Trendline

Trendline 2022-2025 - Data collection and analysis of road safety KPIs in Europe

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10-10-2025	3.0	Version with drafts of all chapters
15-11-2025	4.0	Final version submitted to the Commission

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Trendline

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About Trendline

Trendline brings together 29 European countries (25 EU Member States and 4 countries as observers) for data collection, data analysis, delivery of road safety KPIs (Key Performance Indicators) and for using these KPIs within road safety policies. Trendline is co-funded by the European Union and builds on the experience gained in the Baseline project. KPIs provide information about factors that are associated with crash and injury risks. At the core of Trendline project are eight KPIs:

Indicator	Definition
Speed	Percentage of vehicles travelling within the speed limit
Safety belt	Percentage of vehicle occupants using the safety belt or child restraint system correctly
Protective equipment	Percentage of riders of powered two wheelers and bicycles wearing a protective helmet
Drugs	Percentage of drivers driving within the legal limit for blood drug content (BAC)
Distraction	Percentage of drivers NOT using a handheld mobile device
Vehicle safety	Percentage of new passenger cars with a Euro NCAP safety rating equal or above a predefined threshold
Infrastructure	Percentage of distance driven over roads with a safety rating above an agreed threshold
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

These 8 KPIs originate from the Commission Staff Working Document 'EU Road Safety Policy Framework 2021-2030 - Next steps towards "Vision Zero" SWD (2019) 283 final.' In addition, some new experimental and complementary indicators have been developed and tested within Trendline:

- Driving under the influence of drugs
- 30km/h on urban roads
- Compliance with traffic rules on signalized pedestrian crossings and intersections
- Compliance with traffic rules on unsignalized pedestrian crossings and intersections
- Helmet wearing by PMD (Personal Mobility Devices) riders
- Self-report behaviour
- Attitudes
- Light use by cyclists in the dark
- Enforcement of traffic regulations
- Alternative speeding KPIs.

For each of the original eight KPIs and the experimental KPIs, a 'KPI Expert Group' (KEG) was established, consisting of European experts. The main role of the KEGs was to draft the common methodological guidelines, to answer methodological questions, and to supervise the pilot tests of the new methodologies.

Website Trendline: https://www.trendlineproject.eu/

1. Context

1.1. Why use road safety KPIs?

Road safety remains a major public health and societal challenge across the European Union (EU) (European Commission, 2018). Although the last two decades have seen significant reductions in fatalities and serious injuries, thousands of people still die or are severely injured on Europe's roads every year. The European Commission has set an overarching ambition of approaching Vision Zero by 2050, meaning no deaths or serious injuries on the road network. This long-term ambition is complemented by interim targets of a 50% reduction in both road deaths and serious injuries between 2020 and 2030 (European Commission, 2020). These goals were reconfirmed in the 2018 Communication "Europe on the Move – Sustainable Mobility for Europe: safe, connected and clean" and are now embedded in the EU's policy architecture for the decade 2021–2030.

Measuring progress towards these targets requires two complementary forms of evidence. First are the outcome indicators such as the number of fatalities and serious injuries, which are traditionally used to judge performance. These provide the end-state picture but tell us relatively little about the proximal causes of risk or the effectiveness of individual countermeasures. Secondly, and crucially, are road safety performance indicators – called Key Performance Indicators (KPIs) in the EU context[1] – that monitor risk factors and safety conditions in the system, such as speed compliance, seat-belt and helmet wearing, or vehicle safety, to name a few (Hakkert et al., 2006; Van den Berghe et al., 2024)

Using KPIs respond to a central need in road safety governance: translating strategic goals into measurable levers. While fatalities and serious injuries remain the definitive outcomes, KPIs allow authorities to track the determinants of those outcomes. They link policy and practice to expected effects, thereby supporting evidence-based decision-making and implementation (Holló & Hakkert, 2010).

Unlike lagging outcomes, KPIs function as leading indicators. A rise in the percentage of drivers travelling within speed limits typically precedes improvements in casualty metrics; conversely, deteriorating helmet wearing rates or increased handheld device use at the wheel may herald a worsening safety picture. KPIs thus provide diagnostic power and enable rapid course correction, particularly when multiple indicators are read together (e.g., speed compliance alongside enforcement intensity and driver attitudes to speeding).

