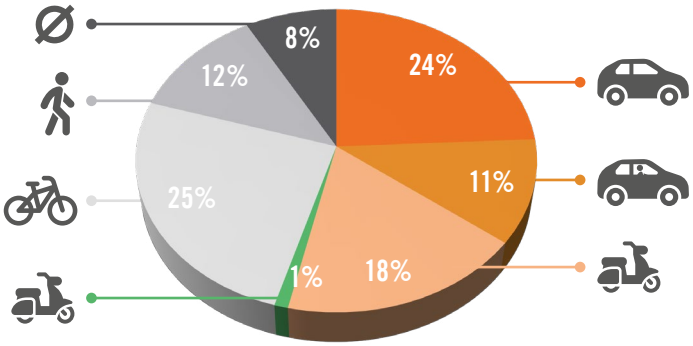


APPROX. 1,291,000 PEOPLE RECORDED AS INJURED EACH YEAR

THE PROPORTION OF SERIOUSLY INJURED PER DEATHS FOR CYCLISTS IS **3 TIMES HIGHER** THAN FOR CAR DRIVERS



57% OF THOSE SERIOUSLY INJURED ARE VULNERABLE ROAD USERS CYCLISTS REPRESENT THE HIGHEST PROPORTION OF ALL THOSE SERIOUSLY INJURED

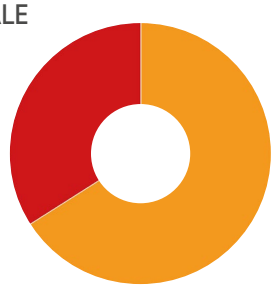


10-19 YEAR OLDS REPRESENTS **12%** OF ALL **MALE** SERIOUS INJURIES AND **11%** OF ALL **FEMALE** SERIOUS INJURIES
(ALMOST DOUBLE THE PROPORTION OF ALL ROAD DEATHS FOR THE SAME AGE GROUP)

66% OF SERIOUSLY INJURED ARE MALE AND 34% ARE FEMALE

66 Male

34 Female



THE RATIO BETWEEN KILLED AND SERIOUSLY INJURED VARIES FROM **1** IN THE COUNTRIES WITH THE **LOWEST RATE** TO **20** IN THE COUNTRY WITH THE **HIGHEST RATE**

ETSC'S RECOMMENDATIONS

- Collect serious injury data (MAIS3+ and national definition)
- Reduce the speed for motorised vehicles in residential and core urban zones to 30 km/h
- Set national targets for reducing serious injuries
- Develop safer infrastructure in general, paying special attention to the needs of vulnerable road users

EXECUTIVE SUMMARY

This report provides an in-depth assessment of serious road traffic injuries across Europe and presents key recommendations to enhance road safety for both national governments and the EU. The Road Safety Performance Index (PIN) programme, which underpins this report, serves as a vital policy tool to assist national governments and the European Union in their efforts to improve road safety across 32 participating countries, including the 27 Member States of the EU, as well as Israel, Norway, the Republic of Serbia, Switzerland, and the United Kingdom.

The report highlights that serious injuries are a critical, yet often underestimated, aspect of road safety. While road deaths rightly receive significant attention, the long-term consequences of serious injuries, including pain, disablement, and the associated societal costs, demand greater consideration. Approximately 1,291,000 people are reported injured annually in the European Union, 141,000 of these injuries are serious. However, this figure likely underestimates the true extent of the problem due to inconsistencies in data collection and sometimes massive underreporting.

One of the primary challenges identified in the report is the significant inconsistency in data collection and comparability across different countries. Varying data collection methods, definitions of what constitutes a serious injury, and levels of reporting lead to substantial discrepancies in the recorded numbers. The report notes that the actual number of serious injuries is often considerably higher than the number officially recorded by the police. For example, comparisons between collision data in Czechia from the police database and the public health insurance system revealed that the police database contained only 43% of the data found in the public health insurance system.

To address this issue, the EU has defined a common definition of a serious road injury as one where a person is an in-patient with an injury level of MAIS3 or more (MAIS3+). The Abbreviated Injury Scale (AIS) is a globally accepted, anatomical-based trauma classification of injuries. The Maximum Abbreviated Injury Scale (MAIS) is the maximum AIS of all injury diagnoses for a person. While this common definition is a step in the right direction, the report acknowledges that achieving comparability in practice remains a challenge due to the variety of methods used by Member States to estimate the number of people seriously injured. In addition to MAIS3+ data, the EU encourages Member States to continue collecting data based on their previous national definitions.

Underreporting is a significant concern, particularly among vulnerable road users (VRUs) such as pedestrians, cyclists and motorcyclists. A study in the Netherlands found that there was a police record for about 65% of those seriously injured in a collision with a motor vehicle involved, but only about 12% of those resulting from crashes where no motor vehicle was involved. This is especially pertinent given that a significant proportion of vulnerable road users are seriously injured in crashes with no other motor vehicle involved.

In 2018, the European Commission announced a target to reduce serious road traffic injuries by 50% between 2020 and 2030. This ambitious goal aligns with the Valletta Declaration on road safety in 2017 which called for such a target. In response, many PIN countries have incorporated serious injury reduction targets into their national road safety strategies. However, the report highlights that progress in reducing serious and slight injuries is lagging behind the reduction in road deaths. Serious injuries in the EU24 decreased by 13% between 2013 and 2023, which is slower than the 16% decrease in road deaths, but faster than the reduction of slight injuries. The report emphasises that the size of the decrease over the period 2013-2023 is far from the objective of reaching a 50% reduction over the decade 2020-2030.

The distribution of serious injuries across different road user groups varies considerably among PIN countries. On average across the EU, car occupants account for 35% of those seriously injured (24% car drivers and 11% car passengers), while cyclists represent a

disproportionately high percentage (25% compared to 10% for road deaths). This highlights the vulnerability of cyclists and the need for targeted measures to improve their safety.

There are also notable gender differences in serious injuries. Across the EU, men account for 66% of serious injuries, while women account for 34%. The proportion of male seriously injured road users varies from 81% in Greece to 55% in Estonia.

To address the challenges and achieve the ambitious reduction target, the report advocates for a "Safe System" approach to road safety. This approach recognises the vulnerability of the human body and aims to create a road safety system that minimises the risk of both deaths and serious injuries. Key elements of the Safe System approach include:

- Safe speeds: Managing speed to levels appropriate for the road environment and the vulnerability of road users.
- Safe roads: Designing and maintaining infrastructure that reduces the risk of collisions and minimises injury severity.
- Safe vehicles: Promoting vehicle safety technologies that prevent collisions and protect occupants and vulnerable road users in the event of a crash.
- Safe road users: Encouraging responsible road user behaviour through education, enforcement, and incentives.
- Post-crash care: Ensuring timely and effective emergency response and medical care to minimise the consequences of collisions.

To implement the Safe System approach and achieve the 2030 target, the report makes several key recommendations, directed at both national governments and the EU. These recommendations are summarised below and listed throughout the report.

This report underscores the urgent need for a concerted effort to improve road safety across Europe. By addressing inconsistencies in data collection, implementing evidence-based interventions, and adopting a comprehensive Safe System approach, both national governments and the EU can work to reduce serious injuries and create a safer road environment for all.

MAIN RECOMMENDATIONS TO NATIONAL GOVERNMENTS

- Collect serious injury data according to the MAIS3+ definition and continue collecting data based on national definitions.
- Consider how to improve the registration of deaths and recording of serious injuries among vulnerable road users and tackle underreporting. As a matter of priority, analyse single bicycle crashes and single e-scooter crashes, including how they are recorded.
- Adopt road safety plans, including national targets for reducing serious injuries (based on the MAIS3+ standard) alongside a reduction of road deaths and quantitative sub-targets based on performance indicators.
- Reduce the speed for motorised vehicles in residential and core urban zones to 30 km/h.
- As per the requirements of the RISM Directive, complete the first network wide assessment including the 'evaluation of collisions and their severity' and classification into at least three categories and report to the EC by 31.10.2025.
- Develop safer infrastructure in general, paying special attention to the needs of vulnerable road users.
- Arrange for vulnerable road users and motorised traffic to be physically separated where the speed or the traffic flow of the latter is higher than 30 km/h.

- Set enforcement plans with yearly targets for numbers of checks and compliance with traffic laws, addressing the priority areas of speeding, drink- and drug-driving, illegal use of mobile phone, red-light running, failing to wear seatbelts, child restraints or helmets. Share those enforcement plans with the European Commission to facilitate the exchange of best practice on enforcement across the EU.
- Streamline the emergency response chain and increase the quality of trauma management to mitigate collision consequences more effectively.
- Encourage helmet wearing among cyclists without discouraging cycling.
- Keep records of pedestrian falls in the road system that result in death and serious injury.

MAIN RECOMMENDATIONS TO THE EU

Regarding the implementation of the EU Road Safety Policy Framework 2021-2030:

- Within the framework of the 5th EU Road Safety Action Programme mid-term review, redouble road safety action considering the implementation report on the framework expected in 2025.
- Continue to support Member States in collecting harmonised data for road safety Key Performance Indicators (KPIs) and serious injuries (MAIS3+).
- Adopt a new joint-EU strategy to tackle serious injuries involving all directorates general (DGs) of the European Commission, in particular the DG for health.
- Work with Member States to ensure that they collect and report data on serious injuries using the common EU definition of MAIS3+; support Member States with the training of data-handling professionals.
- Continue to review the procedures used by Member States to estimate the number of people seriously injured to achieve comparability even though a variety of methods will be used in practice to implement the common definition.
- Prioritise short-term measures that can be implemented with existing knowledge, e.g. measures to improve speed limit compliance will reduce injury severity and have an immediate effect.
- Encourage Member States, through a European Commission Recommendation, to apply safe speed limits in line with the Safe System approach for different road types: 30 km/h on urban roads in residential areas and areas where there are high levels of cyclists and pedestrians, 70 km/h on undivided rural roads and a top speed of 120 km/h or less on motorways.
- As required by the RISM Directive, complete the technical guidance on 'road design quality requirements' for Vulnerable Road Users and 'design of forgiving and self-explaining/ enforcing roads'. The guidelines should be based on independent research.
- Review the implementation effects of the revised RISM Directive and consider further improvements in the second half of the 2020-2030 strategy period.
- Update the General Safety Regulation by 7 July 2027 to account for the latest advancements in vehicle safety technology.
- Create a European Road Safety Agency responsible for the collection and analysis of collision data, help speed up developments in road safety and provide a catalyst for road safety information and data collection.

INTRODUCTION

Every day, all over Europe, people fall off bikes or trip on pavements and injure themselves.

While these incidents do not usually end in tragedy, the short-term effects can be extremely burdensome. Broken bones can require multiple x-rays, visits to specialist doctors, plaster casts, physiotherapy sessions, as well the supply and fitting of equipment such as boots and crutches. Days and weeks of work time are lost. Family and friends are needed to pick up the pieces. In a significant number of cases, the injury causes lifelong disability.

But these events often don't appear in national road safety statistics. Nor are the locations of crashes reported to the authority responsible for that section of road. It's as if they never officially happened.

Road injuries of all levels of severity often go unreported, particularly those involving a pedestrian or cyclist and no other vehicle, for the simple reason that the police are not called to the scene, and they are usually the authority responsible for recording the injuries and deaths that occur in road collisions. This approach is fundamentally flawed and leads to a misleading picture of the full burden of road injuries on individuals, societies and our economies.

According to the available official data, more than a million people are injured on the roads each year. Many injuries are serious with lifelong impacts on individuals, families and working lives. The true number is likely to be much higher. This report focuses on this often-overlooked aspect of road safety.

Progress is being made to get more accurate data on serious injuries. The European Union has developed a standard way of defining road injury severity. Work is being done in many countries to link hospital records, insurance data and police records, to get a fuller picture of what is happening. But there is still a long way to go. It is not even possible to compare data from different countries due to the range of different definitions, data collection procedures and reporting rates.

This report gives an overview of the current facts on serious injuries in the PIN countries, as well as describing the state of the art in data collection.

Importantly it also looks at the countermeasures that are available to prevent injuries from occurring in the first place following the established model of the Safe System approach. In a few years, it should be possible for road injuries of all kinds to be recorded properly so local, national and international policymakers are better equipped to assign resources to reduce these harms in the most effective way possible.

Leaving thousands of injuries unaccounted for is a disservice to the millions affected by road collisions every year in Europe and leaves policymakers in the dark about the true scale of the problem because when injury collisions occur and are not reported they do not appear in police reports or national databases. This gap in the data for those locations or types of collisions means that interventions are less likely because the full picture of the causes is lacking.

PART I

DATA

01

Data

The data were retrieved from the CARE database when available and completed or corrected by PIN Panellists. The full dataset is available in the Annexes.

All figures use the national definition of a serious injury, except figure 1, which uses both the national definition and MAIS3+.

CARE DEFINITION

Serious Injury: Injured (although not killed) in the road accident and hospitalised at least 24 hours.

(NOTE: some countries define serious injuries in terms of type of injury, the inability to work, or the length of recovery and report this national definition to CARE). In the Netherlands, the national definition of a serious injury is based on hospital data and MAIS3+ but, for the purposes of this report, when referring to the national definition of a serious injury for the Netherlands, we refer to the serious injuries collected by the police.

A list of each national definition of a serious injury is available in the Annexes.

MAIS3+ DEFINITION

The Abbreviated Injury Scale (AIS) is a globally accepted anatomical-based trauma classification of injuries published by the Association for the Advancement of Automotive Medicine (AAAM). It is used by medical professionals to describe injuries and rank their severity on an ordinal scale from 1 (minor injuries) to 6 (non-treatable injuries). As one person can have more than one injury, the Maximum Abbreviated Injury Scale (MAIS) is the maximum AIS of all injury diagnoses for a person.

INDICATOR

It is not yet possible to compare the number of seriously injured between PIN countries because of the different definitions of a serious injury as well as differing levels of underreporting. The comparison therefore takes as a starting point the changes in the number of serious injuries since 2013 (Fig. 2) compared to the changes in the number of deaths over the same period (Fig. 2 and 5).

Reporting on serious injuries is prioritised over slight or total injuries because of the greater impact of serious injuries on society. Moreover, serious injuries are more likely to be reported.[1]

Numbers of seriously injured were retrieved from the CARE database when available and completed or corrected by the PIN Panellists in each country using their national definition of a serious injury. National definitions as provided by the PIN Panellists are available in the Annexes.

Within the definition of a serious injury applied in this report, a wide range of injuries are considered under the same definition within each country. They range from lifelong disablement 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.

[1] ETSC (2007), Social and Economic consequences of Road Traffic Injury in Europe. https://tinyurl.com/3w8j4eb8

COVID-19 PANDEMIC

In this report we cover the period 2013-2023. In 2020 the COVID-19 pandemic hit the world. The initial response to the pandemic was to severely restrict people's travel. This resulted in unprecedented reductions in traffic volumes in most PIN countries during 2020. In many countries traffic volumes did not reach pre-pandemic levels in 2021 either, so data in both 2020 and 2021 should be considered with this in mind. Due to the many possible short and long-term effects of the pandemic, in our analyses of the trends and data we have not tried to correct for the influence of COVID-19.

GENDER

In this report, the term 'gender' is used as it appears in the primary data source, the European Union's CARE database. It is important to note that road crash data are typically collected by police, who may determine gender or sex classification based on identification documents or their own assumptions. Different institutions may refer to gender or biological sex. Additionally, the data usually categorise individuals as male or female (and sometimes 'unknown'). We recognise that this binary classification does not fully capture the complexity of gender identities.

1.1 OVERVIEW OF SERIOUS INJURIES

In addition to the 20,400 people killed in road collisions in the European Union in 2023, about 1,291,000 people are recorded as injured in police records each year, among them 141,000 are seriously injured.

Today, thanks to more protective vehicles, better infrastructure, better emergency response and medical progress, many road deaths are prevented. However, of those not killed in a collision, many will be seriously injured and can suffer pain and disablement for many years. European and national decision makers should not neglect this less-publicised part of the full road safety picture by referring only to road deaths.

Comparisons between countries are hampered because both the levels of injury reporting and the national definitions of a serious injury vary greatly across Europe.

The magnitude of injuries not covered by reporting agencies (police and hospitals) and underreporting, undermine proper allocation of resources to preventive measures. Improving the quality of data on seriously injured survivors of road collisions is key to designing more effective road safety policies.

1.2 COLLECTING SERIOUS INJURY DATA

1.2.1 Large differences in the numbers of people recorded as injured due to varying data collection methods, definitions and reporting levels

Sample studies show that the actual number of serious injuries is often considerably higher than the number officially recorded by the police. In general, the lower the injury severity, the higher the rate of injuries not reported. Also, disabilities are not captured at the scene of a collision. The level of underreporting tends to be higher for pedestrians, cyclists and motorcyclists than for vehicle occupants. This is especially the case when no motor vehicle is involved in a collision and even more so in single vehicle crashes.

In Norway, for instance, it was found that police records contain only about 37% of all serious injuries occurring on Norway's roads.[2] In Denmark, one study found that, while official statistics registered 550 personal injuries per million population, in fact the number is more likely to be 14,637 personal injuries per million population.[3] In France, the ONISR has estimated that 170,000 more people were injured than were reported by the police.[4] In Switzerland, levels of underreporting of serious injuries are estimated every year as an extrapolation. The extrapolation of the people injured is based on a household survey commissioned by the BFU and conducted from January to December 2011 using computer-assisted telephone interviews.[5] According to this extrapolation, the number of serious injuries in road traffic (including invalidity) was 5,980 in 2021.[6] According to police records, the number of seriously injured in 2021 was 3,933.[7] In Czechia, comparisons between collision data found in the police database (PCR) and the public health insurance system (Institute of Health Information and Statistics of the Czech Republic, UZIS), found that the PCR only contained 43% of the data in the UZIS (2012-2021). A closer look at the data for cyclist injuries reveals an even more pronounced disparity, as the PCR recorded only 17-19% of cyclist injuries.[8]

Serious injury numbers based on the MAIS3+ definition tend to be smaller than the number of hospitalised injured registered by the police. This is illustrated by data from countries where two data sets, MAIS3+ and police data, are collected (Figure 1). Therefore, serious injury numbers depend on definitions, data collection methodologies and data quality.

Figure 1 shows the number of seriously injured road users based on both national and MAIS3+ definitions compared to the number of road deaths recorded by the police in PIN countries where data are available. Data based on national definitions are collected by the police while MAIS3+ data in one way or another are collected based on hospital records, often matched with police records.

The reporting level of serious injuries recorded by the police varies greatly among countries. This can be related to differences in legislation, insurance requirements, police resources and the quality of data collection and processing. In some countries, reporting is better because the police must attend all collisions with personal injury (e.g. Germany) or because insurance compensation can only be claimed if there is a report by the police. In the SafetyNet report "Estimating the real number of road accident casualties", conversion factors for underreporting in police records were estimated for eight countries.[9] It was originally envisaged that the conversion factors would be generalised to other EU countries to allow for European comparison. The authors concluded, however, that the conversion factors differed too widely among countries and that comparable studies should be conducted in as many countries as possible.

Unreported serious injuries in traffic also imply a level of unreported road deaths (by the police), as some of those seriously injured can die later in hospital.

When looking at recorded serious injuries based on national definitions, one serious injury is registered for every recorded road death in Greece, the ratio is around 21 in Germany, 20 in Malta and Sweden, 19 in Austria and the Netherlands (Figure 1). The differences in seriously injured per death do not mean that fewer people are injured for very road death in Greece compared to Germany, Malta, Sweden,

2 TRYGG TRAFIKK (2019) Helsevesenbasert skaderegistrering som verktøy for å forebygge trafikkulykker (in Norwegian: Healthcare-based claims registration which tools to prevent traffic accidents), https://tinyurl.com/bcrjmavp

3 Olesen, A. V., Lahrmann, H., Madsen, T. K. O., Hels, T., & Lauritsen, J. (2022). Hvor mange kommer til skade i trafikken? -estimering af antal personskader efter trafikulykker i Danmark baseret på selvrapportering igennem en befolkningsundersøgelse. Danish Journal of Transportation Research – Dansk Tidsskrift for Transportforskning, 4. https://tinyurl.com/jsmk626f (In Danish with English summary: How many people are injured in traffic? Estimation of the number of injuries after traffic accidents in Denmark based on self-reporting through a population survey)

4 ONISR (Observatoire National Interministériel de la Sécurité Routière), (2023) Road Safety Annual Report https://tinyurl.com/bd5hahvw

5 BFU (2015) Non-occupational accidents in Switzerland: updated extrapolation and cost calculation https://tinyurl.com/4tu6tmph

6 BFU (2024) Status 2024 – Statistics on non-occupational accidents and the level of safety in Switzerland https://tinyurl.com/3ymscjny

7 Ibid.

8 Data provided by the PIN Panellist.

9 Broughton et al. (2008), Estimating the real number of road accident casualties, Final deliverable D1.15, SafetyNet, https://tinyurl.com/ycy4d4ym. Participating countries: Austria, Czechia, France, Greece, Hungary, the Netherlands, Spain and the UK.

Austria or the Netherlands but rather that seriously injured survivors are better reported in the latter countries. Disparities may also stem from differences in travel behaviour: the ratio of injured per death strongly depends on the travel mode, age and road type. Thus, neither serious injury numbers, nor ratios between killed and injured, are comparable between countries. In the Netherlands for instance, the number of bicycle serious injuries is almost 20 times higher than the number of deaths on bicycles. For other modes the number of serious injuries is about five times higher.[10]

14 EU countries and Israel were able to provide data on serious injuries classified as MAIS3+. There are around 11 seriously injured people based on the MAIS3+ definition for every road death in the Netherlands, seven in Israel and six in Belgium. There is less than one seriously injured person based on the MAIS3+ definition for each road death in Lithuania, one in Cyprus and two in Finland. As for serious injuries based on police records, the differences in serious injuries based on the MAIS3+ definition per death do not necessarily mean that fewer people are injured for every road death in Lithuania, Cyprus or Finland. These countries, as well as other countries, are in the process of improving the quality of MAIS3+ data. The challenge is to capture all serious injuries that occur in traffic collisions, because hospitals record injuries from all causes and in some cases apply a different code (using the International Classification of Diseases – ICD). Also, differences may arise due to differences in travel mode use: use of bicycles or motorcycles leads to a much higher ratio between MAIS3+ and deaths than pedestrians or car occupants.

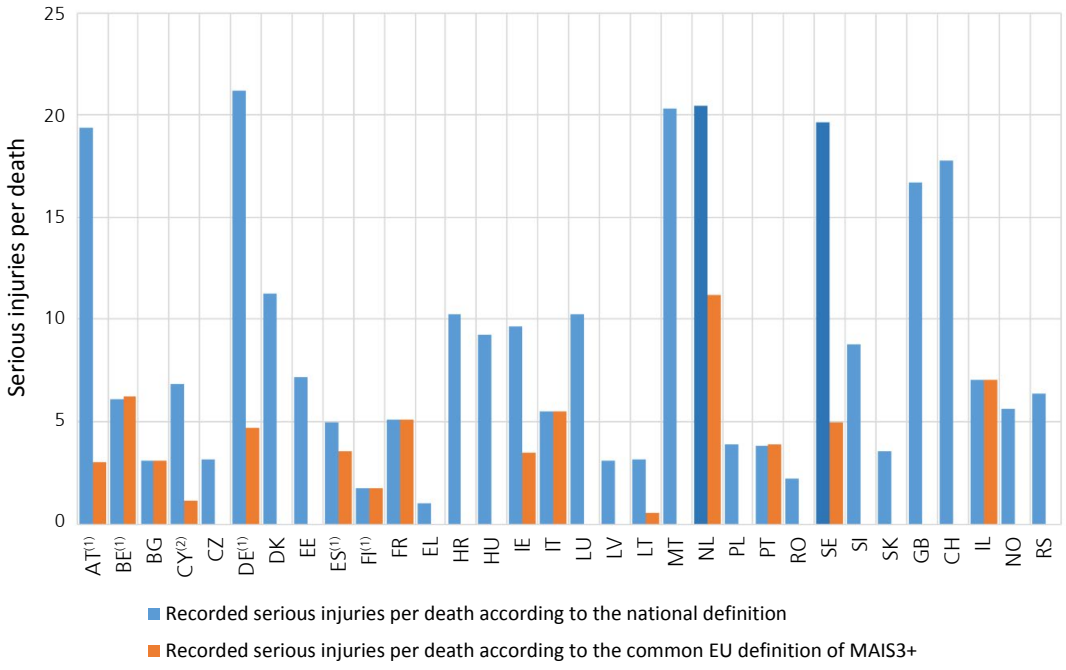


Figure 1 – Number of seriously injured recorded in national statistics per single road death per country in the last three years available, ranked alphabetically. Numbers for different countries are not comparable. 2021-2023 average or the latest three years available. (1)2020-2022, (2)2022-2023. SE (dark blue bar) – hospital data. NL (dark blue bar) – MAIS2+, hospital data.

[10] SWOV (2023) Serious road injuries in the Netherlands. SWOV fact sheet https://tinyurl.com/yth26tds

In a report on road safety published by the European Court of Auditors in March 2024[11], the authors found that monitoring Member State progress in improving road safety remained a challenge for the European Commission. They considered that a lack of sufficient data comparability between Member States was hampering the Commission's ability to monitor progress adequately, particularly as regards serious injuries. The auditors found a lack of harmonisation in how Member States classify data on serious injuries, leaving the Commission "unable to obtain an accurate overview of serious injuries at EU level and design well-targeted actions to reduce their number." In its official response to the ECA report[12], the European Commission accepted the auditors' recommendations to improve the comparability of data for serious injuries and committed to continue working with Member States on both issues.