For researchers and analysts, KPIs enable a finer-grained understanding of how interventions affect safety. By correlating KPI trends with policy measures and, in time, with casualty trends, analysts can probe causal pathways, in particular to what extent improved KPI ratings are associated with reduced numbers of injury crashes. In Trendline's experimental stream, the programme has explicitly triangulated between observational indicators (e.g., behaviour at crossings), self-reported behaviour and attitudes, and administrative data (e.g., enforcement statistics), thereby expanding the methodological toolkit and testing feasibility across diverse national contexts.

[1] In many countries, the term SPIs is used, for road Safety Performance Indicators (Van den Berghe & Meesmann, 2024).

In summary, KPIs are the practical bridge between road safety principles and everyday policy and practice. They translate big ambitions into tractable, monitorable quantities that can guide decisions—and they do so in a way that encourages learning, comparability, and continuous improvement across Europe.

In summary, key criteria for defining and selection of KPIs for road safety are:

- A strong link between the KPI and road safety performance
- Policy relevance, in particular the possibility of implementing measure to improve the values of the KPI
- Comparability of KPI values over time and between regions in a country
- Reliability of the methodologies to collect and analyse data for the KPI
- Operational feasibility of the implementation of the methodology

A further elaboration of these criteria can be found in Table 15174, page 52. They have been used for defining the KPIs in Trendline.

1.2. The origin of Trendline

A core objective of the EU framework is cross-national comparability so that countries can learn from one another and benchmark progress. Harmonised definitions and minimum methodological requirements make it possible to compare like with like. This encourages the diffusion of effective practices and highlights structural obstacles that require collective attention (e.g., gaps in data systems or legal constraints on certain measurement methods).

In 2019 the Commission published a first common set of eight KPIs, each linked to a core element of risk in the Safe System: infrastructure safety, vehicle safety, safe road use and post-crash care (European Commission, 2019). The list and definitions of the KPIs are given in Table 1.

Table 1. Definition of the eight standard EU KPIs.

Indicator	Definition
Speed	Percentage of vehicles travelling within the speed limit
Safety belt	Percentage of vehicle occupants using the safety belt or child restraint system (correctly)
Protective equipment	Percentage of riders of powered two wheelers and bicycles wearing a protective helmet
Alcohol	Percentage of drivers driving within the legal limit for blood alcohol content (BAC)
Distraction	Percentage of drivers NOT using a handheld mobile device
Vehicle safety	Percentage of new passenger cars with a Euro NCAP safety rating equal or above a predefined threshold
Infrastructure	Percentage of distance driven over roads with a safety rating above an agreed threshold
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

To operationalise these indicators at European scale, the Commission funded a first collective effort, the Baseline project (2020–2022). Baseline was the EU's first large-scale attempt to collect harmonised KPI values across Member States for the eight standard indicators defined in the 2019 policy framework. Eighteen Member States participated, supported by central methodological coordination and shared templates. The project's deliverables included methodological guidelines, KPI values and breakdowns for participating countries, and a first-generation KPI database (Baseline Consortium, 2022). Details on the Baseline project can be found in the publications on the Baseline website (baseline.vias.be/en/publications). Key achievements included: (i) an agreed set of definitions, sampling designs and analysis rules; (ii) demonstrated feasibility to collect KPI data comparably in different national settings; (iii) capacity-building for countries with limited prior experience; and (iv) a stronger basis for policy uptake through the visibility and comparability of KPI values.

Baseline demonstrated that it is both feasible and useful to collect comparable KPI values across countries with differing legal, organisational and data contexts. It also surfaced what would be required to scale up participation and to refine methodology for stronger comparability and policy uptake.

1.3. The Trendline project

Building on Baseline, the Commission launched a new technical assistance action under the Connecting Europe Facility (CEF), resulting in the Trendline programme (2022–2025). Trendline brings together 25 EU Member States (with four additional European countries participating as observers) to (i) update and apply harmonised methods for the eight standard KPIs, (ii) collect and analyse KPI data at national level, and (iii) develop and test a suite of experimental and complementary indicators that address emerging or under-measured risk areas. These are displayed in Table 2.

Table 2. List of the new, experimental KPIs.