1.2.2 Data collection

Following the announcement by the European Commission of the first target for reducing serious road traffic injuries by 50% between 2020 and 2030, it was agreed that the common EU definition of a serious road injury would be an in-patient with an injury level of MAIS3 or more (MAIS3+).[13]

The High Level Group on Road Safety representing all EU Member States identified three main ways Member States can choose to collect data in accordance with the MAIS3+ definition:

1. continue to use police data but apply a correction coefficient based on samples;

2. report the number of injured based on data from hospitals;

3. create a link between police and hospital data.

1.2.3 Linking hospital and police data

All methods used for estimating the number of serious traffic injuries according to the EU definition (MAIS3+) are in one way or another based on hospital records. Even when applying correction factors to police data, it is necessary to have samples of hospital data to derive the correction factors. These correction factors are likely to be different depending on the travel mode, age group and country.

Although direct coding in AIS is preferred, medical diagnoses are usually coded using the WHO's International Classification of Diseases (ICD).[14] This classification is regularly revisited, with subsequent versions indicated by a number, e.g. ICD10, ICD11. A transformation is therefore required from ICD to AIS, which provides some challenges.

In addition, not all hospitals use ICD10 coding and some countries have experienced difficulties making the conversion. For this report, 13 countries reported that hospitals use ICD codes (AT, BE, CY, FR, HU, IE, IT, LT, NL, PL, PT, SE, SK).

Collecting hospital data can also be made easier if it is mandatory for them to be shared. Of the PIN countries able to provide data for this report, 12 state that it is mandatory for hospitals to share their data (Table 2). In Ireland, whilst it is not mandatory, data from hospitals are shared for research purposes. The situation is similar in the Netherlands where data are shared on a

[11] European Court of Auditors (2024) Reaching EU road safety objectives, Time to move up a gear, https://tinyurl.com/4294wr74
[12] Replies of the European Commission to the European Court of Auditors (2024) Special report: Reaching EU road safety objectives, Time to move up a gear. https://tinyurl.com/37zuyap6
[13] European Commission (2020), Road Safety: Europe's roads are getting safer but progress remains too slow, https://tinyurl.com/bdzz378p
[14] https://icd.who.int/browse10/2019/en

voluntary basis for research through Statistics Netherlands. In Finland, Statistics Finland is granted access to the Care Register for Health Care, to which it is mandatory for hospitals to report. In Germany hospitals can share their data on a voluntary basis with the Trauma Register (DGU) and enough hospitals do so for the data to be representative. In Poland it is mandatory for hospitals to report data to the National Institute of Public Health – National Institute of Hygiene database on all those discharged from hospitals, but they are not obliged to share and disseminate these data. In addition, data in the National Institute of Public Health – National Institute of Hygiene database is coded in such a way that it is not possible to match the records with the police database (due to a lack of personal identity numbers in hospital data).

Table 1 – Is it mandatory for hospitals to report or share serious injury data?
*SE – only emergency hospitals

Is it mandatory for hospitals to report/share serious injury data	
YES	AT, BE, CY, DK, HR, HU, IL, IT, LV, RO, SE*, SK
NO	BG, CZ, DE, EE, FI, FR, EL, IE, NL, PL, PT, SI, UK, CH, NO

Within the framework of the SafetyCube project funded by the European Commission, a study was published on serious road traffic injury data reporting practices. It provides guidelines and recommendations for each of the three main ways to estimate the number of serious road traffic injuries to assist Member States in MAIS3+ data collection.[15]

As part of a project in 2022, the Association for the Advancement of Automotive Medicine (AAAM) provided the European Commission with several tools to assist those collecting data according to the MAIS3+ definition.[16] Of the PIN countries able to provide data for this report, Austria, Finland and Ireland reported using the AAAM conversion tool for converting ICD codes into AIS. In Sweden, serious injuries are reported in AIS directly and therefore no conversion is required.

In addition to MAIS3+ data, the EU encourages Member States to also continue collecting data based on their previous national definitions. This will enable monitoring of progress in the same way at least until these rates of progress can be compared with those under the new definition.

SWEDEN
EXPERIENCE OF LINKING POLICE AND HOSPITAL DATA

The Vision Zero strategy, which states that no person should be killed or seriously injured in road traffic, was adopted by the Swedish Parliament in 1997. It brought the long-term health consequences of road traffic collisions into focus and included the need for a new database including hospital data. As a result, Sweden has routinely been linking police and hospital records using a system known as STRADA (Swedish Traffic Accident Data Acquisition), since 2003.

Implemented by the former Swedish Road Administration and, since 2009, managed by the Swedish Transport Agency, STRADA was developed in cooperation with the Police, the National Board of Health and Welfare and several other organisations and interested parties. STRADA coordinates the registration of road traffic crashes (RTCs) and injuries (RTIs). Nationwide data on road traffic collisions have been reported to STRADA by the police authority since 2003. Approximately 70 hospitals with emergency care departments and an orthopaedic or trauma surgery department, were approached one by one to start data collection on a voluntary basis, reaching full national coverage as of 2016. Since June 2021 the hospital data collection was regulated by law, making it mandatory.

One of the national goals for road safety is to reduce the number of serious injuries by 25% between 2020 and 2030. A serious injury is defined in Sweden as a person receiving a medical disability of at least 1%. The Abbreviated Injury Scale (AIS) classification

[15] Pérez, K., Weijermars, W., Amoros, E., Bauer, R., Bos, N., Dupont, E., Filtness, A., Houwing, S., Johannsen, H., Leskovsek, B. Machata, K., Martin, JL., Nuyttens, N., Olabarria, M., Pascal, L., Van den Berghe, W., (2016), Practical guidelines for the registration and monitoring of serious traffic injuries, D7.1 of the H2020 project SafetyCube. https://tinyurl.com/yawdetta

[16] Webpage of the European Commission on serious injuries https://tinyurl.com/bd23dcn9

system is used as a base for road traffic injury data collection. Due to the hospitals being the sole source for this follow-up, the underreporting is closely monitored. Like most databases with manual data collection, STRADA suffers from underreporting. Before 2016, the number of hospitals reporting road traffic injury was not complete and statistical adjustments were made to estimate the national number of serious injuries. The levels of underreporting on individual hospitals also varies. This can be due to challenges like priorities between different areas, where treating patients is the top priority. This became obvious during the pandemic years. It will not be possible to recover the underreporting of injuries during 2020-2021. Work to evaluate the impact of the law and the pandemic on hospital data reporting is undergoing.

NETHERLANDS
LINKING POLICE AND HOSPITAL DATA

In the Netherlands the number of serious injuries is determined annually by linking the Database of Registered Crashes in the Netherlands (BRON), which is based on data registered by the police, and the National Hospital Discharge Register (LBZ). This is necessary because the data registered by the police is incomplete and biased and does not contain valid severity indicators. The hospital register can be linked with police-registered data using common identifiers such as date of birth, gender, region and the date and time of admission and collision and contains detailed information on the external cause (ICD10-Vcode) and injuries (ICD10 S- and T-codes) from which an AIS severity can be derived (using AAAM).

The linked data are confidential and no case information may leave the secured research environment. Therefore, complete serious injury figures cannot be seen in the police data alone. Some entries were recorded as only slightly injured or not injured at all, according to the police.

From the set of linked records, and the two sets of records in the police and hospital records, an estimation is carried out of the actual number of serious injuries. To do so, several corrections must be made. In the hospital discharge register, a correction is applied for crashes that did not take place on public roads. Linked police registrations sometimes reveal misclassified patients in hospital, i.e. casualties not reported as road injury patients in the hospital discharge register but reported as road injuries according to police reports. The application of a procedure known as Capture-Recapture allows for an estimation of the expected number of actual road injuries, so that the incompleteness of the police records for serious injuries can be compensated for.

When analysing the linked dataset for 2023, SWOV found that there was a police record for about 65% of those seriously injured in a collision with a motor vehicle involved, but only about 12% of those resulting from crashes where no motor vehicle was involved.[17] The number of serious injuries is increasing in the Netherlands and was estimated at 7,400 in 2023, of which 5,000 were cyclists. The number of seriously injured cyclists is about 20 times higher than the number of cyclist road deaths. For other transport modes the number of serious injuries is about five times higher.

Unfortunately, the hospital register does not specify the location (coordinates) of (serious) crashes. Road authorities need this information to prioritise infrastructure measures, but as it is only available in the police registered data, on the whole, it is only available for crashes involving a motor vehicle. In the Netherlands, to overcome the lack of information on crashes not involving a motor vehicle (mainly bicycle-on-bicycle collisions and single bicycle crashes) other health data are being collected. In 2025, trip data from ambulance services will become available.[18] It is expected that through linking these data to hospital records, the identification of collision locations for hospital patients will become possible.

[17] SWOV (2024) Serious road injuries 2023; Estimate of the number of serious road injuries in 2023 https://tinyurl.com/4szymhwd
[18] Regional Ambulance Services Data Provide Regional Insight into Traffic Accidents (In Dutch only) https://tinyurl.com/yuvxn4wh

IRELAND
2024 STUDY OF SERIOUS INJURIES

In 2022, the Road Safety Authority (RSA) in Ireland started a project in collaboration with the Irish Health Service Executive and the School of Medicine in Trinity College Dublin to study hospital data and apply the MAIS3+ serious injury definition proposed by the European Commission.

The study also focused on estimating the total number of casualties who were hospitalised with injuries of any severity following a road traffic collision and describing their characteristics and clinical outcomes. The national definition of a serious injury followed by the Irish police includes all casualties who were in hospital as in-patients. Hence, the number of all hospitalised casualties was compared with the total of serious injuries recorded by the police, to have an indicator of the size of the difference between the data sources.

The results confirmed that, as in other European countries, police data alone understated the number of serious injuries. The total of hospitalised casualties from road traffic collisions over 2014-2023 was 1.7 times higher than the number of serious injuries recorded by the police. Of all hospitalised casualties, 23% sustained MAIS3+ injuries.

The size of police underreporting on serious injuries is different for each road user. Cyclists accounted for the highest discrepancy between the two data sources, with two to three more casualties in hospital records than in police data, whereas for pedestrians the difference between data sources was much smaller. High-quality data on e-scooter serious injuries remains a challenge in Ireland. For this reason, the RSA is currently exploring the possibility of conducting a multi-centre hospital-based study in partnership with health stakeholders, to monitor the number and characteristics of e-scooter users admitted to emergency rooms in key urban areas in Ireland.

The RSA is also working on the dissemination of results from the serious injury research, including a series of reports by road user type using both hospital and police data, and presentations to key stakeholders. Two reports focused on cyclists and pedestrians have been published on the RSA website.[19]

FINLAND
EXPERIENCES OF REPORTING SERIOUS INJURIES IN FINLAND

In Finland, regular reporting of serious injuries based on the MAIS3+ criteria started in 2015. Serious injuries are identified from the national Care Register for Heath Care[20] based on ICD-10 codes. Both in-patient periods and out-patient visits are included as well as the patient diagnoses (S00-T79). The classification of the severity of injuries is determined based on the diagnosis codes and using the ICD-AIS map by The Association for the Advancement of Automobile Medicine.[21] All patients with at least one AIS 3+ injury, are considered as seriously injured (MAIS 3+), as per the EU definition.

The annual number of serious injuries in road traffic has varied between approximately 800 and 950 from the beginning of the current statistics (from 2014 to 2022). Fewer than half of those seriously injured can be linked to the police register[22] using the personal identification number. Studies on Finnish data have shown that the ICD-AIS map underestimates the number of serious injuries by between 21% and 34%. A 21% underestimation was found in a study[23] using trauma register data containing very seriously injured patients who had several serious injuries. A 34% underestimation was found in a study[24] using data from special health care patients who had fewer serious injuries.

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19 https://www.rsa.ie/road-safety/statistics/analysis-of-road-users

20 The Care Register covers information about treatment periods in in-patient care and out-patient visits in public and, to some extent, in private healthcare: https://tinyurl.com/2t3hp46u

21 https://www.aaam.org/

22 Statistic Finland: Statistics on road traffic accidents: https://stat.fi/en/statistics/ton

23 Airaksinen N, Heinänen M, Handolin L. (2019) The reliability of the ICD-AIS map in identifying serious road traffic injuries from the Helsinki Trauma Registry. https://tinyurl.com/42u9hcw5

24 Airaksinen N, Nurmi-Lüthje I, Kröger H, Lüthje P. (2018) The ability of the ICD-AIS map to identify seriously injured patients in road traffic accidents - A study from Finland. https://tinyurl.com/2uf6m8hr

The main reason behind underreporting in Finland is that ICD-10 injury coding is not detailed enough. There are several ICD-10 codes which can be either minor (MAIS 1–2) or serious (MAIS ≥3) injuries under MAIS but they are often converted to MAIS as minor injuries (which they usually are). However, this also means that many serious injuries are converted from ICD-10 to minor injuries in MAIS.

To improve the outcome of the ICD-10-AIS mapping, the ICD-10 diagnosis codes must be more precise, but it is not easy to change current classification. One option could be to correct the total number of serious injuries with a coefficient based on research. The introduction of ICD-11 in the next few years could also have an impact on injury reporting as many diagnosis codes will become more precise, hopefully improving accuracy.

UK
INJURY-BASED REPORTING

Although work has been undertaken in the UK to estimate MAIS3+ casualties using ICD-10 mapping (up to 2020) and will continue when possible in future, a new approach to injury classification and reporting by police has been rolled-out across police forces in Great Britain.[25] It was found that, compared with police reported injury severity, the injury-based approach was more objective and closer to medical definitions than the previous approach. It was recommended that "all police forces should collect severity data based on injury lists and the option for simply stating 'slight', 'serious' or 'killed' should be removed."

By 2024, the recommendation has been implemented in most forces with the others expected to adopt them during 2025.

Police officers can record data at the scene of a collision via mobile devices. Injury types appear as drop-down lists and officers code as many as apply (e.g. fractured leg, head injury not unconscious, severe lacerations, etc). Severity is then coded based on the most serious injury recorded. It is also possible for the public to record collisions (which a police officer did not attend) online.

Overall, adopting injury-based reporting leads to an increase in the proportion of injuries coded as serious within a police force. A methodology to adjust historic data so that killed or seriously injured figures can be reported as if all forces were using injury-based systems has been developed. After adjusting for the change, the estimated number of killed or seriously injured casualties is around 40% higher than when severity was recorded using the previous method.[26]

FRANCE
METHODOLOGY ESTIMATES SERIOUS INJURIES AT NATIONAL LEVEL

In France, the BAAC (Bulletin d'analyse des accidents corporels de la circulation – Traffic Accidents Analysis Bulletin) is a database of road crashes reported by the French law enforcement authorities. It provides an exhaustive record of the number of deaths and an estimate of the number of people injured. At the same time, in the Rhône *département*, the Rhône Registry was set up in 1995, listing all the people admitted to hospital after a road collision that occurred in the *département*. In 2023, the ONISR (Observatoire national interministériel de la sécurité routière – French Road Safety Observatory) implemented a methodology to estimate the number of injuries at national level based on data available in the Rhône Registry.[27]

The estimation has three to four times higher reported injuries than the BAAC database, depending on the year. This means that in 2023, for instance, nationally 64,000 injuries were recorded in the BAAC, compared to over 234,000 according to the method developed by the ONISR using the Rhône Registry data. The fact that certain transport modes are under-represented in the BAAC also became clear. For example, bicycles accounted for 6%

[25] Department for Transport (2021) Guide to injury-based reporting and severity adjustments for road casualty statistics https://tinyurl.com/mr42344f
[26] Ibid
[27] https://www.onisr.securite-routiere.gouv.fr/en/data-tools/methods

of all injuries in the BAAC file in 2016, but this rose to 15% after the ONISR methodology was applied and to 36% when considering serious injuries (MAIS3+).

The ONISR publishes both monthly[28] and annual[29] estimates of the number of people injured in traffic. Classifying injuries according to the AIS definition (ONISR methodology) provides a better statistical definition of the seriousness of injuries (the BAAC classifies injuries according to the time spent in hospital) and enables better international comparison.

Additional studies carried out in France also show the severity of injuries in traffic. Using data available in the Traumabase (data from the main French trauma centres), a comparative analysis of the traumas suffered by users of powered two wheelers, bicycles and e-scooters showed that users of e-scooters had a comparable frequency of head injuries to that of cyclists, but twice the frequency of those of users of powered two wheelers (25.9%, 22.1% and 11.8% respectively).[30]

1.3 THE FIRST EU TARGET TO HALVE SERIOUS INJURIES BETWEEN 2020 AND 2030

In 2018, the European Commission announced the first target for reducing serious road traffic injuries by 50% between 2020 and 2030. The announcement followed the EU transport ministers' adoption of the Valletta Declaration on road safety in 2017, which had included a call for such a target.

In 2020, the European Commission updated the estimated number of people seriously injured in road traffic collisions. According to this estimate, 110,000 people were seriously injured on EU27 roads in 2019 based on the common EU definition of what constitutes a serious road injury - an in-patient with an injury level of MAIS3 or more.[31]

Many PIN countries have also incorporated a serious injury reduction target into their own national road safety strategies. 27 out of the 32 PIN countries have a serious injury target in their road safety plans (Table 2). Germany, Luxembourg, Malta, the Netherlands and UK do not have a serious injuries target in their road safety plans.

[28] Monthly dashboard, ONISR.
[29] https://www.onisr.securite-routiere.gouv.fr/etat-de-l-insecurite-routiere?field_theme_target_id=638
[30] James A, Harrois A, Abback PS, et al. (2023) Comparison of Injuries Associated With Electric Scooters, Motorbikes, and Bicycles in France, 2019-2022. https://tinyurl.com/k254bj5k
[31] European Commission (2020), Road Safety: Europe's roads are getting safer but progress remains too slow, https://tinyurl.com/bdzz378p

Table 2. Death and serious injury reduction targets as included in road safety strategies in the PIN countries.

	National Road Safety Strategy	Road death reduction target	Serious injury reduction target
AT[32]	YES (2021-2030)	50% (2017-2019av.-2030)	50% (2017-2019av.-2030)
BE[33]	YES (2021-2030/2050)	50%, less than 320 by 2030, 0 by 2050	50%, less than 1800 by 2030, less than 360 by 2050
BG[34]	YES (2020-2030)	50% (2019-2030)	50% (2019-2030)
CY[35]	YES (2021-2030)	50% (2019-2030)	50% (2019-2030)
CZ[36]	YES (2021-2030)	50% (2017-2019av.-2030)	50% (2017-2019av.-2030)
DE[37]	YES (2021-2030)	40% (2021-2030)	NO
DK[38]	YES (2021-2030)	Max 90 road deaths in 2030	Max 900 seriously injured in 2030
EE[39]	Soon coming to an end (2016-2025)	52% (2016-2025)	31% (2016-2025)
EL[40]	YES (2021-2030)	50% (2019-2030)	50% (2019-2030)
ES[41]	YES (2022-2030)	50% (2019-2030)	50% (2019-2030)
FI[42]	YES (2022-2026)	50% (2020-2030)	50% (2020-2030)
FR[43]	YES (2023-2027)	50% (2019-2030)	50% (2019-2030)
HR[44]	YES (2021-2030)	50% (2019-2030)	50% (2019-2030)
HU	YES (2023-2025)	50% (2020-2030)	50% (2020-2030)
IE[45]	YES (2021-2030)	50% (2017-2019av.-2030)	50% (2017-2019av.-2030)
IT[46]	YES (2021-2030)	50% (2019-2030)	50% (MAIS3+) (2019-2030)
LU[47]	Outdated (2019-2023)	NO (Vision Zero)	NO (Vision Zero)
LV[48]	YES (2021-2027)	50% (2020-2030)	50% (2020-2030)
LT[49]	YES (2020-2030)	50% (2019-2030)	50%
MT	Outdated (2014-2024)	NO	NO
NL[50]	Activity plans (2018-2030)	NO	NO
PL[51]	YES (2021-2030)	50% (2019-2030)	50% (2019-2030)
PT[52]	YES (2021-2030)	50% (2019-2030)	50% (2019-2030)
RO	YES (2022-2030)	50% (2019-2030)	50% (2019-2030)
SE	Management by objectives (2020-2030)	50% (2017-2019av.-2030)	25% (2017-2019av.-2030)
SI[53]	YES (2023-2030)	50%, less than 50 road deaths in 2030	50%, less than 400 by 2030
SK[54]	YES (2021-2030)	50% (2020-2030)	50% (2020-2030)
UK[55]	NO, Road Safety Statement 2019 (June 2019-June 2021)	NO	NO
CH	YES (no time limit)	Max 100 road deaths by 2030	Max 2,500 serious injuries by 2030
IL[56]	YES (2022-2027)	50% (2021-2027), less than three deaths per billion-vehicle km	50% (2021-2030)
NO[57]	YES (2022-2025)	Max 50 deaths by 2030	Max. 350 serious injuries by 2030
RS[58]	YES (2023-2030)	50% (2019-2030) and 0 children killed by 2030	50% (2019-2030)

[32] Austrian Road Safety Strategy 2021-2030, https://tinyurl.com/y48depa5
[33] All For Zero, https://tinyurl.com/3s5w4szh
[34] The National Strategy for Road Safety until 2030 has been adopted - State Agency for Road Safety https://tinyurl.com/4et4fh9z
[35] Στρατηγικό Σχέδιο, https://tinyurl.com/mrxaph4u
[36] Czech Road Traffic Safety Strategy 2021-2030, https://tinyurl.com/y8k3p8hb
[37] Deutscher Bundestag, Verkehrssicherheitsprogramm der Bundesregierung 2021 bis 2030 https://tinyurl.com/2yy67bye
[38] Road Safety Commission, 2021-2030 Action Plan, Summary, https://bit.ly/3cdYuGA
[39] Transpordiamet, Lehekülge ei leitud, https://tinyurl.com/4c3e4p4m
[40] National Road Safety Strategic Plan, Greece 2030, https://bit.ly/3OO76b1
[41] Estrategia de Seguridad Vial 2030, https://tinyurl.com/4xwbxj2n
[42] Government resolution: Transport Safety Strategy aims to improve the safety of all modes of transport - Ministry of Transport and Communications https://tinyurl.com/2cjuvemm
[43] Driving safely and serenely on France's roads, https://tinyurl.com/462955ew
[44] Odluka o donošenju Nacionalnog plana sigurnosti cestovnog prometa Republike Hrvatske za razdoblje od 2021. do 2030. https://tinyurl.com/4kznr4w6
[45] Ireland's Government Road Safety Strategy 2021-2030, https://www.rsa.ie/about/safety-strategy-2021-2030
[46] Piano Nazionale Sicurezza Stradale 2030, https://tinyurl.com/5995fjvf
[47] Plan d'action « sécurité routière » (2019–2023), https://tinyurl.com/36us9ysw
[48] Satiksmes ministrija, Ceļu satiksmes drošības plāns 2021.-2027.gadam, https://tinyurl.com/bdcusy2a
[49] Lietuvos Respublikos Vyriausybė (2020), Nutarimas dėl valstybinės eismo saugos programos „Vizija-nulis" patvirtinimo, https://tinyurl.com/8fhkru7t
[50] Veilig van deur tot deur (2018) https://tinyurl.com/rakw6far
[51] Narodowy Program Bezpieczeństwa Ruchu Drogowego 2021 - 2030, https://tinyurl.com/4s7szb4z
[52] Estratégia Nacional de Segurança Rodoviária 2021 / 2030, https://visaozero2030.pt/
[53] Resolution on the national road traffic safety program for the period from 2023 to 2030, https://tinyurl.com/mr3u8phc
[54] Bezpečnosť cestnej premávky, https://tinyurl.com/mufcm2ce
[55] Department for Transport, The Road Safety Statement 2019, A Lifetime of Road Safety, https://tinyurl.com/hef79hbh
[56] National Road Safety Programme https://tinyurl.com/dd66ht3b
[57] Meld. St. 20 (2020–2021), Melding til Stortinget Nasjonal transportplan 2022–2033, https://tinyurl.com/wfmdnfbm
[58] https://www.abs.gov.rs/sr/propisi-71/strateski-dokumenti

SWEDEN
THREE DIFFERENT KPIS RELATING TO SERIOUS INJURIES

Swedish road safety policy is based on Vision Zero with interim targets set to track progress.

In 2020 the Swedish government adopted a new interim target for 2030 aiming to halve the number of road deaths from 266 (the average number 2017–2019) to no more than 133 by 2030. The government also adopted a target to reduce serious injuries (based on the national definition which uses hospital records) by at least 25% by 2030.

In addition there are two other targets related to serious injuries: a target to reduce the number of those seriously injured in pedestrian falls by 25% by 2030 and a target to reduce the number of seriously injured cyclists, also by 25% by 2030.

These targets are followed up each year. In 2023, 2,200 cyclists were seriously injured in single-vehicle crashes (the 2030 target is 1,200) while 3,300 people were seriously injured in pedestrian falls (the 2030 target is 2,300).

1.4 SERIOUS AND SLIGHT INJURIES ARE REDUCING MORE SLOWLY THAN ROAD DEATHS

In addition to collecting serious injury data according to the EU definition (MAIS3+), Member States should also continue collecting and reporting data based on their previous national definitions. This will enable monitoring of progress in the same way at least until these rates of progress can be compared with those under the MAIS3+ definition.

Figure 2 presents the relative reduction in serious and slight injuries since 2013 compared with road death reductions since 2013 in the EU according to countries' national definitions.