1. **Driving under the influence of drugs**
2. **30km/h on urban roads**
3. **Compliance with traffic rules on signalized pedestrian crossings and intersections**
4. **Compliance with traffic rules on unsignalized pedestrian crossings and intersections**
5. **Helmet wearing by PMD (Personal Mobility Device) riders**
6. **Self-report behaviour**
7. **Attitudes**
8. **Light use by cyclists in the dark**
9. **Enforcement of traffic regulations**
10. **Alternative speeding KPIs**

KPIs act as leading indicators: they provide early signals of whether safety conditions are improving, stagnating, or deteriorating, thus enabling timely corrective action. The programme therefore has a dual purpose: not only to produce KPI values but also to embed KPIs in policy cycles so they inform target-setting, prioritisation, and monitoring at national and EU levels.

Trendline brought together 25 EU Member States as partners, with four additional European countries participating as observers in specific activities. National beneficiaries include transport ministries, road safety agencies, research institutes and universities. The list of Trendline partners is given in Table 3.

Trendline was coordinated by SWOV - Institute for Road Safety Research in the Netherlands, with support for coordination being provided by Vias institute (Belgium), NTUA (Greece) and CDV (Czechia). Together these organisations constituted the Trendline Coordination Team (TCT) that managed day-to-day operations, scientific coordination, and quality assurance. Overall governance of the project was governed through a General Assembly (GA) of beneficiaries, which met periodically (both online and in person to monitor progress, decide on strategic matters, and approve recommendations.

Table 3. List of Trendline countries and partners.

Member State	Applicant / future Beneficiary
Austria	BMK (Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology), since spring 2025 BMIMI (Federal Ministry of Innovation, Mobility and Infrastructure)
Belgium	VIAS (Vias institute)
Bulgaria	BGSARS (State Agency Road Safety)
Croatia	FPZ (University of Zagreb Faculty of Transport and Traffic Sciences
Cyprus	MTCW (Ministry of Transport, Communications and Works)
Czechia	CDV (Centrum dopravního výzkumu, v.v.i.)
Denmark	DRD (Danish Road Directorate)
Finland	VTT (Teknologian tutkimuskeskus VTT)
France	DSR (Délégation à la Sécurité routière)
Germany	BAST (Federal Highway Research Institute)
Greece	MIT (Ministry of Infrastructure and Transport)
Hungary	KTI (KTI Közlekedéstudományi Intézet)
Ireland	RSA (Road Safety Authority)
Italy	CTL (Sapienza Università di Roma – Centro di ricerca per il Trasporto e la Logistica)
Latvia	CSDD (Road Traffic Safety Directorate)
Lithuania	TKA (Transport Competence Agency)
Luxembourg	MMTP (Ministère de la Mobilité et des Travaux publics)
Netherlands	SWOV (Institute for Road Safety Research)
Poland	ITS (Instytut Transportu Samochodowego)
Portugal	ANSR (Autoridade Nacional de Segurança Rodoviária)
Romania	MTI (Ministry of Transport and Infrastructure)
Slovakia	RAR (Romanian Automotive Register)
Slovenia	UNIZA (University of Zilinia)
Spain	AVP (Slovenian Traffic Safety Agency)
Sweden	DGT (Directorate-General for Traffic)

Lessons learned from Baseline have informed Trendline's design and implementation. First, expanding participation beyond the initial 18 Member States increased coverage and diversity of contexts. Second, updating guidance to tighten minimum requirements and clarify flexibility led to an improved comparability. Third, the link between measurement and policy use was strengthened, calling for structured dissemination and integration activities. Fourth, the indicator set expanded into domains not fully covered by the original eight.

To ensure methodological rigour and consistency across KPIs and countries, Trendline installed a Technical Committee (TC) composed of representatives from the coordinating organisations. In addition, KPI Expert Groups (KEGs), each chaired by one of the coordinating partners, drove method development, provided help-desk support, advised on deviations or national customisations, and reviewed KPI reports. For both the standard KPIs as well as the experimental ones, KEGs were established. The experts involved in the committees mentioned above, as well as the national coordinators for Trendline, are listed in Appendix 1 of this report.

Trendline moves beyond data production to the question of policy integration: how KPIs inform national strategies, action plans, and routine performance management. To guide this, Trendline has established a Policy Integration Advisory Committee (PAC) to collect good practices, advise on technical requirements, and formulate recommendations to the Commission and Member States (which are included in this report). Trendline also contributed to capacity-building in EU countries with less experience in KPI work, providing methodological support and shared tools.

Trendline's dissemination strategy was two-pronged. At national-level, communication was the responsibility of the national Trendline partners; at the moment of drafting this report, this process was still going on and will likely continue also after the Trendline project has formally come to an end. Second, the project pursued a European-level dissemination (and even beyond Europe) through the project website and conference presentations. Projects outside the EU, such as the Westbelt project in the Western Balkans, were modelled on the Trendline experience.

In short, Trendline has been the biggest international endeavour to date in the development, collection, analysis and policy integration of road safety performance indicators. Trendline continues and deepens a European trajectory that started almost ten years ago: from acknowledging the value of performance indicators in the 2019 framework; through first-generation cross-country measurement in Baseline; to a broader, more ambitious, and more policy-anchored effort in Trendline, which expands participation, refines methodology, and pilots new metrics in areas of growing relevance.

1.4. Structure of the remainder of this report

The rest of this report is structured as follows:

- Chapter 2 provides an overview of the key results for each of the eight standard indicators, including definitions, data sources, breakdowns (e.g., by road type, road user), comparisons with Baseline where available, and brief interpretive commentary. Readers interested in more detailed information are referred to the specific KPI reports that can be found on the Trendline website (https://www.trendlineproject.eu/publications#)
- Chapter 3 synthesises the development and pilot testing of the experimental KPI, highlighting their relevance, methodological obstacles and a justification of the definitions and approaches

adopted. The full methodologies are to be found in the new methodological guidelines that are also published on the Trendline website.

- Chapter 4 discusses how KPIs are currently used in national policies (drawing on Trendline's survey of Member States), the institutional arrangements that support KPI integration, and opportunities to strengthen the policy value chain from measurement to decision.
- Chapter 5 presents a summary of the findings and recommendations to the Commission, the Member States and the research community.

2. Key results for the eight standard KPIs

2.1. Methodology and data submission for the standard KPIs

At the core of Trendline project are eight KPIs listed in Table xxx. While Baseline focused primarily on initial data collection, Trendline has placed greater emphasis on methodological development and harmonisation. The methodologies for data collection and analysis originally developed in Baseline were therefore reviewed and slightly adapted during the early stages of Trendline. These updated methodologies are publicly available at www.trendlineproject.eu.

For each KPI templates were made available to ensure consistent data submission across Member States. For the behavioural KPIs (i.e. the first five from the Table4), a complex weighting procedure was required outlined in a statistical document *Suggested approach for weighting sample data and calculation of statistics*. Member States could either submit raw data for calculation of the KPI values by the coordination team or provide calculated KPI values with supporting calculation details.
Both the templates and the statistical document on weighting are publicly available at www.trendlineproject.eu.

Table 4. Definition of the eight standard EU KPIs.

Indicator	Definition
Speed	Percentage of vehicles travelling within the speed limit
Safety belt	Percentage of vehicle occupants using the safety belt or child restraint system (correctly)
Protective equipment	Percentage of riders of powered two wheelers and bicycles wearing a protective helmet
Alcohol	Percentage of drivers driving within the legal limit for blood alcohol content (BAC)
Distraction	Percentage of drivers NOT using a handheld mobile device
Vehicle safety	Percentage of new passenger cars with a Euro NCAP safety rating equal or above a predefined threshold
Infrastructure	Percentage of distance driven over roads with a safety rating above an agreed threshold
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

2.2. Overview of KPI submission by Member State

In Trendline, each participating Member State was required to deliver results for at least three KPIs. Table 5 shows the KPIs delivered per country.

Table 5. KPIs delivered by country.*

	Speed	Safety belt/CRS	Prot. equip. Cyclists/PTW	Alcohol	Distraction	Vehicle safety	Infra-structure	Post-crash care
Austria	x	x/x	x/x	x	x	x		x
Belgium	x	/x	x/	x	x	x		x
Bulgaria	x	x/x	x/x	x	x	x		
Croatia	x	x/	x/x		x			
Cyprus	x	x/			x			
Czechia	x	x/x	x/x	x	x	x		x
Denmark	x	x/	x/x					
Finland	x	x/	x/	x		x		x
France		x/x	x/x		x			
Germany		x/x	x/x	x	x	x		
Greece	x	x/	/x		x			
Hungary	x	x/x	x/x		x			
Ireland	x	x/	x/x	x	x	x		
Italy	x	x/x	x/x	x	x	x		
Latvia	x	x/x	x/x		x	x		x
Lithuania	x	x/x	x/x	x	x	x	X	x
Luxembourg	x			x	x		x	
Netherlands	x	x/x	x/x	x	x			
Poland	x	x/x	x/x	x	x			
Portugal	x	x/x	x/x	x	x	x		x
Romania		x/x	x/x		x			
Slovakia	x	x/x	x/x		x	x		
Slovenia	x	x/x	x/x	x				
Spain	x	x/x	x/x	x	x	x		
Sweden	x	x/	x/	x		x	X	
Switzerland (observer)				x				