Serious injuries in the EU24[59] decreased by 13% between 2013 and 2023, which is slower than road deaths (which saw a 16% decrease) but faster than slight injuries. Slight injuries in the EU26[60] decreased by 4% between 2013 and 2023, slower than both serious injuries and road deaths.

There was a stagnation of both serious and slight injuries between 2014 and 2019. However, in just one year, between 2019 and 2020, serious and slight injuries decreased by 15% and 23% respectively following measures aimed at controlling the Covid-19 pandemic.

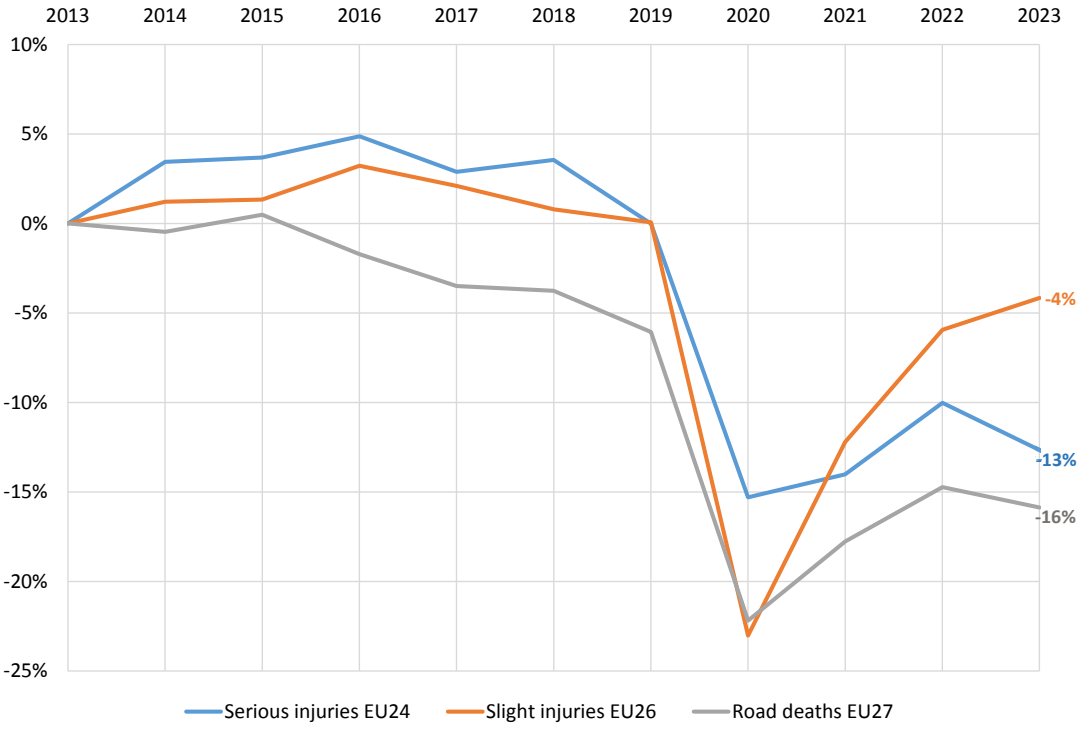
After 2020, there was an increase in serious and slight injuries, by 2% and 14% respectively between 2020 and 2021, and by 5% and 7% respectively between 2021 and 2022.

Serious injuries decreased by 3% between 2022 and 2023 and slight injuries increased by 2% over the same period.

It should be noted that the size of the decrease over the period 2013-2023 is far from the objective of reaching a 50% reduction over the decade 2020-2030.

[59] EU24: EU27 minus IE, LT and NL due to inconsistency in the data series.
[60] EU26: EU27 minus NL due to inconsistency in the data series.

Figure 2 – Relative change in the number of serious and slight injuries and road deaths in the EU over the period 2013-2023.
EU24 serious injuries: EU27 minus IE, LT and NL due to inconsistency in the data series. EU26 slight injuries: EU 27 minus NL due to inconsistency in the data series.



1.5 MOST COUNTRIES HAVE REDUCED THE ANNUAL NUMBER OF SERIOUS INJURIES SINCE 2013

The number of people recorded as seriously injured, based on national definitions, decreased on average annually in 24 of the 30 PIN countries that provided data. Figure 3 shows the average annual change in the number of serious injuries over the period 2013-2023 using current national definitions of a serious injury. In the EU24[61] collectively, serious road traffic injuries reduced annually by 2% on average over the period 2013-2023.

In the PIN countries, Romania and Cyprus achieved the highest average annual reduction of 9% and 7% respectively, followed by Greece and Czechia with a 6% reduction. In four countries the number of serious injuries increased on average annually over the last ten years. The number of serious injuries increased on average by 2% annually in Malta, Portugal and Israel over the period 2013-2022, 2018-2023 and 2013-2023 respectively and by 1% in Italy over the period 2013-2023.

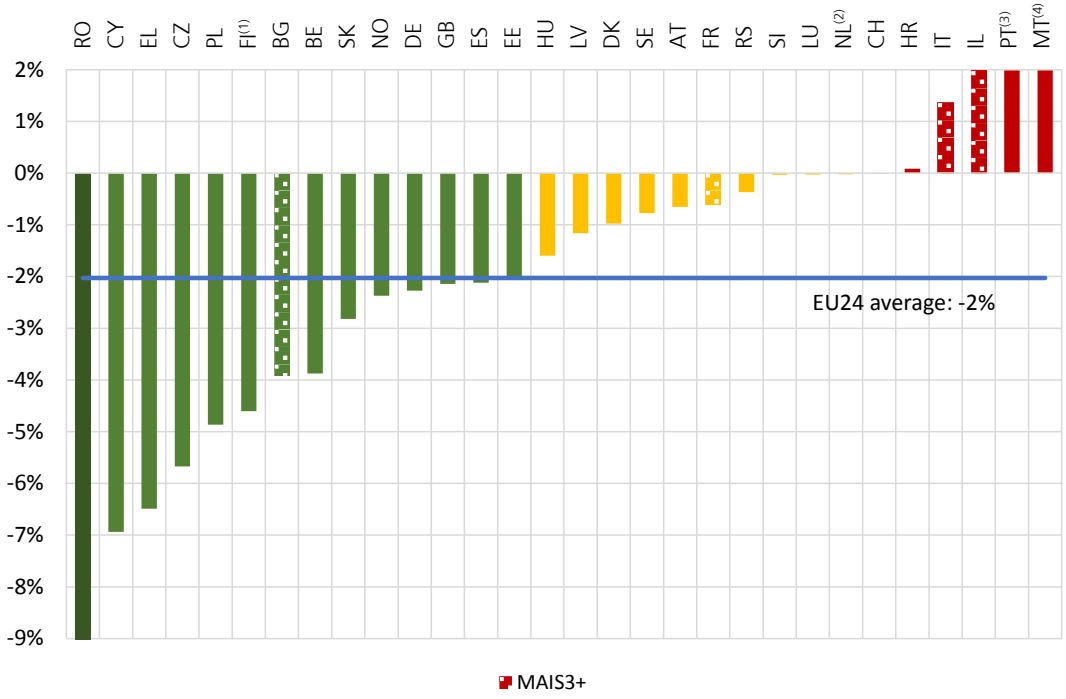


Figure 3 – Average annual change in the number of serious injuries over the period 2013-2023.
(1)2014-2022, (2)2015-2023, (3)2018-2023, (4)2013-2022. EU24: EU27 minus IE, LT and NL due to inconsistency in the data series. IE and LT have been excluded from the graph for inconsistency in the data series.

[61] EU24: EU27 minus IE, LT and NL due to inconsistency in the data series.

1.6 SLIGHT INJURIES

Figure 4 shows the average annual change in the number of slight injuries over the period 2013-2023, based on national definitions.

The number of people recorded as slightly injured, based on national definitions, decreased in 26 of the 31 PIN countries that provided the data. In the EU26[62] collectively, slight road traffic injuries reduced annually by 1.4% on average over the period 2013-2023.

In the PIN countries, Cyprus achieved the highest average annual reduction of 13%, followed by Finland and Poland with a 7% reduction over the period 2014-2022 and 2013-2023 respectively. In Great Britain, Israel and Denmark there was a 5% reduction. In three countries, the number of slight injuries increased on average annually over the last ten years. The number of slight injuries increased on average by 2% annually in Romania and Estonia and by 1% in Luxembourg. The annual reduction rates for slight injuries are also related to changes in reporting rates.

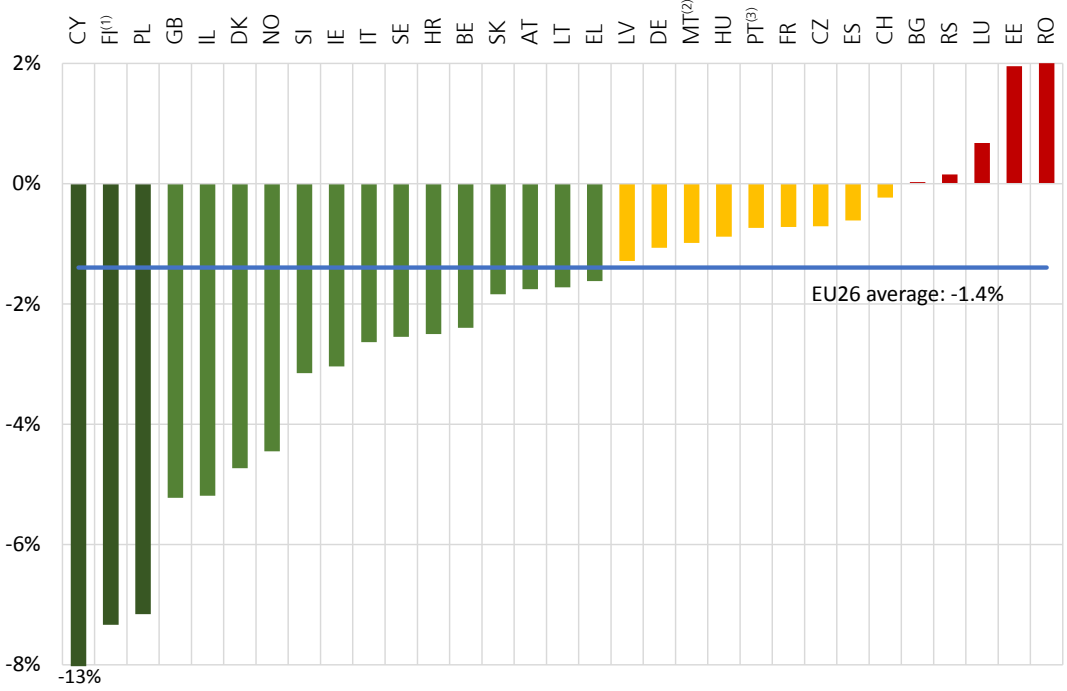


Figure 4 – Average annual change in the number of slight injuries over the period 2013-2023.
(1)2014-2022,
(2)2013-2022,
(3)2018-2023.
EU26: EU27 minus NL due to inconsistency in the data series.

[62] EU26: EU27 minus NL due to inconsistency in the data series.

1.7 ANNUAL REDUCTION IN SERIOUS INJURIES STILL LAGS BEHIND ROAD DEATH REDUCTION

Figure 5 gives an overview of national progress in reducing the numbers of road deaths and serious injuries (based on the national definition) over the last ten years. The figure aims to indicate to what extent the two have moved at a similar pace. The average annual change[63] in road deaths is plotted on the horizontal axis, and the average annual change in serious injuries on the vertical axis. The EU averages of -2.4% (road deaths) and -2% (serious injuries) respectively are shown by vertical and horizontal dotted lines. Green markers are used for countries that performed better than the EU average in both death and serious injury reduction, red markers are for those that performed worse than the EU average in both death and serious injury reduction and amber markers for all others – better than the average in deaths but not in serious injury or vice-versa. Belgium, Bulgaria, Cyprus, Czechia, Germany, Estonia, Greece, Finland, Norway and Poland have performed better than the EU average in reducing both serious injuries and road deaths since 2013. The annual reduction rates for serious injuries are also related to changes in reporting rates.

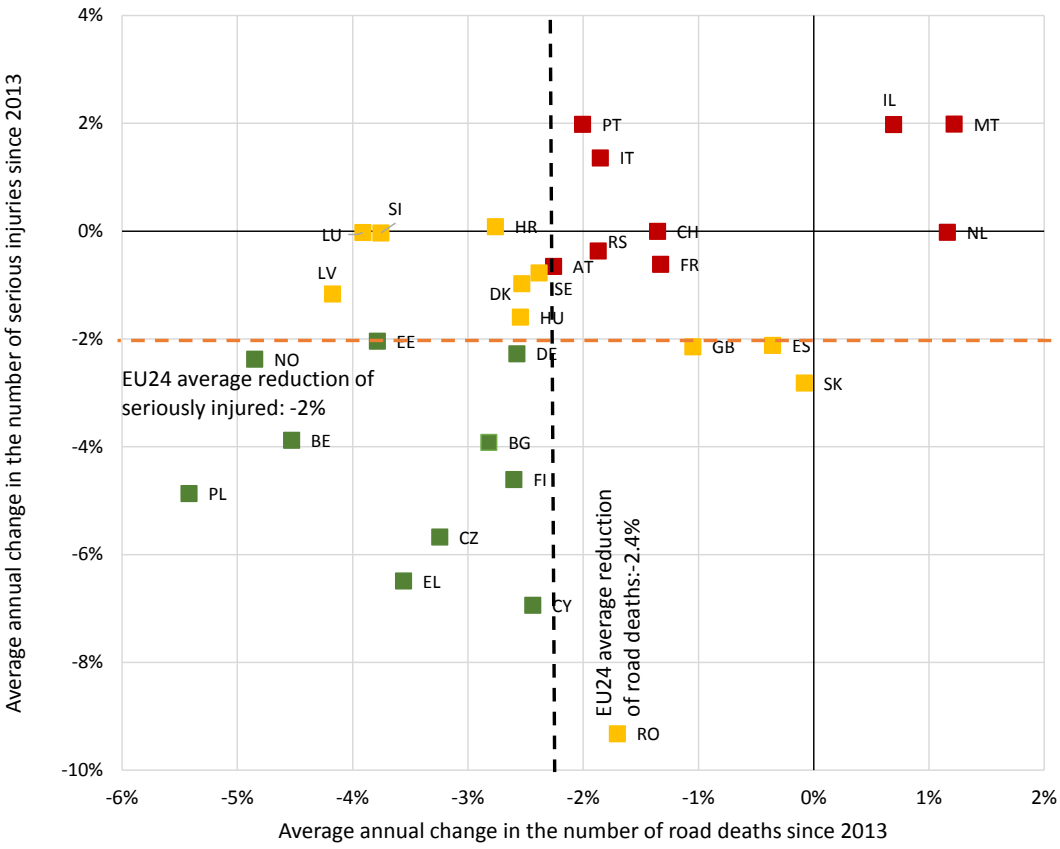


Figure 5 – Estimated average annual change in the number of seriously injured according to the national definition over the period 2013-2023 for countries where data are available, plotted against the estimated average annual change in road deaths over the same period.
The years covered varies: 2013-2022: MT, 2014-2022: FI, 2015-2023: NL, 2018-2023: PT. EU24: EU27 minus IE, LT and NL due to inconsistent trend data.

[63] The average annual change is based on the entire time series of all the nine annual numbers of road deaths and serious injuries between 2013 and 2023, and estimates the average exponential trend. For more information, read the methodological note, https://tinyurl.com/2vj6v5p3

1.8 DIFFERENCE IN REDUCTION BETWEEN SERIOUS INJURIES AND ROAD DEATHS

In the EU24[64] the average annual progress in reducing road deaths exceeds the average annual progress in reducing serious injuries by 0.4%. The development varies significantly among PIN countries (see Figure 6).

In 20 PIN countries the annual progress in reducing road deaths exceeded progress in reducing serious injuries. In Portugal (over the period 2018-2023), Luxembourg and Slovenia the difference was 4%.

In contrast, in 10 PIN countries progress in reducing road deaths was slower than progress in reducing serious injuries. In Romania the difference was 8% and in Cyprus 4.5%.

It is difficult to explain such differences between countries. Several factors could play a role. The rates of reduction could be influenced by changes in the level of underreporting of serious injuries during the period concerned or changes in in-patient admission criteria. Improvement in the reporting system of serious injuries will be reflected in the statistics by an increase in the number of serious injuries. Other factors can play a role too such as the mix of different types of collision and whether they are more likely to result in death or serious injury. For example, for car occupants the number of seriously injured per road death is much less than for powered two-wheeler users. Hence a change in the use of a specific travel mode can lead to an overall change in the ratio between deaths and injured.

Some road safety measures might be more successful at reducing road deaths than reducing serious injuries and vice-versa. Changes in the quality of emergency services, travel patterns (e.g. more cycling or walking) and behaviour can all influence collision outcomes.

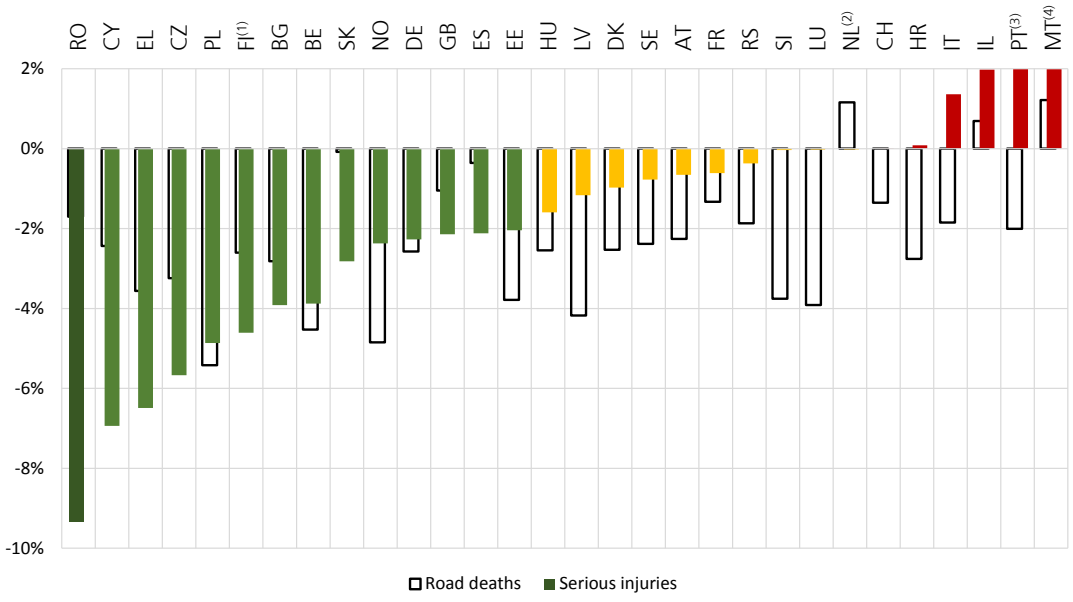


Figure 6 – Average annual change in the number of serious injuries compared to the corresponding average annual change in the number of road deaths over the period 2013-2023.
(1)2014-2022,
(2)2015-2023,
(3)2018-2023,
(4)2013-2022.

[64] EU24: EU 27 minus IE, LT and NL due to inconsistency in the data trend.

UK
ASSESSING THE ACCURACY OF SERIOUS INJURY DATA USING FIVE ALTERNATIVE SOURCES

In Great Britain, serious injuries occurring on public roads and known to the police within 30 days are recorded via a database known as STATS19.[65] It is well known (through hospital, survey and compensation claims data) that a considerable proportion of serious injuries are not known to the police and the number of serious injuries recorded in STATS19 is therefore likely to be lower than the true number.

To assess the accuracy of the police-reported data in terms of both absolute serious injury numbers and trends in serious injuries, the UK government undertook a review in 2021 and considered data from five alternative sources - the National Travel Survey, Hospital Episodes Statistics (hospital admissions data), Compensation Recovery Unit data, Motor Insurance Claims statistics and Road Traffic Statistics.

Overall, the five alternative sources indicated a substantial fall in road traffic and road traffic casualties in 2020 compared to previous years. This picture aligns with that seen in STATS19 data for the same period, which shows a steep reduction in road traffic collisions and casualties reported to police in 2020 – with the exception being a rise in bicycle casualties.

Comparing STATS19 to alternative sources suggests that, overall, STATS19 has captured the trends in road safety in Great Britain for 2020 and previous years relatively well. That having been said, differences between the data sets do exist, in particular the large rise in bicycle casualties recorded in the 'alternative sources' but not seen in STATS19 (police reported), except for deaths.[66]

1.9 ROAD USER GROUP

The proportion of each road user group seriously injured varies across PIN countries (Figure 7). In Bulgaria, Finland and Croatia more than 45% of people seriously injured are car passengers or drivers. In Sweden, Switzerland and Slovenia the proportion is below 23%.

In Sweden, Denmark and Switzerland more than 44% of people seriously injured are cyclists or pedestrians. However, in Greece, Norway and Portugal this proportion is below 21%.

There are several reasons why these proportions may vary between countries, including differences in travel mode use and data collection methods.

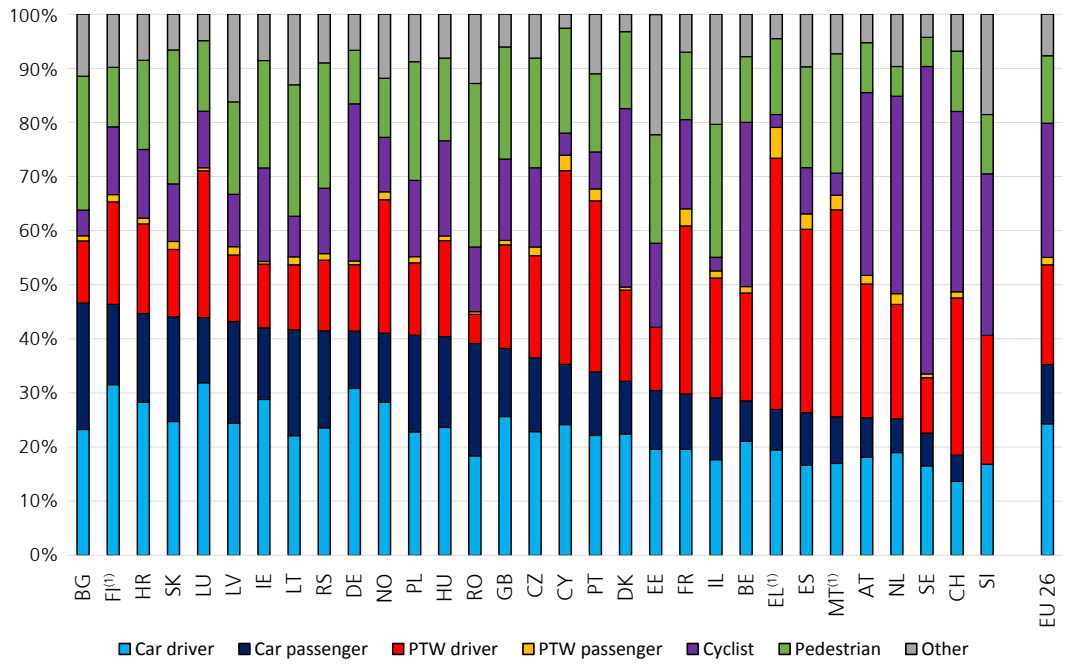
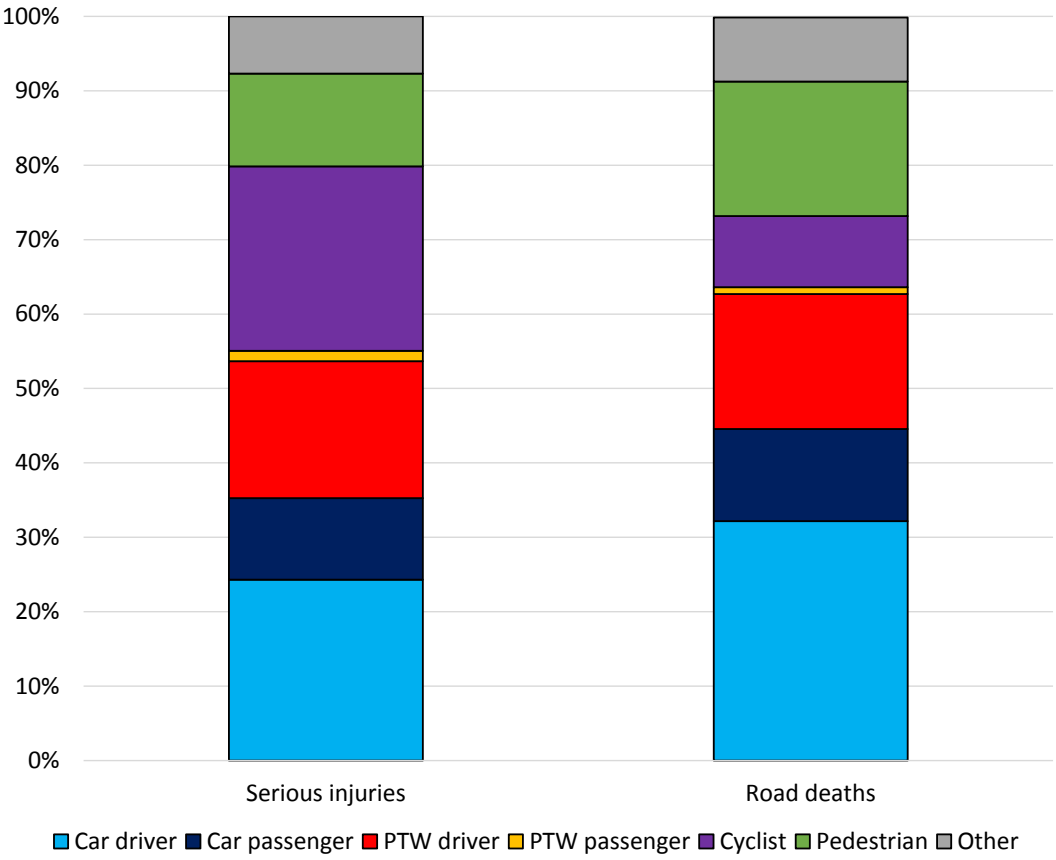


Figure 7 – Proportion (%) of seriously injured by road user group ranked by the share of car drivers and passengers taken together (2021-2023 average). (1)2020-2022. EU26: EU27 minus IT due to lack of updated data.