** Please note that in cases where key methodological requirements have not been met, the results of the relevant KPIs are not included in the figures presented in the following sections.*

2.3. Key results per KPI

The following sections of the chapter present the results of the standard KPIs obtained by applying the key methodological requirements. Each section uses in the same format covering definition, key results, comparability across countries, comparison with the Baseline results and conclusions and recommendations.

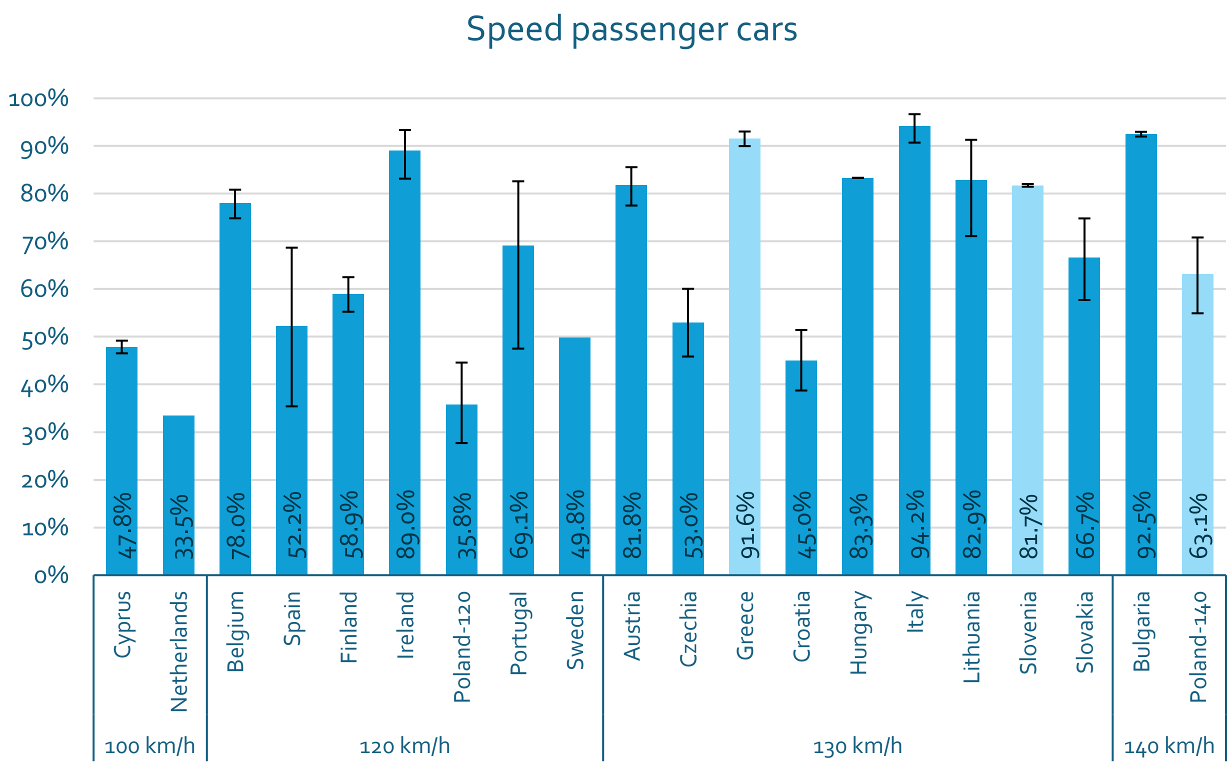
2.3.1. Speed

2.3.1.1. Definition

The KPI refers to the percentage of vehicles travelling within the speed limit, alongside average speed and speed below 85% of drivers are driving (V85).

2.3.1.2. Key results

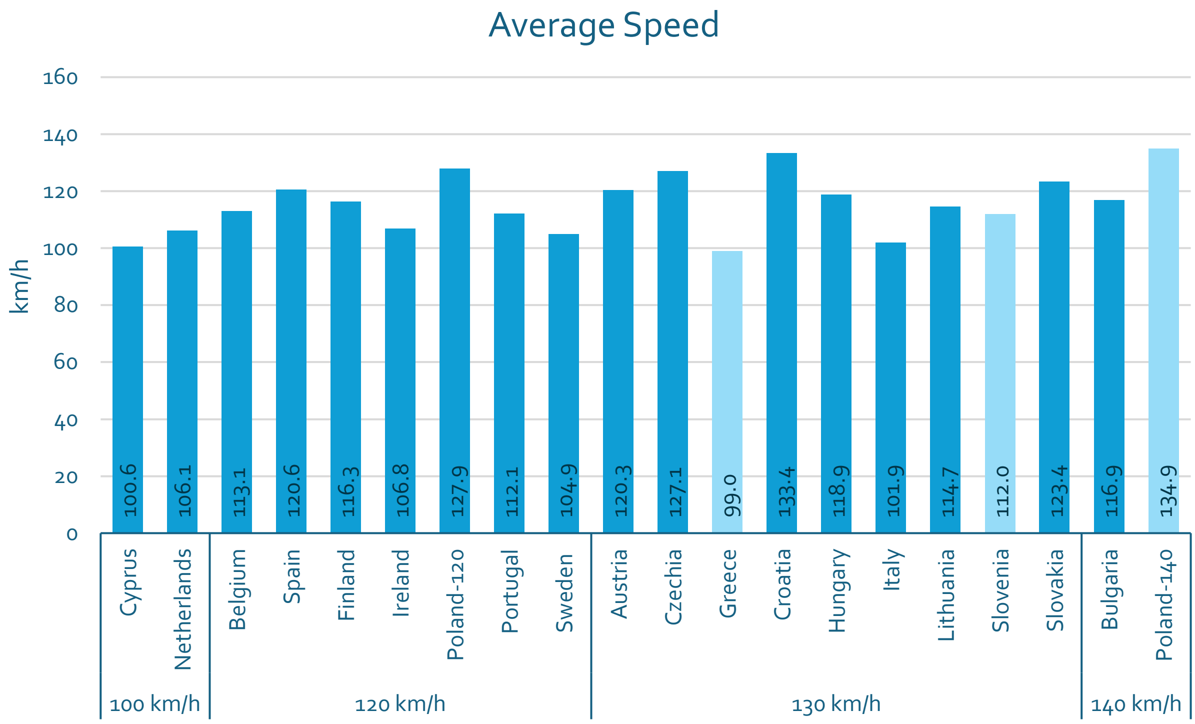
Results were reported separately for motorways, rural non-motorways, and urban roads.
As far as motorways are concerned, compliance with speed limits ranged from above 30% in some countries (the Netherlands, Poland for motorways with the speed limit of 120 km/h) to as high as around 90% or higher in others (Bulgaria, Ireland or Italy), see Figure 2.1.



Light coloured: Countries deviating from minimum requirements: Greece, Slovenia, Poland-140: Low number of locations.

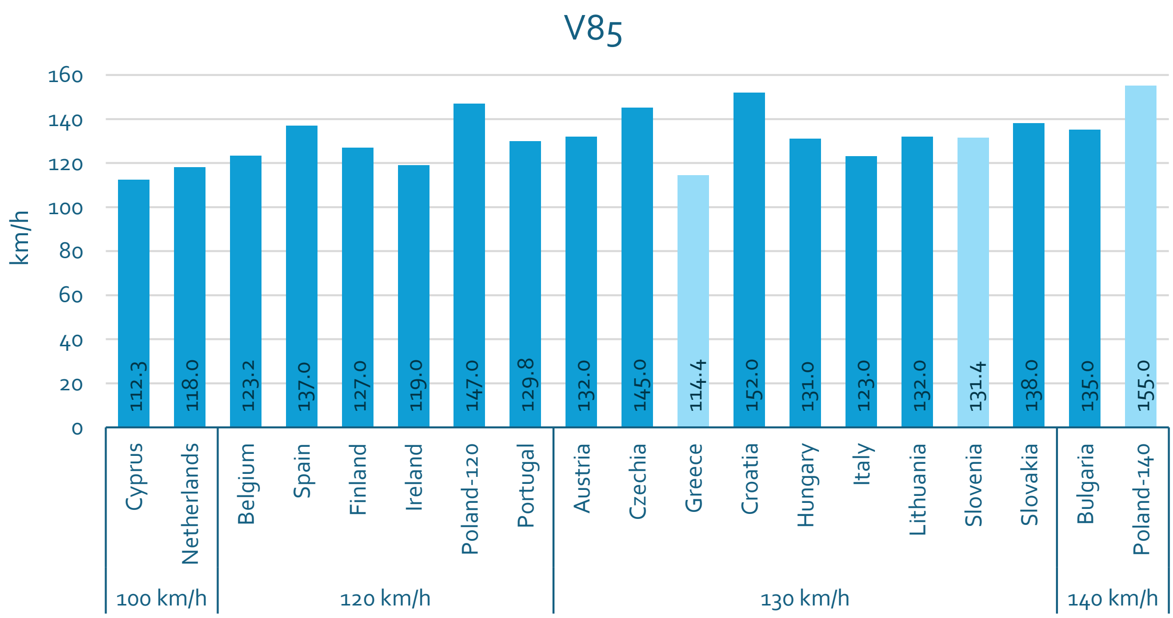
Figure 2.1 Percentage of passenger cars travelling within the speed limit on motorways for passenger cars during weekday daytime.