[65] UK road safety collision database (STATS19) https://tinyurl.com/26zpa5z5
[66] Department for Transport (2021) Guidance: Other sources of information on road casualties https://tinyurl.com/ytkscpc2

On average, across the EU26[67], 35% of people seriously injured are car occupants (24% car drivers and 11% car passengers). By comparison, the proportion of car occupants who are killed in the EU25 is 45%. Cyclists represent the highest proportion of all those seriously injured (25% compared to 10% for road deaths). The proportion of vulnerable road users seriously injured is 57% compared to 47% among road deaths. It is important to consider that the proportions of different road users seriously injured depends both on the distance travelled by these road users, and on the differences in risk between the various travel modes (Figure 8).

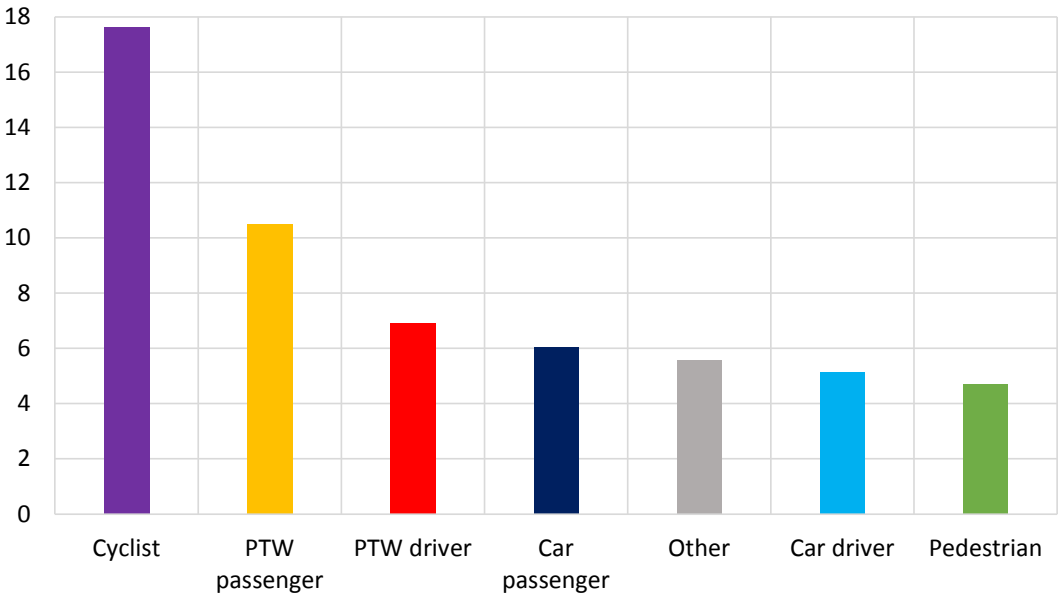
Figure 8 – Proportion (%) of seriously injured by road user group compared to the proportion of road deaths by road user group (2021-2023 average) in the EU26.
EU26: EU27 minus IT due to lack of updated data.



[67] EU26: EU 27 minus IT due to lack of updated data.

To illustrate the relative safety of different travel modes, Figure 9 shows the number of seriously injured per road death by road user group. Cyclists are the road user group with the highest proportion of seriously injured per road death, followed by Powered Two Wheeler (PTW) passengers and riders. Pedestrians are the road user group with the lowest proportion of seriously injured per road death, but well documented underreporting of pedestrian serious injuries in traffic in police statistics should be taken into account when considering this figure.[68]

Figure 9 – number of seriously injured per road death per road user group in the EU26 (2021-2023 average).



1.10 GENDER DIFFERENCES

There is a significant gender difference among seriously injured road users in the EU: 66% are male and 34% are female (Figure 10). The proportion of male seriously injured road users varies from 81% in Greece to 55% in Estonia.

These proportions differ to those for road deaths where the ratio is even more unfavourable towards males. Among road deaths in the EU, 78% are men and 22% are women (Figure 11).

These significant gender differences among seriously injured road users might be due to the differences in travel modes. For example, powered-two-wheeler riders tend to be mainly men. That could explain, for example, the high predominance of men seriously injured in Greece where powered-two-wheelers are widely used.

[68] WHO (2023) Pedestrian safety https://www.who.int/publications/i/item/9789240072497

Figure 10– Proportion (%) of male and female seriously injured road users for the period 2021-2023 or the last three years available (average) ranked by proportion of male seriously injured road users in descending order.
(1)2020-2022.

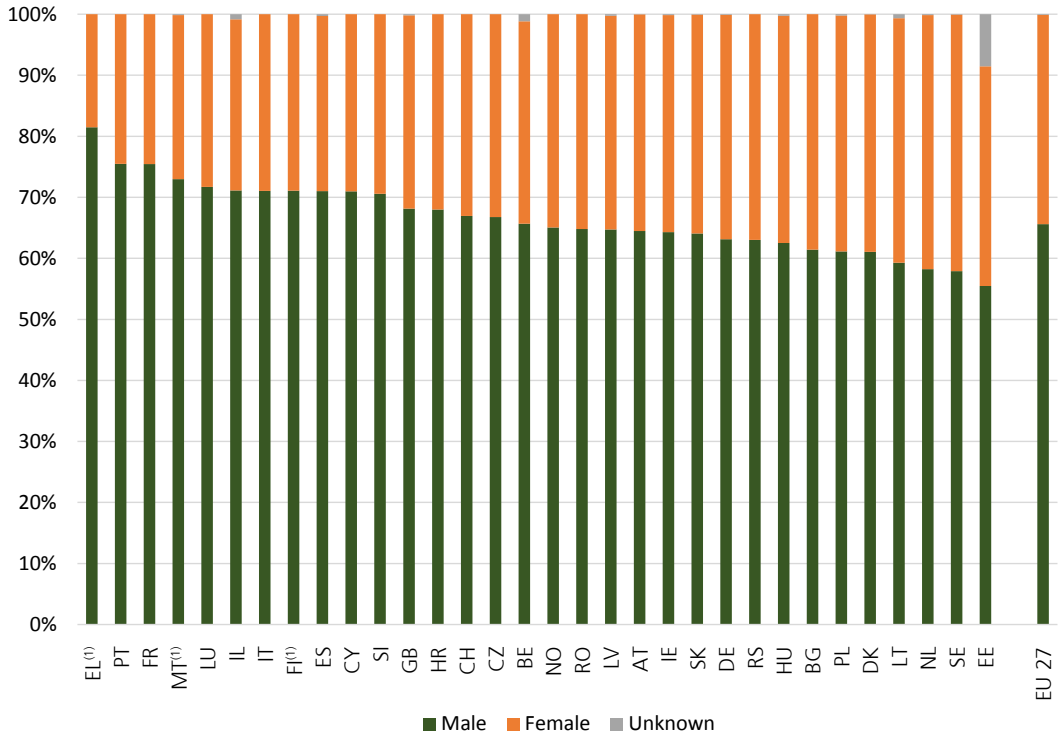
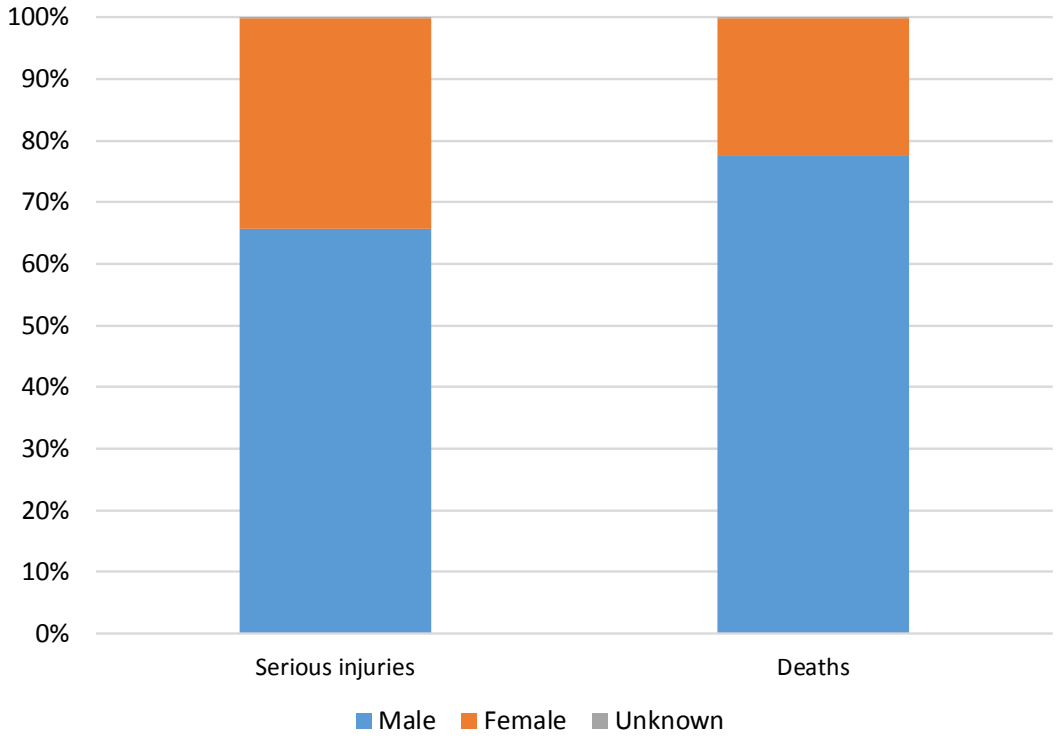


Figure 11 – Proportion (%) of male and female seriously injured road users compared to the proportion of male and female road deaths for the period 2021-2023 in the EU27.



1.11 AGE

In Figure 12 it can be observed that there has been a large reduction in the numbers of seriously injured 18–24-year-old road users between 2013 and 2023, for both male and female road users. The number of seriously injured road users was also lower among 25-54 year olds in 2023 compared to 2013, for both male and female road users. However, the number of seriously injured for both male and female road users was higher in 2023 compared to 2013 for those aged between 54 and 70 years old. The ageing population in Europe in recent years must be considered. Beyond the age of 70, the number of male and female road users seriously injured in 2013 and 2023 is almost the same.

Figure 12 – Male and female seriously injured road users by age in 2023 and in 2013 for comparison in the EU27.

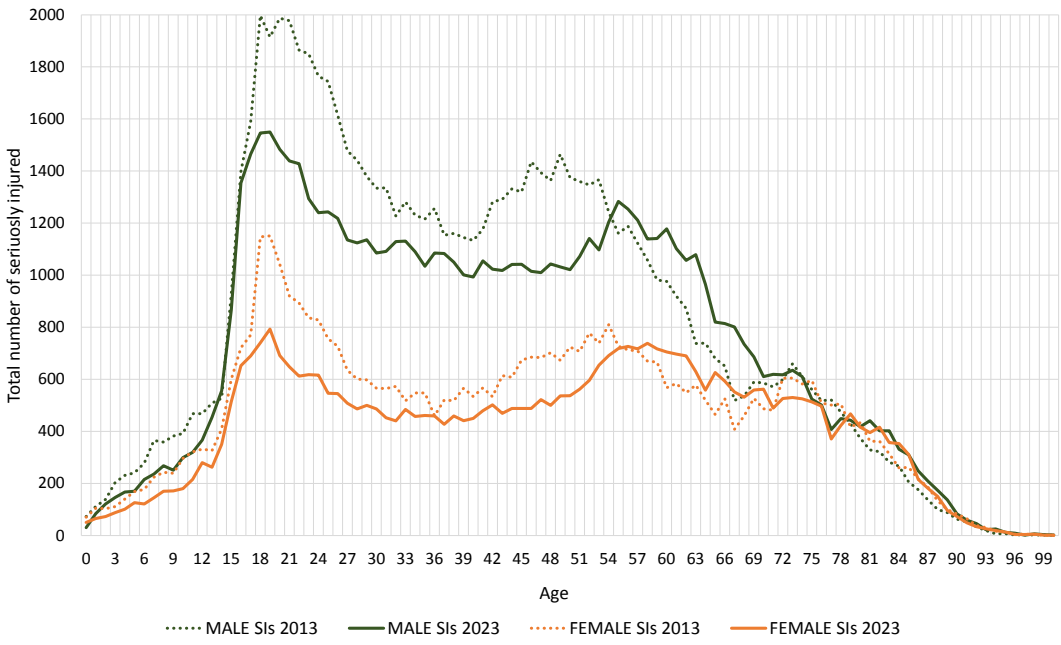
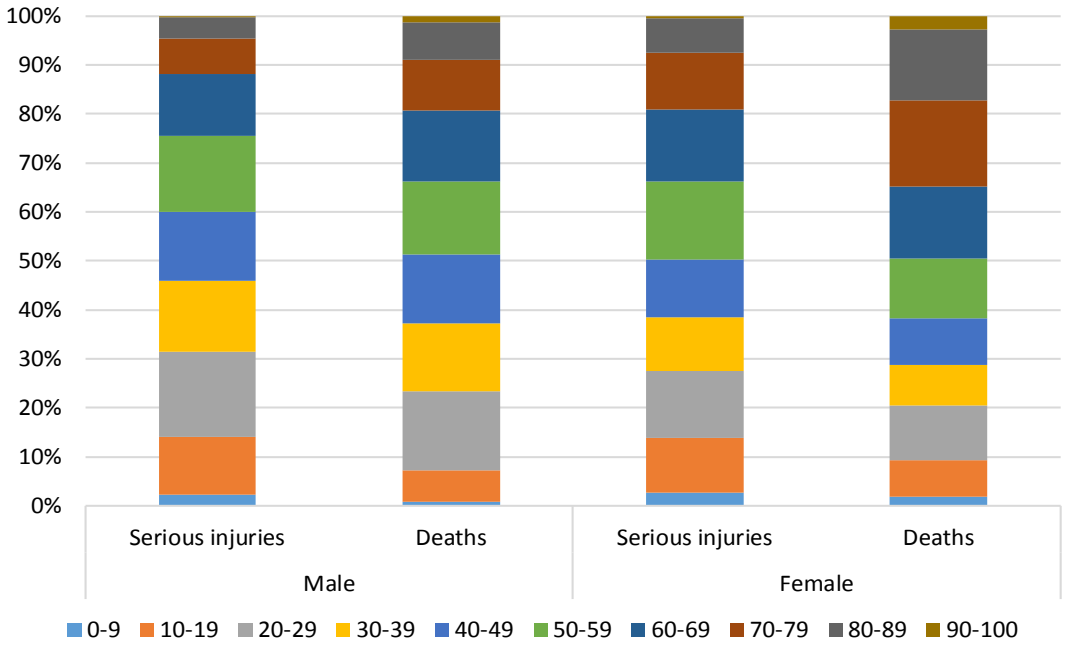


Figure 13 shows the proportion (%) of male and female seriously injured road users by age group compared to road deaths by age group.

It can be observed that a higher proportion of serious injuries are concentrated at younger age groups.

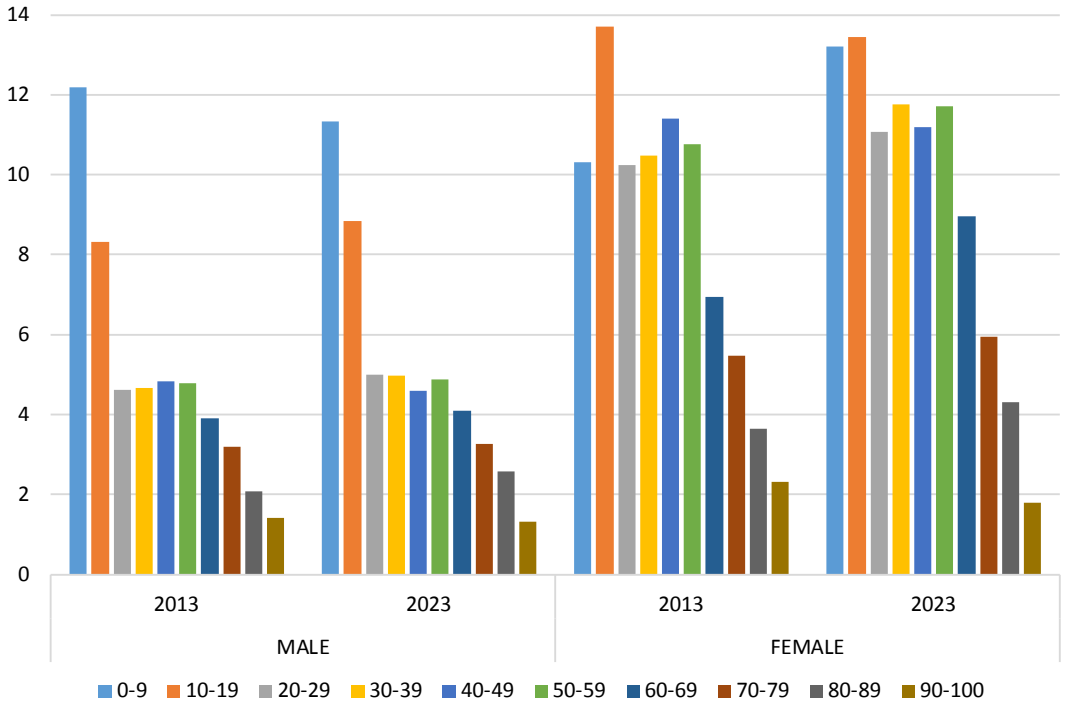
The age group 10–19-year-olds represents 12% of all male serious injuries and 11% of all female serious injuries (almost double the proportion of all road deaths for the same age group). On the other hand, male road users over the age of 50 and female road users over the age of 70 represent a higher proportion of road deaths than serious injuries. That might be due to a higher fragility among older road users compared to younger ones and consequently a higher chance of death due to a collision.

Figure 13 – Proportion (%) of male and female seriously injured road user by age group compared to the proportion of male and female road deaths by age group for the year 2023 in the EU27.



Looking more closely at the ratio of serious injuries to road death by sex and age (Figure 14), there's a high number of seriously injured road users per road death for young male road users (age groups 0-9 and 10-19). For female road users, the number of those seriously injured per death is high for almost all age groups and only starts to decrease at 60 years old. The number of seriously injured female road users per death is higher in all age groups compared to male road users, meaning that *female road users tend to get seriously injured rather than die, as opposed to male road users who have a higher tendency of dying in traffic.*

Figure 14 – Number of seriously injured per death per sex and age group for the year 2023 in the EU27.

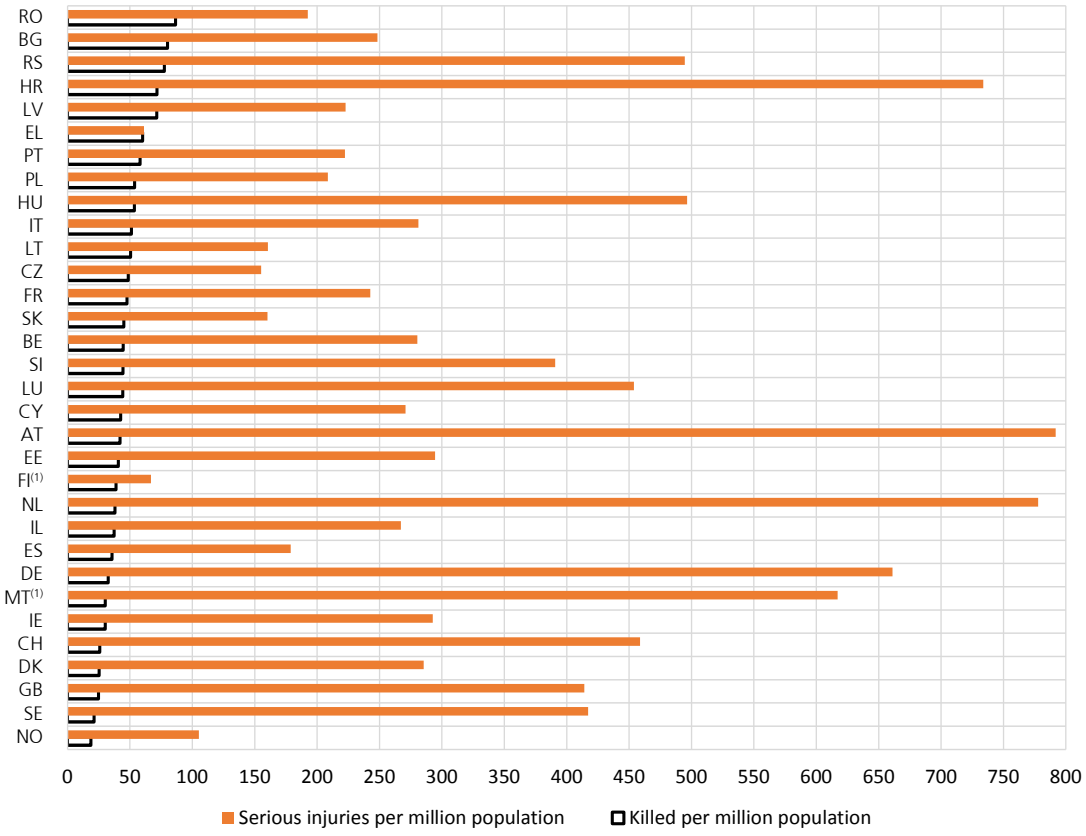


1.12 KILLED AND SERIOUSLY INJURED PER MILLION POPULATION

Road mortality – road deaths per million population – is commonly used to benchmark the level of road safety between countries. It is however only one part of the picture. Figure 15 is an attempt to give a broader picture of the impact of road collisions by showing the numbers of recorded serious injuries per million population in comparison with mortality. The reader should bear in mind that this is not yet a mature indicator due to large differences in definition and reporting practices for seriously injured road users.

As reporting procedures move toward harmonisation in the EU, Killed or Seriously Injured (KSI) per million population may well in the future become another indicator for comparison between countries. How soon this will be achieved will depend on the time it takes to equip and train police forces, hospital staff and data-handling organisations of national governments to implement the MAIS3+ definition.

Figure 15 – Seriously injured per million population compared to killed per million population (average for the years 2021-2023).
(1)2020-2022



RECOMMENDATIONS TO NATIONAL GOVERNMENTS

- Adopt Road Safety Plans, including national targets for reducing serious injuries (based on the MAIS3+ standard) alongside a reduction of road deaths and quantitative sub-targets based on performance indicators.
- Collect serious injury data according to the MAIS3+ definition and continue collecting data based on national definitions.
- Consider how to improve the registration of deaths and recording of serious injuries to vulnerable road users and tackle underreporting. Analyse single bicycle crashes and single e-scooter crashes, including how they are recorded, as a matter of priority.
- Collect travel data for all road users by road to include effects on the number of serious injuries in the impact assessment of road safety measures.
- Collect, and report to the European Commission, data to deliver the Key Performance Indicators included in the EU Road Safety Policy Framework 2021-2030.
- Ensure the e-scooter category is identifiable in official police recorded casualty statistics.
- Include Powered Two Wheeler (PTW) safety in Road Safety Programmes and Strategies.
- Extend periodic technical testing to cover all motorcycles, including mopeds, without exemptions: as a minimum, first inspection after four years, subsequent inspection after two years then every year after that.
- Keep records of pedestrian falls on the roads that result in deaths and serious injuries.

RECOMMENDATIONS TO THE EU

Regarding the implementation of the EU Road Safety Policy Framework 2021-2030:

- Work with Member States to ensure that they collect and report data on serious injuries using the common EU definition of MAIS3+; support Member States with the training of data-handling professionals;
- Continue to support Member States in collecting harmonised data for road safety Key Performance Indicators (KPIs);
- Redouble road safety action in light of the implementation report on the framework expected in 2025;
- Adopt a new joint-EU strategy to tackle serious injuries involving all directorates general (DGs) particularly the DG for health;
- Adopt a new EU health strategy including road traffic injury prevention measures;
- Prioritise short-term measures that can be implemented with existing knowledge;
- Continue to review the procedures used by Member States to estimate the number of people seriously injured to achieve comparability even though a variety of methods will be used in practice to implement the common definition;
- Include the number of seriously injured in the impact assessment of countermeasures;
- Treat road injuries and deaths as a public health problem as well as a mobility issue;
- Within the framework of the 5th EU Road Safety Action Programme mid-term review and considering every child should have the right to grow up in a safe environment, adopt a separate target for reducing road deaths and serious injuries among children and develop accompanying measures and research.

When negotiating the next EU Budget:

- Fund a follow-up project to provide technical support on further developing the KPIs in all EU Member States;
- Fund a follow-up project to provide technical support for the development and further improvement of serious injury data collection;
- Encourage Member States to keep records of pedestrians falls in traffic that result in deaths and serious injuries. Consider extending the definition of what constitutes a road collision to include pedestrian falls.

PART II

COUNTERMEASURES

02

The starting point for tackling both death and serious injury on roads should be to create a road safety system that recognises the vulnerability of the human body.

To a certain extent, tackling serious injury requires the same set of measures that are needed to reduce deaths on the roads with some important additions that are specifically targeted at reducing injury severity.

It is well known that a driver's higher frequency of road offences exponentially enhances their collision risk. Addressing inappropriate and excessive speed, building infrastructure which is adapted to the type of traffic that uses it, enforcing road rules and improving vehicle safety standards and standards of post-crash care can all have an impact on injury severity. Protecting vulnerable road users (VRUs), in particular children and older road users, is another important element, considering 57% of those seriously injured on our roads are VRUs. Measuring the number of people seriously injured in traffic, including pedestrian falls will also ensure policies and funding are better directed. Having a gender perspective in road safety can also help to reduce the risk of serious injury to women.

Collisions that result in serious injuries are often different from fatal collisions. Figure 9 shows us that cyclists are the road user group with the highest proportion of seriously injured per road death. For every cyclist killed in traffic, another 18 are seriously injured. According to one study, there are two types of collision, which together result in just over half of all serious injuries: single bicycle crashes with no other vehicle involved, and overtaking collisions involving cars. These collisions are frequent but rarely result in death. Head-on collisions with cars, on the other hand, are unusual, but the collision severity is high so while they account for less than one-sixth of those seriously injured in passenger cars, they account for almost half of the deaths.[69]

2.1 CURBING SPEED – THE NUMBER ONE PRIORITY

Speed has a direct influence on collision occurrence and severity. The number of collisions and the severity of those collisions increase exponentially as driving speeds increase.[70] Likewise, reducing speeds by only a few km/h can significantly reduce the number and severity of collisions.[71] ETSC estimated that 2,100 lives could be saved each year if the average speed dropped by only 1 km/h on all roads across the EU.[72]

And yet speeding remains a problem on roads. Exceeding the speed limit is by far the most recorded road traffic offence.

Well-designed roads and roadsides encourage safe driving speeds, heighten driver attention where risks are increased by the presence of vulnerable road users and prevent the types of collisions that lead to the most serious injuries.[73] Road infrastructure design should consider the needs of the communities it serves. The road environment must be designed in a way that recognises and takes account of the capabilities and limitations of its users.

[69] Analys av Trafiksäkerhet utvecklingen 2023 Målstyrning av trafiksäkerhetsarbetet mot etappmålen 2030 (only in Swedish) https://tinyurl.com/3d4d6rf6
[70] OECD/ITF (2018) Speed and Crash Risk, https://tinyurl.com/278vdpxe
[71] For more information read an analysis by Henk Stipdonk "The mathematical relation between crash risk and speed; a summary of findings based on scientific literature" https://tinyurl.com/3a2z8ksv
[72] ETSC (2019) PIN Flash 36, Reducing Speeding in Europe www.etsc.eu/pinflash36
[73] Saving lives beyond 2020: the next steps (2019) https://tinyurl.com/39v9vu75

2.1.1 Safe speeds

Driven speeds affect the injury severity sustained in a crash at a given location.[74] According to the Safe System approach, vulnerable road users should not mix with motor vehicle traffic where motor vehicle speeds exceed 30 km/h.[75] Similarly, safe speed limits on rural roads without a median barrier should not be higher than 70 km/h and not higher than 100 km/h on roads with median and side barriers. Roads for motor vehicles with speeds above 30 km/h require separate infrastructure for cyclists, pedestrians and personal mobility devices. Separation of bicycles and personal mobility devices from motor vehicles on the roads with the highest speeds and those with the highest volumes should be a priority for national governments.

In its 'Streets for Life' campaign,[76] the UN calls for a 30 km/h speed limit where people walk, live and play, adding that the measure is vital for children rights: ensuring they have a safe environment to move around and play in. Reducing speed limits to 30 km/h in residential areas and around schools, childcare facilities and playgrounds is also a leading recommendation of both the OECD and UNICEF.

A combination of traffic calming measures, such as roundabouts, road narrowing, chicanes and road humps is helpful in 30 km/h zones to make it easier for vehicle drivers to adhere to the legal speed limit. Different traffic calming measures are more suited to different functions of roads depending on the road hierarchy. Traffic calming should also discourage motorised traffic, except for traffic that needs access to that specific area.[77] Enforcement on roads limited to 30 km/h has a contribution to make where engineering measures by themselves are insufficient to bring drivers to safe speeds.

Studies indicate that as little as 1-3% of road construction budgets are needed to make road safety improvements[78] and that, when the value of lives saved and serious injuries prevented are considered, the return on investment is positive.[79]

RECOMMENDATIONS TO NATIONAL GOVERNMENTS

- Reduce the speed for motorised vehicles in residential and core urban zones to 30 km/h.

RECOMMENDATIONS TO THE EU

- Encourage Member States, through a European Commission Recommendation, to apply safe speed limits in line with the Safe System approach for different road types: 30 km/h on urban roads in residential areas and areas where there are high levels of cyclists and pedestrian, 70 km/h on undivided rural roads and a top speed of 120 km/h or less on motorways.

[74] Bucsuházy et al., Czech In-Depth Accident Study. (2021). Technical report. Transport Research Centre. Czechia
[75] European Commission (2022) Road Safety Thematic Report – Safe System Approach https://tinyurl.com/2f7t26ch
[76] UN 'Streets for Life' campaign https://www.streetsforlife.org/
[77] ETSC (2015) 30 km/h limits gaining rapid acceptance across Europe. https://tinyurl.com/jmm29y66
[78] Welle, B., Sharpin, A.B., Adriazola-Steil, C., Soames, J., Shotten, M., Bose, D., Bhatt, A., Alveano, S., Oblehiero, M. (2018). Sustainable and Safe: A vision and guidance for zero road deaths. World Resources Institute. https://tinyurl.com/mpt6ftfp
[79] Saving lives beyond 2020: the next steps (2019) https://tinyurl.com/39v9vu75

2.2 INFRASTRUCTURE

According to the Safe System approach, infrastructure which is adapted to the type of traffic that uses it is an essential component in preventing death and injury.

Many more cyclists are injured in collisions not involving another road user than in collisions with motorised vehicles. Also, many more pedestrians are injured in falls than the number injured in a collision with another road user. The design, operation and maintenance of infrastructure, in particular infrastructure used by vulnerable road users, is therefore of paramount importance.[80]

The EU Road Infrastructure Safety Management (RISM) Directive[81] requires governments to carry out regular road safety audits, identify high-risk sites and prioritise safety when building new roads. The revised Directive, which came into force in 2019, has extended the scope of the original legislation to include all motorways, primary roads and roads outside urban areas that have received EU funding. Road design concepts such as self-explaining and self-enforcing roads seek to reduce the number of collisions on the whole road network by preventing driving errors.

In addition, a new network-wide road safety assessment has been introduced and the requirements to protect vulnerable road users have been strengthened. Indeed, the revised Directive mandates, for the first time, to systematically take vulnerable road users (VRU), including pedestrians and cyclists, into account in all infrastructure safety management procedures on the roads covered by the Directive. The European Commission (EC) will develop guidance on road design quality requirements for protection of VRUs. An EU KPI will measure the progress of Member States towards improving the safety of their road infrastructure design.

Pedestrians and cyclists mostly travel on urban roads. Although not mandatory, EU Member States are encouraged to extend the road safety management principles to main urban roads.

[80] TOI (2021) Traffic safety for cyclists and pedestrians – status and challenges (In Norwegian only) https://tinyurl.com/23nbedxh
[81] Directive (EU) 2019/1936 of the European Parliament and of the Council of 23 October 2019 amending Directive 2008/96/EC on road infrastructure safety management https://tinyurl.com/3a5u2s7b

RECOMMENDATIONS TO NATIONAL GOVERNMENTS

- Develop safer infrastructure in general, but paying special attention to the needs of vulnerable road users;
- As per the requirements of the RISM Directive, complete the first network wide assessment, including the 'evaluation of collisions and their severity', and classification into at least three categories and report to the EC by 31.10.2025.
- Encourage cities to undertake road safety audits of urban infrastructure;
- Encourage cities to apply safe infrastructure design guidelines and renew the guidelines regularly based on the latest research and innovation;
- Give priority to vulnerable road users in road maintenance paying special attention to the quality of surfaces most used by them;
- Implement infrastructure separated from motorised traffic to make walking, cycling and e-scooter riding safer;
- Arrange for vulnerable road users (VRUs) and motorised traffic to be physically separated where the speed or the traffic flow of the latter is too high;
- Develop infrastructure guidelines which address the issues of PTW safety.

RECOMMENDATIONS TO THE EU

- Review the implementation effects of the revised Road Infrastructure Safety Management (RISM) Directive and consider further improvements in the second half of the 2020-2030 strategy period.
- As required by the RISM Directive, complete the technical guidance on 'road design quality requirements' for Vulnerable Road Users and 'design of forgiving and self-explaining/ enforcing roads'. The guidelines should be based on independent research.
- Adopt the new EU Quality Requirements on VRU Infrastructure Safety, Forgiving and Self-explaining roads as required under the RISM Directive and include integrating the needs of e-scooters.
- Develop a standard for PTW-friendly guardrails.

2.3 VULNERABLE ROAD USERS

57% of those seriously injured on EU roads are vulnerable road users (pedestrians, cyclists or powered two wheeler (PTW) users).

Given the known high levels of underreporting of pedestrian and, especially, cyclist collisions, the actual number of both serious injuries and deaths of pedestrians and cyclists is likely to be higher.

In addition to suffering serious injuries, a study in Belgium found that 16% of those hospitalised following a collision continued to suffer from their injuries for many years. Pedestrians were most likely to suffer long-term consequences of a road collision.[82] This confirms the findings of earlier research which also found that pedestrians (and PTW users) were the road users most likely to suffer pain and long-term disabilities resulting from their serious injuries.[83]

Many steps can be taken to reduce the likelihood of serious injuries to vulnerable road users including minimising their interaction with motorised traffic travelling at more than 30 km/h and ensuring they have access to high-quality infrastructure to prevent pedestrian falls and single bicycle crashes (i.e. falling due to slippery surfaces or colliding with an obstacle). Gathering high quality data on pedestrian and cycling injuries, even when these are not reported to police will also play an important role in improving the road safety of vulnerable road users.

2.3.1 Pedestrian safety

2.3.1.1 Pedestrians injured in traffic

For every pedestrian killed in traffic, five are recorded as seriously injured (Figure 9). Although this is the lowest ratio for all road user groups, it is well known that pedestrian serious injuries in traffic are underreported.[84]

Walking serves as a vital means of transport for people in Europe, particularly for children and older people. Data from the Netherlands in 2017, for instance, show that children up to the age of 12 make 26% of their trips by foot while for those between 65 and 75 years old and those over 75 the proportions are 21% and 25% respectively. The same situation is also found in Czechia where older people walk more frequently than the average population (walking accounts for 53% of their trips compared to 47% for the rest of the population) and only children aged 5-17 walk more often than older people.[85] In Ireland in 2023, younger (4-14) and older people (65 years and older) report similar levels of travelling by foot, which are also similar levels to those aged 35-44 and 55-64 but lower than those aged 15-24 and 25-34.[86] Research nonetheless found that between 2014 and 2023 hospitalised pedestrians were more frequently aged 65+ or less than 14 years.[87] The Czech In-Depth Accident Study (CzIDAS) found that older pedestrians are more likely to be seriously injured in traffic even at lower speeds. In collisions with a vehicle traveling up to 30 km/h, a pedestrian over the age of 65 has a 15.4% chance of being seriously injured compared to a 9.4% chance for someone under the age of 65.[88]

For pedestrians it is important that they can walk on safe footways, not on the carriageway, and that when crossing, they can see the traffic without any obstacles obstructing their view and traffic can clearly see them. Pedestrian crossings are perceived to be safe places to cross the road but the safety of pedestrian crossings is an issue. They need to be carefully designed, including in such a way as to reduce vehicle speeds to no more than 30 km/h, and appropriately sited if they are to improve safety.[89]

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[82] VIAS (2023) Press release: 1 in 6 hospitalised traffic victims suffer the consequences for years (In Dutch or French) https://tinyurl.com/ywz75vmc

[83] Weijermars, W., Meunier, J.-C., Bos, N., Perez, C., Hours, M., Johannsen, H., Barnes, J., et al. (2016), Physical and psychological consequences of serious road traffic injuries, Deliverable 7.2 of the H2020 project SafetyCube. https://tinyurl.com/yc6wddht

[84] WHO (2023) Pedestrian Safety. A road safety manual for decision-makers and practitioners (second edition) https://tinyurl.com/4xda22bw

[85] KOUŘIL, Petr, Michal ŠIMEČEK a Zdeněk DYTRT (2022), Czech Republic on the move: Methodology and basic results of a nationwide survey of traffic behaviour (in Czech), Ke stažení I Česko v pohybu (ceskovpohybu.cz)

[86] NTA (2023) National Household Travel Survey 2023 Research Report https://tinyurl.com/356tvnyn

[87] RSA (2024) Serious injuries among pedestrians in hospital and An Garda Síochána data Period 2014-2023 https://tinyurl.com/55cc45sz

[88] Bucsuházy et al. (2023) Seniors in road traffic - Czech In-Depth Accident Study (CzIDAS), Transport Research Centre (CDV). Brno. Czechia https://tinyurl.com/2296kkh6.

[89] European Commission (2018), Pedestrians and cyclists, https://tinyurl.com/2ry6s7w5

2.3.1.2 Pedestrian falls

In the European Union, the definition of a road collision injury encompasses incidents occurring on public roads that entail at least one moving vehicle and result in at least one casualty, which refers to a person who is either injured or killed. Notably, cases where pedestrians fall on a footpath or carriageway, even if attributable to the substandard quality of the footpath, are not classified as road casualties, even when they lead to deaths. Consequently, incidents involving pedestrian falls without any involvement of vehicles are not reflected in police road safety statistics but are, instead, captured within the health sector's statistical records. Regrettably, the extent and significance of injuries stemming from pedestrian falls within the road system have been overlooked.

Sweden applies the EU definition of a road casualty and therefore pedestrian falls are not considered as road casualties. However, if pedestrian slips and falls in a road environment were included in the definition of road casualty, they would be the most common cause of serious injuries for pedestrians – representing between 40-50% of all causes of pedestrian injuries. To increase and update knowledge about pedestrian falls in Sweden, a study was conducted in 2022. It revealed that 94% of all pedestrians seriously injured in the road system in Sweden over the period 2014-2019 were the result of a pedestrian fall.[90] Predominantly women and older people were injured in falls. 53% of the falls registered were due to slipping on snow and ice. 17% of the falls were due to uneven road surfaces, including potholes. Sweden has adopted a target to reduce the number of seriously injured pedestrians in falls in road traffic by 25 per cent between 2020 and 2030.[91]

The Netherlands also conducted a study into pedestrian collisions in 2022. They found that 22,800 people visited the emergency department, 6,500 were admitted to hospital and 152 people were killed in a pedestrian collision in that year. Around 85% of these pedestrian collisions were in fact pedestrian falls, i.e. without any vehicle involved. 60% of those injured in a pedestrian collision still suffered with their injuries two months later. The study also found that older people (over the age of 60) were more often involved in pedestrian falls while younger people (25-49 years old) were more likely to be involved in a pedestrian collision with a vehicle involved.[92]

A study into pedestrian slip-and-falls in Finland estimates that approximately 125,000 pedestrian falls result in injury every year in Finland, with over half of these (60%) being winter slip and falls. More women experience a slip and fall than men and older women are particularly likely to be seriously injured.[93] Older women often walk more than older men so have a greater exposure to risk but hormonal changes experienced by women in later life can also contribute to increased bone fragility.

Studies in Denmark also show that 25% of adults injured in traffic each year are the result of a pedestrian fall in traffic.[94]

Research projects carried out by the emergency medical clinic in Oslo looking at recorded cyclist and pedestrian injuries, found that a total of 6,309 injured pedestrians were recorded. Most of the pedestrians were injured because of a fall and many of the falls were associated with snow or ice. Researchers estimated that simply improving winter maintenance could reduce pedestrian injuries by 15-23%. In addition, during the same timeframe as the data collected for the research, the police recorded 106 injured pedestrians, demonstrating the extent

[90] Eriksson J., Henriksson, P., Rizzi, M. (2022) Vulnerable road users involvement in accidents and their injury outcome. A comparative study between pedestrians, cyclists, mopedists and motorcyclists. VTI report 1133. In Swedish, summary in English https://tinyurl.com/5av55eab

[91] Swedish Transport Administration (2023) Analysis of Road Safety Trends 2022 https://tinyurl.com/yj8n983u

[92] Olij, B., Asscheman, S., Katona, K., Stam, C., van der Does, H., Nijman, S., (2024) Ongevallen met voetgangers: omvang, aard, oorzaken, gevolgen en risicofactoren (in Dutch: Pedestrian collisions) https://tinyurl.com/2u6rejea

[93] NORDIC (2022) Pedestrian slip-and-fall accidents and their prevention https://tinyurl.com/yxfkht82

[94] Olesen, A. V., Lahrmann, H., Madsen, T. K. O., Hels, T., & Lauritsen, J. (2022). Hvor mange kommer til skade i trafikken? -estimering af antal personskader efter trafikulykker i Danmark baseret på selvrapportering igennem en befolkningsundersøgelse. Danish Journal of Transportation Research – Dansk Tidsskrift for Transportforskning, 4. https://tinyurl.com/jsmk626f (In Danish with English summary: How many people are injured in traffic? Estimation of the number of injuries after traffic accidents in Denmark based on self-reporting through a population survey)

to which police data underestimates the size of the problem and therefore also the potential benefit of making walking safer.[95]

Maintaining records of pedestrian falls within the road system proves valuable for several reasons. Firstly, it aids in the promotion of active mobility by drawing attention to potential safety hazards. Secondly, it facilitates the monitoring of shifts in transportation preferences, also known as modal shifts, by providing insights into mobility patterns. Lastly, it underscores the importance of factors such as the condition and upkeep of footpaths in maintaining road safety.

2.3.2 Cyclists

A large proportion of serious injuries among cyclists occur in collisions with no motor vehicle involved.

These can be either single bicycle crashes or collisions between a cyclist and a pedestrian or another vehicle. These collisions can occur even if motor vehicle traffic and slow traffic are separated, on low-speed roads. The quality of the infrastructure available to cyclists can play an important role in preventing single bicycle crashes. Cycling infrastructure should be free of obstacles, be clearly marked, be sufficiently wide and the surface should be clean and free of cracks. The verges of cycle paths should be forgiving.[96]

In the Netherlands, in 2023, cyclists represented 70% of all serious injuries. Most of these injuries occurred in crashes without another motor vehicle involved.[97] It is estimated that around half of all single bicycle crashes in the Netherlands are due to infrastructure imperfections, such as poles placed to prevent motor vehicles from using cycle paths.[98] SWOV, the Dutch National Scientific Institute for Road Safety Research, has estimated that if all cycling infrastructure in the Netherlands were to be made safe by 2030, 50 road deaths and 2000 serious injuries could be avoided.[99] In Ireland, of the 245 reported seriously injured cyclists involved in single vehicle crashes between 2018 and 2022, 216 (88%) were riding forward at the time of the collision. Of these cyclists seriously injured in a single bicycle crash while driving forward, 14% encountered a problem with the road surface - oil, debris, potholes, wet surface, etc. Furthermore, 10% of the collisions were due to colliding with or (dis)mounting the kerb or footpath.[100] According to the injury data registered at the Oslo Emergency Department, cyclist injuries sustained after a single bicycle crash dominate the data, and collisions with cars make up only a very small proportion. Bicycle falls due to kerbs, tram rails, etc. are the most common scenarios.[101] Data from Czechia showed a higher proportion of older people in bicycle collisions, particularly in e-bike collisions. While on conventional bicycles the proportion of injured older people (65+) was 21%, on e-bikes it was 39%. The collisions on e-bikes are also more severe for the elderly than collisions on conventional bicycles.[102]

It should be noted that as we build more and better walking and cycling infrastructure, and collisions between these road users and motorised vehicles reduce, data from hospitals will become increasingly important as the proportion of single vehicle crashes will likely increase and these are underreported by police in the statistics.[103] This could be particularly relevant in the context of governments seeking to achieve a modal shift towards more sustainable transport.

[95] TOI (2020) The Potential for Reducing the Number of Killed or Seriously Injured Road Users in Norway in the Period 2018-2030 https://tinyurl.com/z5xnhzzh
[96] SWOV (2020) Factsheet: Infrastructure for pedestrians and cyclists (In Dutch) https://tinyurl.com/bdh8x534
[97] SWOV (2023) Backgrounds of the State of Road Safety 2023; The annual monitor https://tinyurl.com/y5bja49t
[98] CROW (2018) The building blocks for a comfortable and forgiving cycling path (In Dutch) https://tinyurl.com/yc7xbn6y
[99] SWOV (2022) A 50% reduction in road casualties by 2030? Calculating the effect of additional measures https://tinyurl.com/mrxtx5f8
[100] RSA (2023) Cyclist spotlight report: fatalities and serious injuries 2018-2022 https://tinyurl.com/576tbtjt
[101] TOI (2021) Traffic safety for cyclists and pedestrians – status and challenges (In Norwegian only) https://tinyurl.com/23nbedxh
[102] Bucsuházy, K., Kadula, L.; Zůvala, R., Research on seniors in traffic and e-bikes. PIN talk. Slovenia. 2024
[103] TOI (2021) Traffic safety for cyclists and pedestrians – status and challenges (In Norwegian only) https://tinyurl.com/23nbedxh

2.3.3 Powered Two Wheeler (PTW) users

On average across the EU25, 19% of those reported as seriously injured in road collisions are Powered Two Wheeler (PTW) users (moped and motorcycle riders and passengers).

When considering distance travelled, a motorcyclist is, depending on the country, between nine to 30 times more likely to be killed in a road collision than a car driver.[104] The relative risk of a motorcycle rider being seriously injured is also higher.[105] The ratio of seriously injured PTW users per PTW user killed is relatively high. On average seven PTW users are reported as seriously injured for every PTW user reported as killed.

The factors that contribute to serious motorcycle collisions differ from those that contribute to car collisions and therefore different approaches and countermeasures are needed to improve PTW safety.

Besides head-on collisions, the most serious collisions involving motorcycles are run-off-the-road collisions and recurring factors include injuries related to guardrails, tight curves and high speed. Vehicle-related factors (i.e. defects on the motorcycle itself, tyres for instance) also play a significant role in fatal motorcycle collisions.[106] [107] [108]

Infrastructure measures that reduce the number of serious injuries to heavy motorcycle users include motorcycle-friendly guardrails (placed only where necessary), improved curved design (including through road markings) and high-quality road maintenance. Vehicle safety technologies, for instance anti-lock braking systems (ABS) and vertical lighting, could also play an important role.[109] Compulsory technical inspections may prevent some vehicle-related factors in PTW collisions causing serious injury.[110] The role of protective equipment in reducing serious injuries among PTW users is addressed in Section 2.4 below.

2.3.4 E-scooter riders

E-scooters are a relatively new form of mobility. However, the increase in usage has led to an increase in road collisions involving e-scooters.

A study in France showed that e-scooter victims are more likely to have multiple injuries than cyclist victims (64% vs 58%) and have a higher average number of injuries per victim (2.2 vs. 2.0). Compared to cyclists, e-scooters victims were more likely to have moderate head injuries (23% vs. 16%) or serious head injuries (2% vs. 1%) and moderate facial injuries (29% vs 22 %).[111]

Establishing road rules for e-scooter riders such as setting a minimum age limit, mandating wearing a helmet, not allowing tandem riding and specifying where and when not to ride, can reduce the risk of a collision and the severity of any injuries. Improving infrastructure for all vulnerable road users, including e-scooter riders, could also have a positive impact on the safety of e-scooter riders.[112]

[104] ETSC (2023) Reducing road deaths among powered two wheeler users https://tinyurl.com/4puk8e7k
[105] OECD-ITF (2015), Improving safety for motorcycle, scooter and moped riders, https://tinyurl.com/373uc8bh
[106] Høye, A., Hesjevoll, I., Egner, L., (2024) Trafikksikkerhet for MC og moped Temaanalyse av ulykker, tiltak og eksponering (in Norwegian, EN summary) https://tinyurl.com/2er94xk5
[107] Bucsuházy et al., Czech In-Depth Accident Study. 2024. Technical Report. Transport Research Centre, Czechia.
[108] Tmejová, T., Zuvala, R., & Bucsuházy, K. (2022). In-depth Crash Causation Analysis of Motorcyclist Crashes. In VEHITS (pp. 249-256). https://tinyurl.com/4t6x98nr
[109] Ibid
[110] ETSC (2023) Reducing road deaths among powered two wheeler users https://tinyurl.com/4puk8e7k
[111] Santé publique France (2024) Tardy H., Amoros E., Ndiaye A., Gadegbeku B., Characteristics of accidents involving electric scooters or other personal mobility devices and comparison with accidents involving bicycles. Rhône register of road traffic accident victims 2015-2019 (in French) https://tinyurl.com/594y7h4p
[112] ETSC (2024) Improving the road safety of e-scooters https://tinyurl.com/5uvsmsdf

RECOMMENDATIONS TO NATIONAL GOVERNMENTS

- Design and implement walking and cycling safety strategies, which include targets and infrastructure measures to improve walking and cycling safety. Ensure that strategies are closely linked with road safety priorities and that increasing walking and cycling will not lead to more deaths and serious injuries;
- 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 30 km/h zones are introduced;
- Develop infrastructure guidelines that address the issues around PTW safety;
- Extend periodic technical testing to cover all motorcycles, including mopeds, without exemptions: as a minimum, first inspection after four years, subsequent inspection after two years then every year after that.[113]
- Construct highly visible, recognisable and uniform pedestrian crossings (e.g. raised crossings) to ensure that road users can anticipate each other's expected behaviour.[114]

RECOMMENDATIONS TO THE EU

- Encourage Member States to keep records of pedestrians falls in traffic that result in deaths and serious injuries. Consider extending the definition of what constitutes a road collision to include pedestrian falls.
- As required by the RISM Directive, complete the technical guidance on 'road design quality requirements' for Vulnerable Road Users and 'design of forgiving and self-explaining/enforcing roads'. The guidelines should be based on independent research.
- Develop a standard for PTW-friendly guardrails.
- Deliver an EU safe active mobility strategy which sets road safety measures and targets to increase the amount of distance safely travelled by walking and cycling;
- Create an EU fund to support priority measures such as for cities to introduce 30 km/h zones supported by infrastructure measures and traffic law enforcement (particularly in residential areas and where there is a high number of VRUs) and to invest in speed management on high-risk roads which carry large flows of traffic.
- Introduce a new concept for improved conspicuity for PTWs, this could include a new vertical lighting scheme[115] which is automatically on regardless of the time of day.
- Extend periodic technical testing to cover all motorcycles, including mopeds, without exemptions: as a minimum, first inspection after four years, subsequent inspection after two years and then every year after that.[116]

[113] ETSC (2020), Position on Roadworthiness Package https://tinyurl.com/mr3pvm23
[114] European Commission (2018), Roads, https://tinyurl.com/437mm9u9
[115] Institut für Zweiradsicherheit (ifz) e.V. (2018) Innovative motorcycle headlight design for improving motorcycle visibility https://tinyurl.com/y485txar
[116] ETSC (2020), Position on Roadworthiness Package https://tinyurl.com/mr3pvm23

2.4 PROTECTIVE EQUIPMENT

Protective equipment such as helmets, seatbelts and child restraint systems have been shown to be very effective in protecting road users from serious injury and death.

2.4.1 Seatbelts

A mandatory seatbelt law together with effective enforcement can mitigate against the most severe type of injuries.[117] Wearing a seatbelt reduces the risk of being killed or severely injured by 60% among front seat occupants and by 44% among rear seat occupants. Additionally, seatbelt usage among rear seat occupants drastically affects the safety of belted front seat occupants - unbelted rear seat occupants can double the death and injury rate for belted front seat occupants.[118]

Based on an analysis of the seatbelt wearing rates of those involved or not involved in a collision in Norway, researchers estimated that unbelted drivers have 5.2 times the serious injury collision risk of belted drivers.[119]

Despite the legal obligation to wear a seatbelt across the EU27 Member States and the mandatory seatbelt reminder (SBR) systems in all seat positions on new car models sold in the EU starting from September 2019,[120] usage in cars in the EU is estimated to be only 93% for front seat occupants and 79% for rear seat passengers in countries that are monitoring wearing rates.[121] The effectiveness of SBR in motivating seatbelt use has been confirmed by several studies.[122] [123]

Seatbelts have an important protective function, but nevertheless they can also be the source of injuries (rib fractures) that can be very serious and even life-threatening, particularly for senior car occupants.

Recent improvements to restraint systems have greatly reduced the risk and incidence of serious thorax injury for younger occupants. However, research carried out under the EU-funded SENIORS project found that older occupants continue to sustain serious injuries to the thorax in moderate-severity vehicle collisions due to their lower biomechanical tolerance. The project evaluated two new restraint system concepts in detail (Split Buckle[124] and Criss-Cross[125]) that intend to reduce the risk of serious or life-threatening chest injuries. The project found that these new restraint systems can greatly reduce the risk of serious thorax injury to older car occupants in frontal impacts. While there were also benefits for occupants of other ages, it was estimated that the new restraints would potentially avert 6,500 to 10,500 serious injuries over ten years if implemented in all new cars in Europe.[126]

2.4.2 Child restraint systems

A correctly used child restraint system is the most effective passive safety feature for a child travelling as a vehicle occupant. Children who are properly secured have, on average, a 58% lower risk of being injured in a collision than unsecured children; for children under the age of two, the risk is 85% lower. The effect is greater when a rear-facing child seat is used compared to a forward-facing child seat and when the safety equipment is used correctly compared to when it is used incorrectly.[127] Incorrect usage includes moving too quickly to a higher weight category of child restraint system which has been shown to have a negative effect on safety.[128]

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[117] Alfonsi, R., Meta, E., Ammari, A. (2017) Seatbelt law and enforcement, European Road Safety Decision Support System, developed by the H2020 project SafetyCube. Retrieved from www.roadsafety-dss.eu on 07/11/24.
[118] Andersson, M. (2017), Seatbelts, European Road Safety Decision Support System, developed by the H2020 project SafetyCube. Retrieved from www.roadsafety-dss.eu on 07/11/2024.
[119] Høye, A. (2016) How would increasing seatbelt use affect the number of killed or seriously injured light vehicle occupants? https://tinyurl.com/4am633h8
[120] ETSC (2018) Seatbelt reminders on every new car seat from 2019 https://tinyurl.com/36r8awce
[121] ETSC (2022) How traffic law enforcement can contribute to safer roads https://tinyurl.com/5aahjzuk
[122] Lie, A. et al. (2009) Intelligent seatbelt reminders – do they change driver seatbelt use in Europe? https://tinyurl.com/4jtanvpb
[123] Bucsuházy et al., Czech In-Depth Accident Study. (2021). Technical Report. Transport Research Centre. Czechia
[124] A concept seatbelt that separates the buckle anchorage into two separate belt systems upon impact.
[125] A standard three-point lap and diagonal belt system plus a secondary (separate) diagonal belt across the in-board shoulder.
[126] Thomas, A., Hynd, D., Kent, J., Appleby, J., & Zander, O. (2018). Benefit analysis SENIORS project. Deliverable 4.3 of the EC H2020 project SENIORS https://tinyurl.com/mpywctex
[127] Handbook of road safety – Securing children in cars https://tinyurl.com/55dte876
[128] Sedláčková et al. Child restraint systems: Czech In-Depth Accident Study. Technical report. 2024. Transport Research Centre. Czechia

2.4.3 Helmets

Motorcycle helmets reduce the risk of being killed or seriously injured in an accident by at least a third. The risk of serious head, brain or facial injuries is more than halved.[129] Furthermore, a review of 61 international observational studies shows that wearing a motorcycle helmet reduces the risk of severe head injury by about 69%.[130]

Similarly, a meta-analysis of 52 empirical studies shows that bicycle helmets reduce serious head injuries by 60%, both among adults and children.[131] In Norway, a study revealed that mandatory bicycle helmet wearing could prevent between 14-75 serious injuries, and 10-55 serious head injuries to cyclists per year.[132] Similarly, studies in the Netherlands concluded that if all cyclists in the Netherlands wore a bicycle helmet, between 1,700 and 1,900 serious injuries could be avoided.[133]

A meta-analysis of empirical studies found no support for the hypothesis that wearing a bicycle helmet leads to more risk-taking behaviour and while mandating bicycle helmets may lead to fewer people cycling, the decrease is usually neither significant nor long-lasting as there are many other factors that have a far greater effect on whether people cycle.[134]

International studies show that up to a third of all injuries sustained by e-scooter riders during collisions are head injuries[135] and a clear relationship has been found between not wearing a helmet while riding an e-scooter and traumatic brain injury.[136] Wearing a helmet while riding an e-scooter can reduce the risk of head injuries by up to 44%.[137] Helmets specific to e-scooter riding do not yet exist so a bicycle helmet is considered an appropriate helmet to wear. More research is needed to develop helmet testing methods that specifically address impacts sustained by e-scooter riders in collisions.

2.4.4 Protective clothing

Protective clothing, particularly for PTW users, can have two main aims: visibility (fluorescent, bright or reflective clothing) and protecting body parts against injury. EU standards exist for protective clothing including the standards EN 13634 for motorcycle protective gloves, EN 1938 for motorcycle goggles, EN 13634 for protective footwear for motorcyclists and EN 17092 part 1 to 6 for all protective equipment.

Studies have shown significant reductions in the risk and severity of injury if motorcycle protective clothing is worn. Riders were significantly less likely (20% to 60%) to be hospitalised if they were wearing jackets, trousers or gloves and less likely to incur injury if the garments included fitted body armour. Even non-motorcycle boots showed a halving of risk compared with shoes. Worryingly, a study also showed that between 25% to 30% of gloves, jackets and trousers designed for motorcyclists failed to protect the body due to material damage in the collision.[138]

Airbags jackets aim to reduce injury and could be effective in collisions where the rider is thrown from the vehicle.[139] A sample study carried out in Austria found that there was some evidence that airbag wearing mitigates upper body injuries.[140] However, more research is needed to investigate the extent to which these jackets are a viable PTW safety measure.

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[129] Handbook of road safety – Helmets and protective equipment for motorcyclists and All Terrain Vehicle (ATV) users https://tinyurl.com/2j9hxmx9
[130] Liu BC, Ivers R, Norton R, Boufous S, Blows S, Lo SK. (2008), Helmets for preventing injury in motorcycle riders. https://tinyurl.com/mvmp34uh
[131] Handbook of road safety – Bicycle helmets https://tinyurl.com/pn3je3d8
[132] TOI (2024) Expected effects of a bicycle helmet law in Norway https://tinyurl.com/532punsa
[133] SWOV (2024) Factsheet: Bicycle helmets (in Dutch) https://tinyurl.com/mryrhrn7
[134] Handbook of road safety – Bicycle helmets https://tinyurl.com/pn3je3d8
[135] VIAS Institute (2021) E-scooters and road safety (in Dutch or French) https://tinyurl.com/bx67zu96
[136] Revista Emergencias (2023) SCIENTIFIC LETTERS: Electric scooter accidents and injuries https://tinyurl.com/3sxs89sk
[137] Study conducted within the research project SURF (Smart Urban Road Safety - Traffic Safety of new Vulnerable Road Users) https://tinyurl.com/3fupvc23
[138] de Rome et al. (2011) Motorcycle protective clothing: protection from injury or just the weather? https://tinyurl.com/yemyrkcx also OECD/ITF (2015) Improving Safety for Motorcycle, Scooter and Moped Riders, https://tinyurl.com/4wez99ta
[139] OECD (2015) Improving Safety for Motorcycle, Scooter and Moped Riders https://tinyurl.com/23fjj4pk
[140] Martin Winkelbauer (2024), Comparing Riders' Experiences in Real Life Crashes with and without Airbag Jackets, https://tinyurl.com/37v6vcdc

UK
STUDY RANKS BICYCLE HELMET SAFETY

A study carried out by researchers at Imperial College London, and funded by the Road Safety Trust, has developed a cycle helmet safety rating system. Using scores from 0-5, the aim of the project is to help consumers make informed choices when buying a helmet.

Researchers tested 30 of the UK's most popular adult cycle helmets using a combination of in-lab testing, data from major retailers, and a survey of more than 1,000 cyclists.

The tests revealed significant differences in performance but no link between the price of a helmet and the level of safety it provides.

Funding for the project has been extended for a further three years so that the researchers can apply their testing and rating techniques to children's helmets as well as continuing to test the wide range of adult helmets available to buy.[141]

RECOMMENDATIONS TO NATIONAL GOVERNMENTS

- Enforce the compulsory wearing and proper fastening of helmets for PTW riders.
- Encourage PTW users to use protective equipment that meets EU standards.
- Encourage helmet wearing among cyclists without discouraging cycling.

RECOMMENDATIONS TO THE EU

- Support the setting up of a European helmet and protective clothing consumer information scheme, providing independent consumer information on the safety performance of the most popular helmets and protective clothing sold in the EU including information on durability and required maintenance.
- Investigate the extent to which airbag jackets are a viable PTW safety measure.
- Revise standards for testing bicycle helmets to increase the safety standard currently in use to offer higher levels of protection.
- Carry out research to develop helmet design and testing methods that specifically address impacts sustained by e-scooter riders in collisions.

[141] https://www.hiperhelmets.org/

2.5 ENFORCEMENT

Exceeding speed limits, drink-, drug- or distracted-driving, and failure to wear a seatbelt or a helmet are among the most important factors leading to serious injury on European roads. A higher frequency of road offences also exponentially enhances collision risk.[142] One French study highlighted the link between offending behaviour and collision rates. People involved in collisions resulting in personal injury commit offences 1.7 times more often than car users not involved in collisions. And the offences are more serious – one out of three of those involved in collisions had already had their licence suspended before the collision, compared with only one out of 10 of others.[143]

Road safety laws have been adopted to guide drivers in their behaviour. Many comply with them willingly. Others, however, would be less likely to comply if it were not for fear of being detected and sanctioned. This is where traffic law enforcement comes in.

Sustained intensive traffic law enforcement that is well explained and publicised also has a long-lasting effect on driver behaviour. Traffic law enforcement is a very cost-effective means of enhancing road safety and forms a fundamental part of achieving the EU 2030 road safety targets. The benefits of applying existing best practice to the whole of the EU exceed the costs by a factor of four in the case of drink-driving and ten in the case of seatbelt use.[144]

Automated enforcement can take a number of forms. Fixed cameras (in fixed locations) can continually monitor traffic speeds without a human operator if digitally connected to an electronic system. Time-over-distance systems measure the average speed over a road section to determine whether a violation has occurred.

Mobile camera systems can be deployed in marked or unmarked units. Some countries move cameras between boxes or switch off cameras at certain times while drivers are unaware which ones are operational.

Research into the effects of speed cameras consistently shows positive results. An international review of studies reported that speed cameras produce a reduction of approximately 20% in personal injury collisions on road sections where cameras are used.[145]

RECOMMENDATIONS TO NATIONAL GOVERNMENTS

- Apply proven traffic law enforcement strategies according to the EC Recommendation on Enforcement.
- Set enforcement plans with annual targets for numbers of checks and compliance with traffic laws, in particular addressing the priority areas of speeding, drink- and drug-driving, illegal use of mobile phones, red-light running, failing to wear seatbelts, child restraints or helmets. Share those enforcement plans with the European Commission to facilitate the exchange of best practice on enforcement across the EU.

[142] Goldenbeld, C., Reurings, M., Van Norden, Y., & Stipdonk, H. (2013). Crash Involvement of Motor Vehicles in Relationship to the Number and Severity of Traffic Offenses. An Exploratory Analysis of Dutch Traffic Offenses and Crash Data. Traffic Injury Prevention, 14(6), 584–591. https://tinyurl.com/yt2juxj7

[143] Bazerque Claire, Cerema, (2023) Accidentologie et Comportement des Conducteurs Infractionnistes (ACCI): infractionnisme et accidentalité https://tinyurl.com/pyxt3ab3

[144] ETSC (2007), Traffic Law Enforcement Across the EU – Time for a Directive, https://tinyurl.com/2mj6ehps

[145] Steinbach, R., Perkins, C., Edwards, P., Beecher, D., et al. (2016). Speed cameras to reduce speeding traffic and road traffic injuries. London: Cochrane Injuries Group, London School of Hygiene & Tropical Medicine. https://tinyurl.com/mr4yukra

2.6 POST-CRASH RESPONSE

Improvements to post-crash care can reduce injury severity. Research shows that as many as 50% of deaths from road traffic collisions occur either at the scene or while in transit to hospital.[146] Of the remainder, most die within 24 hours despite medical care. Both the response time of emergency services and the quality of the care play important roles in the survivability of collisions.

When a collision occurs, fast, appropriate and well-coordinated emergency response is crucial for effective treatment of seriously injured people. Improvements in emergency response can help prevent deaths and life-changing injuries in road collisions. Post-crash care provided by Emergency Medical Service (EMS) and Rescue and Fire Service (RFS) practices can mitigate the consequences of road collisions.

2.6.1 The emergency corridor

The emergency corridor (also known as a rescue lane) is a clear lane intended for priority vehicles. The aim is to allow emergency/rescue vehicles to drive without unnecessary delay. The emergency corridor must be formed should the surrounding traffic slow down significantly before coming to a halt, and only on certain types of roads, such as motorways.

According to a study conducted in Austria, an emergency corridor may speed up the arrival of Emergency Medical Services/Fire and Rescue Services to the scene of a collision by up to four minutes and increase the chances of survival by 40%.[147]

Of the PIN countries able to provide data for this report, 16 report having emergency corridor legislation. (Table 3.)

Table 3. Existence of 'emergency corridor' legislation

Countries with 'emergency corridor' legislation	Countries with no 'emergency corridor' legislation
Austria	Bulgaria[(1)]
Belgium	Denmark[(2)]
Cyprus	Estonia
Czechia	Finland[(3)]
Germany	France
Greece	Croatia
Hungary	the Netherlands[(4)]
Israel	Sweden[(5)]
Italy	Norway
Poland	United Kingdom[(6)]
Portugal	
Romania	
Slovenia	
Slovakia	
Switzerland	
Serbia	

[(1)]BG – there are requirements in the traffic regulation law to give way to cars with a special light and sound signal
[(2)]DK – it is recommended that drivers create emergency corridors
[(3)]FI – an emergency vehicle giving regulated sound and light signals, as well as a convoy led by a police vehicle giving said signals, must be given unobstructed passage regardless of the instructions given by the traffic control devices.
[(4)]NL – on motorways there is almost always an emergency lane.
[(5)]SE – there are requirements in the traffic regulation on leaving the road clear. The road user must give way to an emergency vehicle that emits a signal with a prescribed alarm device. Drivers who must 'clear' the road should stop if necessary.
[(6)]UK – covered in rule 219 of the Highway Code.

[146] ETSC (1999) Reducing the Severity of Injury Through Post Impact Care https://tinyurl.com/4bjhhnky
[147] Webpage: The emergency corridor on Austrian roads https://tinyurl.com/5d2ndwx2

2.6.2 A KPI for post-crash care

Key Performance Indicators can give a more complete picture of the level of road safety than just numbers of road deaths and serious injuries and can help detect the emergence of problems at an earlier stage.[148] Furthermore, outcome targets can be set based on the data collected.

The EU's Road Safety Policy Framework 2021-2030 introduced, for the first time, a list of Key Performance Indicators (KPIs) which will be used to measure overall road safety performance. The KPIs were further detailed in the EU Strategic Action Plan on Road Safety.[149]

One of the eight KPIs selected in an initial phase relates to post-crash care: time elapsed in minutes and seconds between the emergency call following a collision resulting in personal injury and the arrival at the scene of the collision of the emergency services.

The 'Baseline' project, supported by the European Commission and coordinated by the VIAS Institute, was launched in 2020 to produce values for the EU Road Safety KPIs in the 18 Member States participating in the project. Each participating country provided between one and eight national KPI values that were comparable across countries and which met the minimum methodological requirements of the European Commission.[150]

During the Baseline project 11 EU Member States collected data for the KPI on post-crash care (EL, SE, BE, PT, LT, FI, AT, LV, CY, CZ, DE).[151] The estimates gathered under Baseline for the KPI on post-crash care vary broadly between 18 and 54 minutes. The authors of the report note that there could be several reasons for the difference and country comparisons are difficult. Nonetheless, they recommend keeping the KPI as the speed of response times is a determining factor for the survival of victims of road traffic collisions.

For this report, 15 PIN countries reported having a KPI on post-crash care (Table 4).

Table 4. Does your country collect data for a post-crash care KPI?
(1)SE – collected once during Baseline project, but not routinely collected

Collects post-crash care KPI	Does not collect post-crash care KPI
Austria	Bulgaria
Belgium	Denmark
Cyprus	Estonia
Czechia	Spain
Germany	France
Finland	Hungary
Greece	Ireland
Croatia	Poland
Italy	Romania
Latvia	Sweden(1)
Lithuania	Slovenia
Malta	Slovakia
the Netherlands	United Kingdom
Portugal	Switzerland
Serbia	Israel
	Norway

[148] ETSC (2018), Briefing: 5th EU Road Safety Action Programme 2020-2030, https://tinyurl.com/2z58hda3
[149] ETSC (2019), Briefing EU Strategic Action Plan on Road Safety, https://tinyurl.com/46x5cd47
[150] Baseline project, https://baseline.vias.be/
[151] https://www.baseline.vias.be/en/publications/kpi-reports/

POLAND
DEVELOPING THE NATIONAL RESCUE SYSTEM

Poland has a national target to reduce serious injuries by 50% by 2030. In its National Road Safety Programme 2021-2030, one of the priorities under the rescue services and post-crash response pillar is the integration and development of the National Rescue System.

This includes:

- the further development of the emergency medical system through expanding hospital emergency departments (HEDs) Medical Air Rescue (MAR) and optimisation of the concentration of medical dispatching centres;
- bringing the Volunteer Fire Department (VFD) units into the system; modernising equipment; support for autonomous automatic accident notification solutions; creating a database on actual health consequences of accidents; ensuring proper use of the resources of the emergency medical system and NFRS (National Firefighting and Rescue System) and delivering comprehensive first aid education (including for candidate drivers) and promotional activities.

RECOMMENDATIONS TO NATIONAL GOVERNMENTS

- Streamline the emergency response chain and increase the quality of trauma management to mitigate collision consequences more effectively.

RECOMMENDATIONS TO THE EU

- Set common standards for the creation of emergency corridors and apply them throughout the EU. Drivers need to be aware of how they should react once they find themselves upstream of a road collision.
- As regards EU Key Performance Indicators (KPIs)
  - Continue to support Member States in collecting harmonised data.
  - Adopt a new indicator on the proportion of patients treated by ambulance staff within 15 minutes.

2.7 ENSURING A GENDER PERSPECTIVE TO ROAD SAFETY SOLUTIONS

Despite improvements in vehicle safety systems over recent decades, ***studies show that men and women are not equally well protected both inside and outside vehicles in the event of a collision.***

Inside vehicles, women have a higher risk of injury to the lower extremities, torso, and cervical spine compared to men, while men show higher risks of skull fractures and severe brain injuries in comparable collisions.[152] Studies using Swedish data also show the overall risk of permanent medical impairment (PMI) is still 1.5 times higher for women (15%) compared to men (10%). When it comes to neck injuries, the risk of PMI was found to be nearly twice as high for women (7%) compared to men (4%).[153] Further studies also show that the odds of a seatbelt-restrained female driver sustaining a Maximum Abbreviated Injury Scale (MAIS) 3+ and MAIS 2+ injury were 47% and 71% higher, respectively, than those of a belt-restrained male driver when controlled for the effects of age, mass, Body Mass Index (BMI) category, crash, change of velocity, vehicle body type, number of events, and crash direction. The largest difference between male and female injury risk is found for whiplash injuries. Injury statistics from the mid-1960s until today show that on average females are exposed to double the risk of sustaining whiplash injuries than males, ranging from 1.5 to 3 times higher.[154]

Outside vehicles, female pedestrians and cyclists have an increased risk of suffering pelvis fractures when in a traumatic road collision than males.[155]

Furthermore, studies have also shown that female patients are more frequently trapped than male patients (female patients 15.8%, male patients 9.4%) following a motor vehicle collision, leaving them exposed to greater injury than men.[156]

Despite injury statistics showing that men and women are not equally well protected in the event of a collision, it is the average male that represents the adult population in vehicle safety assessments. The use of crash test dummies representing the average female, for use in regulatory tests together with the male equivalent would go some way to addressing the gap.[157]

In the EU-funded project, VIRTUAL[158], the world's first crash test dummy of an average female, SET 50F, has been created together with the equivalent average male, SET 50M, for low-speed rear impact testing. The project has also developed open-source human body models based on both the average male and the average female - the VIVA+ models - facilitating the biomechanical representation of both genders in virtual crash testing.

RECOMMENDATIONS TO CAR MANUFACTURERS AND THE EU

- Update existing crash test dummies to allow a proper assessment of the risk of sustaining potentially fatal abdominal injuries for rear-seat passengers.
- Develop crash test dummies representative of more aspects of variability such as age, gender, size and stature for those users outside the vehicle.

[152] Klug, C., Bützer, D., Iraeus, J., John, J., Keller, A., Kowalik, M., Leo, C., Levallois, I., Putra, I.P.A., Ressi, F., Schmitt, K-U., Svensson, M., Trummler, L., Wijnen, W., Linder, A., (2023) How much does the injury risk between average female and average male anthropometry differ? – A simulation study with open source tools for virtual crash safety assessments https://tinyurl.com/ycu4ncru
[153] Ibid
[154] Linder, A., Svedberg, A., (2019) Review of average sized male and female occupant models in European regulatory safety assessment tests and European laws: Gaps and bridging suggestions https://tinyurl.com/ybb5nk7f
[155] Kale, N., Lavorgna, T., Vemulapalli, K.C., Ierulli, V., Mulcahey, M.K.,(2023) Traumatic orthopaedic motor vehicle injuries: Are there age and sex differences in pedestrian and cyclist accidents in a major urban center? https://tinyurl.com/4mam8e2r
[156] Nutbeam, T., Weekes, L., Heidari, S., Fenwick, R., Bouamra, O., Smith, J., Stassen, W., (2022) Sex-disaggregated analysis of the injury patterns, outcome data and trapped status of major trauma patients injured in motor vehicle collisions: a pre-specified analysis of the UK trauma registry (TARN) https://tinyurl.com/y6xevuh2
[157] Linder, A., Svedberg, A., (2019) Review of average sized male and female occupant models in European regulatory safety assessment tests and European laws: Gaps and bridging suggestions https://tinyurl.com/ybb5nk7f
[158] https://projectvirtual.eu/

2.8 VEHICLE SAFETY

Vehicle safety technology has proven to be effective both in preventing collisions and in saving lives when collisions happen. The age of vehicles and poor technical conditions are also associated with more serious injuries in a collision. In one study, for every 10 years older a vehicle was, the risk of serious injury increased fourfold.[159]

As legislated by the EU, new technologies fitted to new cars will improve the safety of all road users, inside and outside the vehicle. Passive safety measures, including seatbelts, airbags, frontal and side impact protection and pedestrian protection, reduce forces by extending deceleration times and managing the way forces are directed to the body. Some of these technologies are also applicable to powered two wheelers.

2.8.1 Latest mandatory vehicle safety improvements

Intelligent Speed Assistance (ISA) became mandatory on all new vehicles as of July 2024 and Automated Emergency Braking (AEB) detecting pedestrians and cyclists was required on new models as of July 2024. ISA and AEB detecting pedestrians and cyclists can mitigate or prevent traffic collisions. The passive safety of cars was also improved by extending the crash test zone to include the windscreen between the A-pillars for better pedestrian and cyclist protection.

New heavy goods vehicles have also had to be fitted with advanced systems capable of detecting pedestrians and cyclists located in close proximity since 2024 and new models must also comply with improved direct vision requirements as of 2026.

2.8.2 Euro NCAP Testing

The consumer vehicle safety rating organisation Euro NCAP (The European New Car Assessment Programme) carries out pedestrian protection tests to evaluate the most important vehicle front-end structures, such as the bonnet and windshield, the bonnet leading edge and the bumper. In these tests, the potential risk of injuries to child and adult pedestrian head, adult pedestrian pelvis and upper and lower leg are assessed. In 2016, Euro NCAP started testing and rewarding an Automated Emergency Braking System with pedestrian detection. However, in general, car manufacturer improvements in pedestrian protection have been slower than those for occupant protection.

Euro NCAP tests cars with crash test dummies of different types and statures in frontal impact protection. In its 'Vision 2030 document'[160], Euro NCAP proposes to use THOR 50F small female and THOR 50M mid-size male crash dummies. They will be used as driver and front passenger, respectively, in a revised low severity full-width barrier test, applying criteria and injury limits that promote restraints that better protect older occupants.

Vehicles are also rewarded for providing important child safety features such as ISOFIX anchorages on various seating positions, "i-Size" labelling, a front seat airbag-disabling switch with clear user instructions and integrated child seats. Euro NCAP also verifies whether the car can easily accommodate the most common child restraint systems available on the market and checks that the information that vehicle manufacturers provide to car owners is accurate and clear.[161]

Euro NCAP designs and carries out vehicle tests to generate a vehicle safety rating. The crash dummies used during these tests are important for determining the safety of vehicles for a wider range of occupants (see section 2.7 above regarding gender).

[159] Bucsuházy, K., Zůvala, R., Valentová, V., & Ambros, J. (2022). Factors related to severe single-vehicle tree crashes: In-depth crash study. PLoS one, 17(1), e0248171. https://tinyurl.com/4znzruzc
[160] EuroNCAP Vision 2030: A safer future for mobility https://tinyurl.com/r6dpk8s5
[161] Ibid

2.8.3 eCall

eCall, the automated emergency call system that alerts emergency services in the event of a collision, has been mandatory on all new car models since 2018. Research shows that, with eCall, emergency service response time would be cut by 50% in rural areas and by 40% in urban areas.[162]

ETSC calls for the extension of eCall technology to PTWs. The EU-funded I_HeERO[163] project concluded that an eCall for two- and three-wheeled vehicles would need to differ significantly from the one used in passenger cars due to different collision dynamics, injury patterns and severity. The project also defined the minimum requirements for a motorcycle-specific eCall system, embedded in the vehicle. More recently, a second EU-funded project, known as sAFE[164], allowed manufacturers to conduct real tests with Public Safety Answering Points (PSAPs) for motorcycle eCall devices with the aim of refining the PTW eCall concept developed by I_HeERO.

2.8.4. Improving Vehicle Safety Regulations

The European Commission is required to review the General Safety Regulation by 7 July 2027 and, where appropriate, accompany that review with a legislative proposal to update it to further reduce or eliminate collisions and injuries.[165]

As requested by the European Parliament, the European Commission should consider the feasibility, acceptability and possible implications for road safety of next-generation Intelligent Speed Assistance (ISA). This should include consideration for the feasibility and acceptability of non-overridable ISA.

In recent years, cars have become heavier, taller and more powerful. The risk of injuries to vulnerable road users increases as the weight of the vehicle hitting them increases. The same is true for the bonnet height of the vehicle hitting them. For example, a pedestrian or cyclist hit by a car with a bonnet 90 cm high runs a 30% greater risk of fatal injury than if hit by a vehicle with a bonnet 10 cm lower.[166] A maximum bonnet height as well as a maximum weight limit for passenger cars should be introduced.

'Dooring', where a car occupant opens their door into the path of an approaching cyclist, is a common cause for serious injuries of cyclists involved in collisions with vehicles.[167] Cyclist dooring prevention systems can warn occupants to not open the door when a cyclist is approaching, and more advanced systems can also physically prevent the door from being opened in such situations.

Collisions due to a driver becoming incapacitated because of health issues are rare. However, when they do happen, they often have catastrophic consequences. The 'risk mitigation function' is a system that can detect, for example through a driver monitoring system, that the driver is unresponsive and subsequently stop the vehicle in lane or, preferably, in a safe area such as at the side of the road.

Pedestrians' heads impacting on a vehicle's 'A-pillar', which are the forward pillars on either side of the windscreen, is currently excluded from approval testing, as is contact with the windscreen header as well as with the area between the end of the hood and the windscreen. As these head impacts on A-pillars are responsible for most fatal injuries in such collisions, these should be included in testing.[168]

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[162] https://etsc.eu/automated-emergency-calling-ecall-now-mandatory-on-new-car-models/
[163] Factsheet: What is eCall? http://tinyurl.com/33wbhhh2
[164] https://safe112.eu/
[165] Regulation (EU) 2019/2144 of the European Parliament and of the Council of 27 November 2019 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.
[166] VIAS Institute. 2023. https://tinyurl.com/5n8t36p2
[167] There were 3,500 'dooring' collisions in Germany in 2018 alone. https://tinyurl.com/48ws6b6c
[168] Rikard Fredriksson (2011) Priorities and potential of pedestrian protection: accident data, experimental tests and numerical simulations of car-to-pedestrian impacts https://tinyurl.com/ms4yrr8z

RECOMMENDATIONS TO THE EU

With regards to the safety of motor vehicles:

- Consider the feasibility, acceptability and possible implications for road safety of next-generation ISA for cars, vans, trucks and buses as requested by the European Parliament in its report;
- Update the General Safety Regulation by 7 July 2027 to account for the latest advancements in safety technology;
- Extend the mandatory fitment of advanced seatbelt reminders as standard equipment to all seats;
- Require that the relevant mandatory advanced driver assistance systems (ADAS) (e.g. Automated Emergency Braking Systems (AEBS) and Blind Spot Information Systems (BSIS)) can detect e-scooter riders. Include tests to verify compliance with the requirement;
- Mandate the installation of a cyclist dooring prevention system and a risk mitigation function system;
- Initiate an amendment of UN Regulation No 127 to include headform contact with A-pillars;
- Introduce a maximum bonnet height as well as a maximum weight limit for passenger cars.

With regards to the safety of motorcycles:

- Update the minimum safety requirements for motorcycles.[169]
- Mandate compulsory Anti-lock Braking Systems (ABS) for all motorcycles.
- Carry out research into the feasibility of mandating ABS for mopeds.
- Introduce a new concept for improved conspicuity for PTWs, this could include a new vertical lighting scheme[170] which is automatically on regardless of the time of day.
- Consider the practical application of mandating the fitment of AEB and speed assistance systems on motorcycles.

With regards to eCall:

- Include more vehicle categories in the eCall regulation, motorcycles most importantly.

RECOMMENDATIONS TO NATIONAL GOVERNMENTS

- Use public procurement to require vehicle safety features such as direct vision, Intelligent Speed Assistance, Automated Emergency Braking with pedestrian and cyclist detection and alcohol interlocks in public sector fleets and fleets providing the public with services until such time as all vehicles on the roads have such features.

[169] Regulation (EU) No 168/2013 of the European Parliament and of the Council of 15 January 2013 on the approval and market surveillance of two- or three-wheel vehicles and quadricycles.

[170] Institut für Zweiradsicherheit (ifz) e.V. (2018) Innovative motorcycle headlight design for improving motorcycle visibility https://trid.trb.org/view/1681947

ANNEXES

ISO Codes

Country	ISO Code
Austria	AT
Belgium	BE
Bulgaria	BG
Switzerland	CH
Cyprus	CY
Czechia	CZ
Germany	DE
Denmark	DK
Estonia	EE
Greece	EL
Spain	ES
Finland	FI
France	FR
Great Britain	GB
Croatia	HR
Hungary	HU
Ireland	IE
Israel	IL
Italy	IT
Lithuania	LT
Luxembourg	LU
Latvia	LV
Malta	MT
The Netherlands	NL
Norway	NO
Poland	PL
Portugal	PT
Romania	RO
Serbia	RS
Sweden	SE
Slovenia	SI
Slovakia	SK
The United Kingdom	UK

National definition of a seriously injured person in a road collision

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.
BE	Hospitalised more than 24 hours. But in practice no communication between police and hospitals so in most cases allocation is made by the police without 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 is "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.
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 is used to find out how long the person (involved in an accident 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.Since 2017, we have stopped using hospitalised injuries from police data due to a change in recording. Moreover, we now put forward the estimed number of people injured rather than the recorded number; but the estimate is partially built on the recorded number.
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 injuries include injuries, fractures, bruises, internal injuries, severe cuts and destruction, general shock requiring medical treatment, or any injury requiring hospital care, which usually heals beyond 8 days.
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 seriously and slightly 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.
LU	From 2004: hospitalised more than 24 hours as in-patient. Police records.
LV	From 2004 till 2021: hospitalised more than 24 hours as in-patient. Police records. From 2022: MAIS 3+
LT	According to the definition provided in legal acts, a seriously injured person is someone who loses more than 30% of their working capacity or/and his or her body is being incurably mutilated. The injury scale is determined by doctors and forensic medical experts. In the official traffic accident statistics provided by the police, the injury scale for people injured in traffic accidents (MAIS3+) has five values. However, on average, only 62% of injury scale data for injured road users is provided in police records, i.e.: • in 2020, a total of 3,203 road users were injured, with the MAIS3+ column filled in for 70% of cases – meaning the injury scale for the remaining injured road users was not provided. • in 2021, out of 3,211 injured road users, the injury scale was known for 68%. • in 2022, out of 3,375 injured road users, only 58% had a recorded injury scale. • in 2023, out of 3,256 injured road users, only 53% had a recorded injury scale. On average, the injury scale remains unknown for approximately 38% of people injured in traffic accidents. Therefore, when determining the number of seriously injured persons, two classifiers from police records are considered: 1. the MAIS3+ column, where the value is marked as "severe health impairment" and 2. the classifier indicating that the road user was hospitalized.
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 within 30 days. Police records.

NL	Injured in the police reporting -as provided to CARE- is any person having sustained injury due to a road traffic crash with at least one moving vehicle involved on a public road in the Netherlands. The injury varies from: - Slight (treated on the scene by local help/bystanders/first aid assistant or ambulance staff without transport to hospital/Emergency Unit, possible treatment later by GP); - A&E (treated by ambulance staff, medical team with transport to hospital/Emergency Unit or brought to the hospital by other means, without stay); - Hospitalised (stabilised by ambulance staff, medical team and transported to hospital/Emergency Unit or brought to the hospital by other means and admitted for at least one night). From police data a more or less stable series can be found by adding Hospitalised + A&E treated, as since 2014 these groups are no nonger possible to distinguish. Note that this series is underreported by a factor 3-20, depending on the mode of transport and involvement of a motorvehicle. The national definition for Serious Injury corresponds to MAIS3+ and is "Hospitalised after a traffic accident and sustaining an injury of at least 3 on the Abbreviated Injury Scale (AIS), and not died within 30 days" MAIS3+ is estimated from linked hospital data and preferred over police data for totals and grouped data. For numbers by location this source does not provide information.
PL	Seriously injured – a person who has suffered injuries, in the form of: a) blindness, loss of hearing, loss of speech, ability to procreate, other severe disability, severe incurable disease or long-term life-threatening illness, permanent mental illness, complete substantial permanent inability to work in the occupation or permanent, significant body disfigurement, b) other injuries causing disturbance of the functioning of a bodily organ or health disorder lasting longer than 7 days. Police records.
PT	Hospitalised for at least 24 hours and not having died within 30 days after the road traffic accident . Police records.
RO	In police data base for trafic accidents, seriously injured is defined by MAIS 3+
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 2030 (-25 % since 2020). 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, or 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	Historically the following definition was used - Serious injury: An injury for which a person is detained in hospital as an "in-patient", or any of the following injuries whether or not they are detained in hospital: fractures, concussion, internal injuries, crushings, burns (excluding friction burns), severe cuts, severe general shock requiring medical treatment and injuries causing death 30 or more days after the collision. An injured casualty is recorded as seriously or slightly injured by the police on the basis of information available within a short time of the collision. This generally will not reflect the results of a medical examination, but may be influenced according to whether the casualty is hospitalised or not. Hospitalisation procedures will vary regionally. Since 2012, some police forces have moved to injury-based reporting systems which has impacted on the number of serious and slight injuries reported, affecting trends over time. In these injury-based reporting systems, police officers report injuries sustained (from a list of 20) and injury severity is coded from the most serious injury recorded. A list of the injuries and which ones are classed as serious is published (https://www.gov.uk/government/publications/guide-to-severity-adjustments-for-reported-road-casualty-statistics/guide-to-severity-adjustments-for-reported-road-casualties-great-britain#classification-of-injury-severity-using-the-crash-reporting-system). All police forces are expected to adopt this injury-based reporting from 2025.
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. Further comments: 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 corps 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	1965-2012: A person injured in a road crash and hospitalised for a period of 24 hours or more, not for observation only. 2013 onwards: Police data is linked with the hospital data and any casualty found in both sources had their severity of injury defined by MAIS. If the casualty was not found in the hospital data, their severity of injury was defined by the police. Seriously injured is defined by MAIS 3+ or hospitalized for a period of 24 hours or more, not for observation only.
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. Categorization 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.

Countries' progress in collecting data on serious injuries based on MAIS.

AT	The KFV carried out a feasibility study on MAIS3+ assessment on behalf of the (then) Austrian Transport Ministry (bmvit) in 2014 and 2015. The study covered two methods to estimate the number of serious road injuries: a) application of a (hospital data based) correction factor to the police reported number of serious injuries, and b) use hospital data alone to arrive at an estimate for serious injuries. The latter method was selected for further use. In late 2015, the number of MAIS3+ injuries was estimated for the first time for the year 2014 (using the AAAM conversion table) and has been continued for all years thereafter. Time series are now available starting 2010.
BE	New MAIS3+ data will be available every year. We are able to provide breakdowns according to age, road user type, gender, month, year, accident type. We use method one (correction factors applied to police data) and method two (use of hospital data) that are proposed by the European Commission.
BG	The only source is Police records.
CY	The data based on MAIS3+ for 2018, 2019, 2022 and 2023 have been calculated. For 2020 and 2021, the numbers are expected to be calculated in about six months.
CZ	Negotiations between the Ministry of Interior and the Ministry of Health under way, implementation of MAIS3+ maybe in a near future?
DE	An MAIS3+ injured persons estimation based on GIDAS data, data from the German Trauma Register and data from the official accident statistcs is being calculated by Bast.
DK	No systematic linkage between police and hospital data. Denmark is working on a process to convert ICD diagnose codes into AIS and MAIS.
EE	ICD-10 diagnose info exists, technologically ready to link accident data with health registry data. Need to change legislation and due to that issue we can't start linking process. In 2019 we tried to test EU proposed ICD - AIS convertion tool. The result we got from the Health Information System was very doubtful. Further work depends on the initial data quality and convention tool (AAAM) updates. Legislative changes are drafted.
ES	Data available from 2010. Since 2011 MAIS3+ is published in official reports. In a near future Spain will add MAIS3+ to the current definition of seriously injured.
FI	MAIS3+ (based on AAAM converter tool) is used in official data (from 2014 onwards). A pilot study was made in 2014 where the number of seriously injured MAIS3+ was 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. Number of serious injuries (MAIS3+) in road traffic were estimated for the years 2010-2011.
FR	Linking between police and health data (hospitalised and emergency patients) is done in the Rhone county and then used by Gustave Eiffel University to build an estimate comparing the structure of Rhone recorded traffic accidents and the national accident database. Using a similar but simpler method, a first estimate of the number of serious injuries (MAIS3+) is produced at the same time as the other accident statistics, while waiting for an updated estimate produced directly by Gustave Eiffel University model.
EL	Hospitals do not systematically collect data on the injury severity of road casualties.
HR	Link between police and hospital is based on the law. Only ICD based number is available.
HU	The real possibility can only be the transformation of ICD codes to AIS ones thus Hungary started modification of the legislation in 19.12.2016. The current data architecture does not provide direct linkage between police and hospital data. The National Healthcare Services Center started to upgrade the information system but the required time for the development of the necessary IT systems is not known yet.
IE	In 2022 Ireland commenced a project to study hospital data and apply the MAIS3+ serious injury definition proposed by the EC, following the Safety Cube methodology and additional procedures needed due to the nature of Irish data. This project aligns with action 172 of the Road Safety Strategy: Develop a method to identify and enumerate serious injuries using a medical definition, such as MAIS3+, and report on same as part of the dissemination of trend data, updates, and reporting on serious injuries. We have reported to the EC MAIS3+ numbers for the period 2014-2023. We are currently working on a series of reports on serious injuries using hospital data by road user group. Full reports on cyclist and pedestrian serious injuries, infographics, a methodology report, and FAQs on hospital data can be found at https://www.rsa.ie/road-safety/statistics/analysis-of-road-users
IT	The current data architecture does not provide direct linkage between police and hospital data. MAIS3+ has been adopted for coding the level of injury and calculated on the basis of data sources such as the hospital discharge register. An estimate of the number of seriously injured has been calculated since year 2012 according to the conversion tables made available by EC.
LU	MAIS3+ will be used in the near future.
LV	MAIS3+ introduced by law in August 2021. Ministry of Health and Ministry of the Interior reported that fully introduced in August 2022

LT	MAIS3+ data already available since 2014, but not all accident fields (MAIS3+) are filled - missing information (the injury scale remains unknown for approximately 38% of people injured in traffic accidents). Currently, the Road Accident Information System (RAIS) is being modernized. The updated RAIS system will include linking between police and medical data, and road user injuries will be classified using the International Classification of Diseases (ICD-10). This will allow injury severity to be classified according to the MAIS3+ scale.
MT	MAIS3+ conversion process from ICD to MAIS3+ is still ongoing. Progress stalled due to a low rate of positive matches in converting data using conversion tables provided by the EC. The EC has recently communicated that AAAM have been contracted in 2022 to provide support to MS for this conversion. As Malta has encountered difficulties on MAIS3+ conversion, this support is welcomed. We aim to resume conversion of MAIS3+ data this year in collaboration with the Ministry of Health.
NL	Data on MAIS3+ have been recalculated for AIS®2005 instead of AIS®1990. Also MAIS2 was recalculated. Nationally now also MAIS3+ is defined as seriously injured, where as previously MAIS=2 was also included.
PL	The work is coordinated by the National Road Safety Council, National Institute of Public Health and Motor Transport Institute. Poland transfer data from 2013 and 2014 according to the recomendations of the CARE group (DG MOVE). In recent years, work on MAIS 3+ in Poland has been stopped. The method proposed by DG MOVE (conversion of ICD-10 scale on the MAIS 3+ scale) in our opinion has errors and leads to incorrect results. Unfortunately, due to a lack of financing, Poland could not launch a national project to develop a methodology for assessing the severity of injuries of road accident victims according to the MAIS 3+ scale.
PT	A methodology was developed in 2015 to estimate the number of MAIS3+ serious injuries, using the national hospital discharge database. The Health Ministry applies the EC's AAAM converter to the ICD9-CM codes to calculate the MAIS score. This method is being improved, as Health Ministry is currently using ICD-10-CM/PCS injury codes, since mid-2016. Also, recommendations from SafetyCube D7.1, on external causes codes for road accident victims are being analysed. Under the new Road Safety Strategy (2017-2020), a procedure was made to collect from the police data the required information while preserving the victim's privacy. A protocol for agreed procedure implementation is being prepared for signature by relevant parties.
RO	From 2021 we use MAIS3+ with conversion approved by DG-MOVE because Ro Hospitals used ICD 10 Australian version.
SE	Data already available since 2007.
SI	We have made experimental linking between police and hospital data. MAIS3+ data are incomplete and not ready for publication and still under discussion.
SK	Under discussion.
UK	MAIS 3+ serious injuries is done on an ad hoc basis, and is therefore not published regularly. Figures have been updated to 2020 for UK MAIS3+ figures and are published in table RAS4101: https://assets.publishing.service.gov.uk/media/632df8ade90e0711da8b2b40/ras4101.ods
CH	Linking of health and police data has started in 2014. This allows to code the recommended maximum AIS score based on ICD-10.
IL	Since 2013 police data is linked with hospital data. Any casualty found in both sources, their injury severity is defined by MAIS. If the casualty was not found in the hospital data, their injury severity is defined by the police. Seriously injured is defined by MAIS 3+ or hospitalized for a period of 24 hours or more, not for observation only.
NO	Under consideration.
RS	Road Traffic Safety Agency has begun activities to introduce the MAIS 3+ scale to record serious injuries. During 2017, an analysis of the possibilities for the most efficient introduction of the MAIS 3+ scale was performed. via EU for Improving Road Safety in Serbia Project. Road Traffic Safety Agency intends to continue activities on introduction MAIS3+ definition of serious injuries in road traffic accidents in the next period.

Table 1 (Fig. 1) Serious injuries according to MAIS3+ definition over the period 2013-2023

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
AT MAIS3+	1,397	1,402	1,303	1,380	1,238	1,279	1,211	988	1,078	1,204	n/a
BE MAIS3+	4,191	4,026	3,597	3,512	3,554	3,317	3,493	3,167	3,150	3,386	n/a
BG MAIS3+	2,303	2,174	2,295	2,503	1,943	1,988	1,937	1,556	1,458	1,766	1,794
CY MAIS3+	n/a	83	n/a	n/a	92	92	53	n/a	n/a	37	43
CZ MAIS3+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DE MAIS3+	n/a	15,392	15,442	16,337	15,892	15,265	15,311	13,238	12,244	12,485	n/a
DK MAIS3+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
EE MAIS3+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ES MAIS3+	6,613	6,343	6,955	n/a	n/a	6,059	6,162	4,793	5,654	6,066	n/a
FI MAIS3+	n/a	519	477	460	409	485	390	408	368	334	n/a
FR MAIS3+[(1)]	15,841	16,496	16,355	16,773	16,887	16,104	16,248	13,337	15,944	15,956	15,936
EL MAIS3+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
HR MAIS3+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
HU MAIS3+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
IE MAIS3+	n/a	364	341	386	444	475	523	406	483	567	596
IT MAIS 3+	12,899	14,943	15,901	17,324	17,309	18,614	17,600	14,102	15,990	16,875	16,989
LU MAIS3+	n/a	n/a	69	69	43	55	n/a	n/a	n/a	n/a	n/a
LV MAIS3+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	385
LT MAIS3+	n/a	n/a	147	71	131	163	110	86	81	74	61
MT MAIS3+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NL MAIS3+	5,300	5,800	6,000	6,400	6,500	6,800	6,900	6,500	6,800	8,300	7,400
PL MAIS3+	1,859	2,263	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
PT MAIS3+[(2)]	2,074	2,055	2,171	2,199	2,301	2,276	2,281	2,201	2,287	2,392	2,467
RO MAIS3+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SE MAIS3+	1,051	1,147	777	878	835	742	704	601	904	1,230	1,162
SI MAIS 3+	n/a	213	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SK MAIS3+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
UK MAIS3+	5,235	5,740	6,092	6,549	6,328	6,363	6,436	n/a	n/a	n/a	n/a
GB MAIS3+	5,173	5,666	6,012	6,481	6,237	6,277	6,342	5,349	n/a	n/a	n/a
CH MAIS3+	3,204	2,899	2,887	2,929	3,127	3,732	3,086	3,207	3,385	n/a	n/a
IL MAIS3+	2,086	2,031	2,190	2,474	2,366	2,181	2,409	2,067	2,449	2,595	2,581
NO MAIS3+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RS MAIS3+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Source: CARE database and national statistics provided by PIN Panellists in each country
[(1)]FR - Mainland
[(2)]PT - 2012 to 2017: Mainland; 2018 onwards: Total Portugal (including the autonomous regions of Açores and Madeira)

Fig 1. Number of seriously injured recorded in national statistics per single road death per country in the last three years available ranked alphabetically

	SIs per road deaths	MAIS 3+ per road deaths	
AT	19.4	3.0	2020-2022
BE	6.1	6.2	2020-2022
BG	3.1	3.1	
CY	6.8	1.1	2022-2023
CZ	3.2		
DE	21.2	4.7	2020-2022
DK	11.3		
EE	7.2		
ES	4.9	3.6	2020-2022
FI	1.7	1.7	2020-2022
FR	5.1	5.1	
EL	1.0		
HR	10.3		
HU	9.3		
IE	9.7	3.5	
IT	5.5	5.5	
LU	10.2		
LV	3.1	1.0	
LT	3.2	0.5	
MT	21.1		
NL	20.5	11.2	
PL	3.9		
PT	3.8	3.9	
RO	2.2		
SE	19.6	4.9	
SI	8.8		
SK	3.5		
GB	16.7		
CH	17.8	5.0	
IL	7.1	7.1	
NO	5.6		
RS	6.4		

Table 2 (Fig.1, 2, 3, 5, 6 and 15) Total number of seriously injured according to national definitions over the period 2013-2023

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
AT	7,344	7,434	7,486	7,566	7,664	7,631	7,384	6,650	6,945	7,258	7,191
BE	4,581	4,484	4,181	4,095	3,762	3,637	3,605	2,978	3,119	3,413	3,261
BG	2,303	2,174	2,295	2,503	1,943	1,988	1,937	1,556	1,458	1,766	1,794
CY	407	467	377	406	388	348	340	211	252	253	232
CZ	2,721	2,714	2,487	2,530	2,286	2,395	2,061	1,761	1,580	1,682	1,711
DE	64,045	67,709	67,706	67,426	66,513	67,967	65,244	58,005	55,137	57,727	52,902
DK	1,891	1,798	1,780	1,797	1,756	1,862	1,822	1,716	1,639	1,718	1,680
EE	501	455	407	424	429	420	356	346	352	404	430
ES	10,086	9,574	9,495	9,755	9,546	8,935	8,613	6,681	7,784	8,502	9,265
FI	485*	519	477	460	409	485	390	408	368	334	370*
FR[(1)]	15,841	16,496	16,355	16,773	16,887	16,104	16,248	13,337	15,944	15,956	15,936
EL	1,212	1,016	999	879	706	727	652	518	610	664	657
HR	2,831	2,675	2,822	2,746	2,776	2,731	2,492	2,295	2,610	2,910	3,102
HU	5,369	5,331	5,575	5,541	5,630	5,559	5,482	4,655	4,595	5,041	4,772
IE	508	759	827	965	1,053	1,359	1507	1216	1363	1686	1,440
IT	12,899	14,943	15,901	17,324	17,309	18,614	17,600	14,102	15,990	16,875	16,989
LU	316	245	319	249	256	273	248	217	267	267	347
LV	452	434	479	525	496	542	461	491	449	425	385
LT	1,481	1,437	724	655	368	165	308	376	392	476	490
MT	265	292	306	294	304	317	305	242	339	379	320*
NL	8,151	9,817	13,523	13,660	13,182	13,599	12,436	10,225	12,380	14,373	14,377
PL	11,672	11,696	11,200	12,077	11,103	10,941	10,633	8,805	8,276	7,541	7,594
PT[(2)]	1,946	2,010	2,148	1,999	2,117	2,195	2,383	1,877	2,161	2,302	2,500
RO	8,156	8,122	9,057	8,285	8,181	8,144	8,125	5,491	3,796	3,690	3,539
SE	4,645	4,810	3,818	4,074	3,988	3,606	3,503	3,098	3,784	4,718	4,575
SI	708	826	926	850	851	821	814	678	784	862	829
SK	1,086	1,098	1,121	1,057	1,127	1,272	1,050	894	854	866	894
GB	31,052	32,818	31,454	30,266	29,186	29,657	28,710	22,386	25,537	27,989	28,087
CH	4,129	4,043	3,830	3,785	3,654	3,873	3,639	3,793	3,933	4,002	4,096
IL	2,086	2,031	2,190	2,474	2,367	2,182	2,411	2,061	2,446	2,597	2,644
NO	712	683	693	656	665	602	565	627	569	578	568
RS	3,422	3,275	3,448	3,362	3,514	3,338	3,322	2,953	3,347	3,302	3,398
EU 24	**161,762**	**167,322**	**167,717**	**169,635**	**166,427**	**167,514**	**161,748**	**137,012**	**139,093**	**145,553**	**141,275**

Source: CARE database and national statistics provided by PIN Panellists in each country
EU24: EU27 excluding IE, LT and NL for inconsistency in the data trend
*Estimated
[(1)]FR - Mainland
[(2)]PT - 2012 to 2017: Mainland; 2018 onwards: Total Portugal (including the autonomous regions of Açores and Madeira)

Fig 3. Average annual change in the number of serious injuries over the period 2013-2023

RO	-9%	
CY	-7%	
EL	-6%	
CZ	-6%	
PL	-5%	
FI	-5%	2014-2022
BG	-4%	
BE	-4%	
SK	-3%	
NO	-2%	
DE	-2%	
GB	-2%	
ES	-2%	
EE	-2%	
HU	-2%	
LV	-1%	
DK	-1%	
SE	-1%	
AT	-1%	
FR	-1%	
RS	0%	
SI	0%	
LU	0%	
NL	0%	2015-2023
CH	0%	
HR	0%	
IT	1%	
IL	2%	
PT	2%	2018-2023
MT	2%	2013-2022
EU24	**-2%**	

Table 2 (Fig. 2 and 4) Total number of slightly injured according to national definitions over the period 2013-2023

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
AT	40,700	40,236	39,880	40,827	39,594	38,894	37,756	31,080	33,944	36,004	37394
BE	48,531	48,753	47,650	47,163	44,710	45,116	43,583	33,673	39,005	42,153	41,481
BG	6,472	6,465	6,676	6,871	6,737	6,478	6,562	5,565	6,151	6,656	7,307
CY	722	603	570	558	451	393	333	218	194	215	202
CZ	22,567	23,644	24,407	24,486	24,719	25,196	23,914	20,870	20,567	22,435	23,931
DE	310,085	321,803	325,726	329,240	323,799	328,051	318,986	269,545	267,992	303,407	313,655
DK(1)	1,503	1,396	1,376	1,432	1,387	1,425	1,254	1,035	968	1,045	936
EE	1,171	1,250	1,318	1,418	1,305	1,416	1,411	1,271	1,419	1,516	1,511
ES	114,634	117,058	124,960	130,635	129,616	129,674	130,745	87,881	110,378	119,328	124,266
FI	5,856*	6,186	5,931	5,451	5,165	4,818	4,623	4,003	3,518	3,504	3,675*
FR(2)	222,365	234,017	223,409	232,698	228,672	218,041	222,797	184,084	224,042	220,878	218,900
EL	13,963	13,548	13,097	12,946	12,565	12,422	12,350	10,300	11,746	11,961	12,644
HR	12,453	11,547	12,201	11,850	11,832	11,258	10,385	7,739	9,297	10,419	11,101
HU	14,729	14,795	15,324	15,801	15,825	16,440	16,119	13,061	14,004	14,505	13,974
IE	6,252	7,181	6,886	6,683	6,723	6,640	6,642	4611	4835	5673	5505
IT	245,194	236,204	231,019	231,851	229,441	224,305	223,784	145,146	188,738	206,600	207,645
LU	936	981	1,029	954	1,016	945	1,048	745	976	1,144	1087
LV	3,886	4,169	4,087	4,123	4,328	4,256	4,098	3,567	3,568	3,613	3,812
LT	3,429	3,251	3,168	2,989	3,189	3,225	3,463	2,827	2,819	2,899	2,766
MT	1,035	1,202	1,396	1,536	1,542	1,340	1,290	897	1,184	1,202	1,094*
NL	2,478	4,847	6,745	6,999	7,327	7,442	8,437	8,298	7,666	10,608	11,591
PL	32,387	30,849	28,578	28,688	28,363	26,418	24,844	17,658	18,139	17,202	16530
PT(3)	36,807	37,005	38,808	39,106	41,776	43,126	44,934	32,058	35,853	40,114	42,873
RO	23,306	24,212	27,751	31,277	32,028	30,565	31,545	22,471	29,613	31,050	32901
SE	17,543	15,141	17,198	16,316	17,387	16,306	15,768	13,714	14,147	13,638	13,293
SI	8,034	7,394	7,777	7,606	7,050	6,867	6,756	5,017	5,654	6,453	6,391
SK	5,225	5,519	5,628	5,883	5,756	5,647	5,517	4,466	4,504	4,823	4982
UK	168,710	178,494	171,267	164,186	152,712	141,237	n/a	n/a	n/a	n/a	n/a
GB	150,905	159,884	153,005	149,326	140,014	129,156	122,696	91,738	101,114	105,780	103,266
CH	17,250	17,478	17,708	17,607	17,759	17,958	17,641	16,002	16,601	17,896	17,404
IL	24,239	21,742	21,952	21,724	22,472	20,708	20,572	16,155	17,632	15,501	12,861
NO	5,828	5,424	4,873	4,634	4,286	4,091	3,655	3,728	3,944	3,873	3,587
RS	15,053	14,720	15,901	17,308	17,849	17,508	17,068	14,297	16,557	15,817	15,627
EU 26	**1,199,785**	**1,214,409**	**1,215,850**	**1,238,388**	**1,224,976**	**1,209,262**	**1,200,507**	**923,502**	**1,053,255**	**1,128,437**	**1,149,859**

Source: CARE database and national statistics provided by PIN Panellists in each country
EU26: EU27 excluding NL for inconsistency in the data trend
*Estimated
(1)DK - police registered data only
(2)FR - Mainland
(3)PT - 2012 to 2017: Mainland; 2018 onwards: Total Portugal (including the autonomous regions of Açores and Madeira)

Fig 4. Average annual change in the number of slight injuries over the period 2013-2023

CY	-13%	
FI	-7%	2014-2022
PL	-7%	
GB	-5%	
IL	-5%	
DK	-5%	
NO	-4%	
SI	-3%	
IE	-3%	
IT	-3%	
SE	-3%	
HR	-2%	
BE	-2%	
SK	-2%	
AT	-2%	
LT	-2%	
EL	-2%	
LV	-1%	
DE	-1%	
MT	-1%	2013-2022
HU	-1%	
PT	-1%	2018-2023
FR	-1%	
CZ	-1%	
ES	-1%	
CH	0%	
BG	0%	
RS	0%	
LU	1%	
EE	2%	
RO	2%	
EU26	**-1%**	

Table 3 (Fig. 2, 5, 6 and 15) Total number of road deaths over the period 2013-2023

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
AT	455	430	479	432	414	409	416	344	362	370	402
BE	764	745	762	670	609	604	644	499	516	540	501
BG	601	660	708	708	682	611	628	463	561	531	525
CY	44	45	57	46	53	49	52	48	45	37	34
CZ	654	688	734	611	577	658	617	517	531	527	502
DE	3,340	3,368	3,459	3,206	3,177	3,275	3,059	2,719	2,562	2,776	2,830
DK	191	182	178	211	175	171	199	163	130	154	162
EE	81	78	67	71	48	67	52	59	55	50	59
ES	1,680	1,688	1,689	1,810	1,830	1,806	1,755	1,370	1,533	1,746	1,806
FI	258	229	270	258	238	239	211	223	225	196	183
FR[(1)]	3,268	3,384	3,461	3,477	3,448	3,248	3,244	2,541	2,944	3,267	3,167
EL	879	795	793	824	731	700	688	584	624	654	621
HR	368	308	348	307	331	317	297	237	292	275	274
HU	591	626	644	607	625	633	602	460	544	537	472
IE	188	192	162	182	154	134	140	141	132	152	180
IT	3,401	3,381	3,428	3,283	3,378	3,334	3,173	2,395	2,875	3,159	3,039
LU	45	35	36	32	25	36	22	26	24	36	26
LV	179	212	188	158	136	148	132	139	151	115	138
LT	258	267	242	192	192	173	186	175	147	120	160
MT	18	10	11	22	19	18	16	12	9	26	16
NL	570	570	620	629	613	678	661	610	582	745	684
PL	3,357	3,202	2,938	3,026	2,831	2,862	2,909	2,491	2,245	1,896	1,893
PT[(2)]	637	638	593	563	602	700	688	536	561	618	642
RO	1,861	1,818	1,893	1,913	1,951	1,867	1,864	1,646	1,779	1,634	1,545
SE	260	270	259	270	253	324	221	204	210	227	229
SI	125	108	120	130	104	91	102	80	114	85	82
SK	223	259	274	242	250	229	245	224	226	244	267
UK	1,770	1,854	1,804	1,860	1,856	1,839	1,808	1,516	1,608	1,766	1,695
GB	1,713	1,775	1,730	1,792	1,793	1,784	1,752	1,460	1,558	1,711	1,624
CH	269	243	253	216	230	233	187	227	200	241	236
IL	311	319	355	376	364	316	355	305	364	351	361
NO	187	147	117	135	106	108	108	93	80	116	110
RS	650	536	599	607	579	548	534	492	521	553	503
EU 24	**23,280**	**23,159**	**23,389**	**22,877**	**22,487**	**22,396**	**21,836**	**17,980**	**19,118**	**19,700**	**19,415**

Source: CARE database and national statistics provided by PIN Panellists in each country
EU24: EU27 excluding IE, LT and NL for inconsistency in the data trend
(1)FR - Mainland
(2)PT - 2012 to 2017: Mainland; 2018 onwards: Total Portugal (including the autonomous regions of Açores and Madeira)

Fig 5. Estimated average annual change in the number of seriously injured according to the national definition over the period 2013-2023 for countries where data are available, plotted against the estimated average annual change in road deaths over the same period

	AAC deaths	AAC SIs	
AT	-2%	-1%	
BE	-5%	-4%	
BG	-3%	-4%	
CY	-2%	-7%	
CZ	-3%	-6%	
DE	-3%	-2%	
DK	-3%	-1%	
EE	-4%	-2%	
ES	0%	-2%	
FI	-3%	-5%	2014-2022
FR	-1%	-1%	
EL	-4%	-6%	
HR	-3%	0%	
HU	-3%	-2%	
IT	-2%	1%	
LU	-4%	0%	
LV	-4%	-1%	
MT	1%	2%	2013-2022
NL	1%	0%	2015-2023
PL	-5%	-5%	
PT	-2%	2%	2018-2023
RO	-2%	-9%	
SE	-2%	-1%	
SI	-4%	0%	
SK	0%	-3%	
GB	-1%	-2%	
CH	-1%	0%	
IL	1%	2%	
NO	-5%	-2%	
RS	-2%	0%	
EU 24	**-2%**	**-2%**	

Fig 6. Average annual change in the number of serious injuries compared to the corresponding average annual change in the number of road deaths over the period 2013-2023

	AAC deaths	AAC SIs	Deaths - SIs	
RO	-1.7%	-9.3%	7.6%	
CY	-2.4%	-6.9%	4.5%	
EL	-3.6%	-6.5%	2.9%	
CZ	-3.2%	-5.7%	2.4%	
PL	-5.4%	-4.9%	-0.6%	
FI	-2.6%	-4.6%	2.0%	2014-2022
BG	-2.8%	-3.9%	1.1%	
BE	-4.5%	-3.9%	-0.7%	
SK	-0.1%	-2.8%	2.7%	
NO	-4.8%	-2.4%	-2.5%	
DE	-2.6%	-2.3%	-0.3%	
GB	-1.0%	-2.1%	1.1%	
ES	-0.4%	-2.1%	1.8%	
EE	-3.8%	-2.0%	-1.7%	
HU	-2.5%	-1.6%	-1.0%	
LV	-4.2%	-1.2%	-3.0%	
DK	-2.5%	-1.0%	-1.6%	
SE	-2.4%	-0.8%	-1.6%	
AT	-2.3%	-0.7%	-1.6%	
FR	-1.3%	-0.6%	-0.7%	
RS	-1.9%	-0.4%	-1.5%	
SI	-3.8%	0.0%	-3.7%	
LU	-3.9%	0.0%	-3.9%	
NL	1.2%	0.0%	1.2%	2015-2023
CH	-1.4%	0.0%	-1.4%	
HR	-2.8%	0.1%	-2.8%	
IT	-1.9%	1.4%	-3.2%	
IL	0.7%	2.0%	-1.3%	
PT	-2.0%	2.0%	-4.0%	2018-2023
MT	1.2%	2.0%	-0.8%	2013-2022
EU 24	**-2.4%**	**-2.0%**	**-0.4%**	

Table 5 (Fig. 7, 8 and 9) Total number of serious injuries per road user group over the period 2021-2023

	Car driver	Car passenger	PTW driver	PTW passenger	Cyclist	Pedestrian	Other	
BG	23%	23%	11%	1%	5%	25%	11%	
FI	32%	15%	19%	1%	13%	11%	10%	2020-2022
HR	28%	16%	17%	1%	13%	16%	9%	
SK	25%	19%	12%	1%	11%	25%	7%	
LU	32%	12%	27%	1%	10%	13%	5%	
LV	24%	19%	12%	2%	10%	17%	16%	
IE	29%	13%	12%	0%	17%	20%	9%	
LT	22%	20%	12%	1%	8%	24%	13%	
RS	24%	18%	13%	1%	12%	23%	9%	
DE	31%	11%	12%	1%	29%	10%	7%	
NO	28%	13%	25%	1%	10%	11%	12%	
PL	23%	18%	13%	1%	14%	22%	9%	
HU	24%	17%	18%	1%	18%	15%	8%	
RO	18%	21%	5%	0%	12%	30%	13%	
GB	26%	13%	19%	1%	15%	21%	6%	
CZ	23%	14%	19%	2%	15%	20%	8%	
CY	24%	11%	36%	3%	4%	19%	3%	
PT	22%	12%	32%	2%	7%	14%	11%	
DK	22%	10%	17%	1%	33%	14%	3%	
EE	20%	11%	12%	0%	16%	20%	22%	
FR	20%	10%	31%	3%	16%	12%	7%	
IL	18%	11%	22%	1%	3%	25%	20%	
BE	21%	7%	20%	1%	30%	12%	8%	
EL	19%	7%	46%	6%	2%	14%	5%	2020-2022
ES	17%	10%	34%	3%	9%	19%	10%	
MT	17%	9%	38%	3%	4%	22%	7%	2020-2022
AT	18%	7%	25%	2%	34%	9%	5%	
NL	19%	6%	21%	2%	36%	5%	10%	
SE	17%	6%	10%	1%	57%	5%	4%	
CH	14%	5%	29%	1%	33%	11%	7%	
SI	17%	0%	24%	0%	30%	11%	19%	
EU 26	**24%**	**11%**	**18%**	**1%**	**25%**	**12%**	**8%**	

Source: CARE database and national statistics provided by PIN Panellists in each country
EU26: EU27 excluding IT due to lack of updated data

Table 6 (Fig. 10 and 11) Total number of serious injuries by gender over the period 2021-2023

	MALE				FEMALE				UNKNOWN			
	2020	2021	2022	2023	2020	2021	2022	2023	2020	2021	2022	2023
AT	4,311	4,502	4,617	4,674	2,338	2,442	2,641	2,513	1	1	0	4
BE	2,001	2,057	2,211	2,164	947	1,029	1,170	1,049	30	33	32	48
BG	979	897	1,074	1,111	577	561	692	683	0	0	0	0
CY	166	183	179	161	45	69	74	71	0	0	0	0
CZ	1,186	1,073	1,123	1,124	575	507	559	587	0	0	0	0
DE	36,615	34,861	36,552	33,259	21,371	20,216	21,090	19,625	19	60	85	18
DK	1,052	1,012	1,032	1,032	660	625	686	648	4	2	0	0
EE	221	175	229	254	120	139	134	154	5	38	41	22
ES	4,846	5,546	6,009	6,594	1,813	2,225	2,466	2,642	22	13	27	29
FI	293	265	231	263*	115	103	103	107*	0	0	0	0
FR[(1)]	10,071	12,085	12,013	11,986	3,266	3,859	3,943	3,950	0	0	0	0
EL	421	494	545	487*	97	116	119	111*	0	0	0	0
HR	1,645	1,817	1,969	2,078	650	793	941	1,024	0	0	0	0
HU	2,999	2,877	3,134	3,009	1,649	1,711	1,890	1,771	7	7	17	10
IE	810	885	1,099	902	406	476	585	536	0	2	2	2
IT	10,012	11,466	12,023	11,927	4,090	4,524	4,852	5,062	0	0	0	0
LU	151	203	185	243	66	64	82	103	0	0	0	0
LV	318	285	276	254	172	163	147	131	0	1	2	0
LT	249	242	268	295	124	146	206	192	3	4	2	3
MT	171	251	273	232*	71	87	106	88*	0	1	0	0
NL	6,114	7,328	8,265	8,351	4,102	5,046	6,086	5,993	9	6	22	33
PL	5,562	5,146	4,610	4,557	3,240	3,121	2,923	3,008	3	9	8	29
PT	1,445	1,662	1,684	1,911	432	499	618	589	0	0	0	0
RO	3,657	2,477	2,418	2,250	1,834	1,319	1,272	1,289	0	0	0	0
SE	1,741	2,153	2,750	2,670	1,357	1,629	1,965	1,902	0	2	3	3
SI	486	563	607	577	192	221	255	252	0	0	0	0
SK	589	587	556	552	324	282	324	342	1	0	2	0
UK	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GB	15,777	17,775	18,956	18,899	6,599	7,728	8,989	9,119	10	34	45	69
CH	2,557	2,618	2,697	2,738	1,236	1,315	1,305	1,358	0	0	0	0
IL	1,526	1,746	1,840	1,896	516	684	744	732	27	23	17	24
NO	415	375	362	379	212	194	216	189	0	0	0	0
RS	1,944	2,112	2,087	2,134	1,010	1,235	1,215	1,264	0	0	0	0
EU 27	**98,111**	**101,092**	**105,932**	**102,916**	**50,633**	**51,972**	**55,929**	**54,442**	**104**	**179**	**243**	**201**

Source: CARE database and national statistics provided by PIN Panellists in each country
[(1)]FR - Mainland

Fig 10. Proportion (%) of male and female seriously injured road users for the period 2021-2023 or last three years available (average) ranked by proportion of male seriusly injured road users in descending order

	Male	Female	Unknown	
EL	81%	19%	0%	2020-2022
PT	75%	25%	0%	
FR	75%	25%	0%	
MT	73%	27%	0%	2020-2022
LU	72%	28%	0%	
IL	71%	28%	1%	
IT	71%	29%	0%	
FI	71%	29%	0%	2020-2022
ES	71%	29%	0%	
CY	71%	29%	0%	
SI	71%	29%	0%	
GB	68%	32%	0%	
HR	68%	32%	0%	
CH	67%	33%	0%	
CZ	67%	33%	0%	
BE	66%	33%	1%	
NO	65%	35%	0%	
RO	65%	35%	0%	
LV	65%	35%	0%	
AT	64%	36%	0%	
IE	64%	36%	0%	
SK	64%	36%	0%	
DE	63%	37%	0%	
RS	63%	37%	0%	
HU	63%	37%	0%	
BG	61%	39%	0%	
PL	61%	39%	0%	
DK	61%	39%	0%	
LT	59%	40%	1%	
NL	58%	42%	0%	
SE	58%	42%	0%	
EE	55%	36%	9%	
EU 27	**66%**	**34%**	**0%**	

Table 7 (Fig. 15) Total population over the period 2013-2023

	2021	2022	2023	Average
AT	8,932,664	8,978,929	9,104,772	9,005,455
BE	11,566,041	11,617,623	11,742,796	11,642,153
BG	6,916,548	6,838,937	6,447,710	6,734,398
CY	896,005	904,705	920,701	907,137
CZ	10,701,777	10,516,707	10,827,529	10,682,004
DE	83,155,031	83,237,124	84,358,845	83,583,667
DK	5,840,045	5,873,420	5,932,654	5,882,040
EE	1,330,068	1,331,796	1,365,884	1,342,583
ES	47,394,223	47,432,893	48,085,361	47,637,492
FI	5,525,292	5,533,793	5,548,241	5,535,775
FR(1)	65,505,213	65,721,831	65,925,961	65,717,668
EL	10,682,547	10,459,782	10,413,982	10,518,770
HR	4,036,355	3,862,305	3,850,894	3,916,518
HU	9,730,772	9,689,010	9,599,744	9,673,175
IE	5,006,907	5,060,004	5,271,395	5,112,769
IT	59,257,566	59,030,133	58,997,201	59,094,967
LU	634,730	645,397	660,809	646,979
LV	1,893,223	1,875,757	1,883,008	1,883,996
LT	2,795,680	2,805,998	2,857,279	2,819,652
MT	514855	516,100	520,971	517,309
NL	17,475,415	17,590,672	17,811,291	17,625,793
PL	37,840,001	37,654,247	36,753,736	37,415,995
PT	10394297	10421117	10516621	10,444,012
RO	19,186,201	19,042,455	19,054,548	19,094,401
SE	10,379,295	10,452,326	10,521,556	10,451,059
SI	2,108,977	2,107,180	2,116,972	2,111,043
SK	5,459,781	5,434,712	5,428,792	5,441,095
GB	65,078,900	65,692,200	66,344,800	65,705,300
CH	8,667,088	8,738,791	8,815,385	8,740,421
IL	9,371,200	9,557,800	9,840,517	9,589,839
NO	5,391,369	5,425,270	5,488,984	5,435,208
RS	6,871,547	6,797,105	6,641,197	6,769,950
EU 27	**444,632,551**	**444,089,064**	**446,506,807**	**445,076,141**

Source: Eurostat
(1)FR - Mainland

Fig 15. Seriously injured per million population and killed per million population for comparison (average for the years 2021-2023)

	Killed per million population	Serious injuries per million population	
NO	19	105	
SE	21	417	
GB	25	414	
DK	25	285	
CH	26	459	
IE	30	293	
MT(1)	30	617	2020-2022
DE	33	661	
ES	36	179	
IL	37	267	
NL	38	778	
FI(1)	39	67	2020-2022
EE	41	294	
AT	42	792	
CY	43	271	
LU	44	454	
SI	44	391	
BE	45	280	
SK	45	160	
FR	48	243	
CZ	49	155	
LT	50	161	
IT	51	281	
HU	54	496	
PL	54	209	
PT	58	222	
EL	60	61	
LV	71	223	
HR	72	734	
RS	78	495	
BG	80	248	
RO	87	192	

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