Among countries with a motorway speed limit of 130 km/h, compliance varied between 45% in Croatia and 94% in Italy. Where the limit is 120 km/h, the KPI ranged from 36% in Poland to 89% in Ireland. As shown in Figure 2.2 the average speeds ranged between 99 km/h (Greece) and 135 km/h (Poland). The V85 values varied from 112 km/h (Cyprus) to 155 km/h (Poland) and lied between 10 km/h to 21 km/h higher than the average speed (see Figure 2.3).



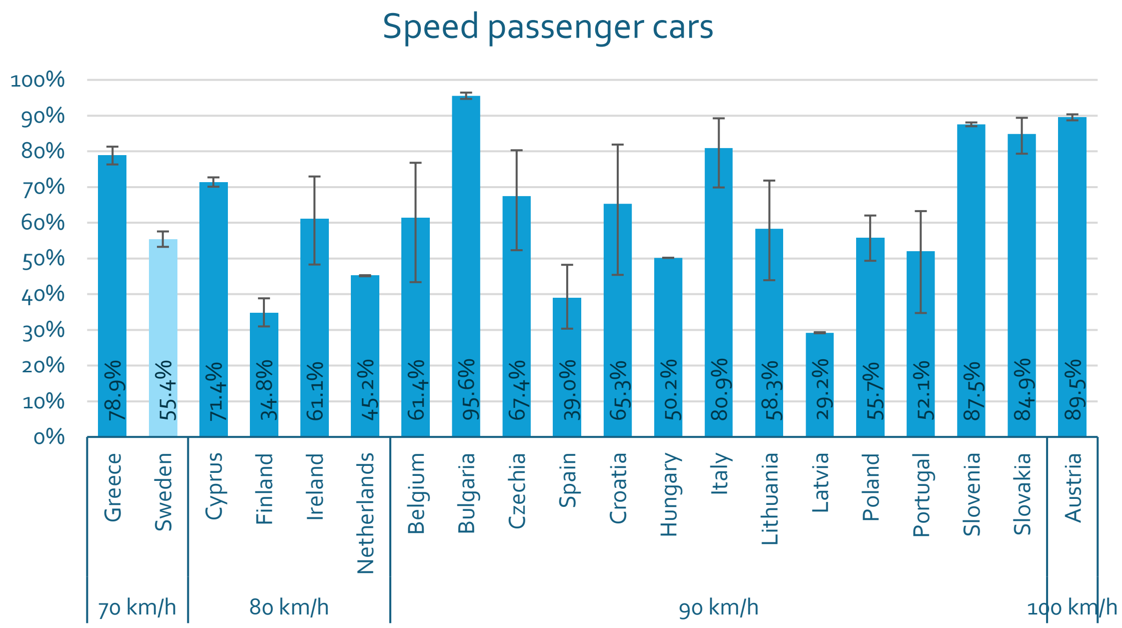
Light coloured: Countries deviating from minimum requirements: Greece, Slovenia, Poland-140: Low number of locations.

Figure 2.2 Average speed for passenger cars on motorways and expressways during weekday/daytime.



Light coloured: Countries deviating from minimum requirements:Greece, Slovenia, Poland-140: Low number of locations.

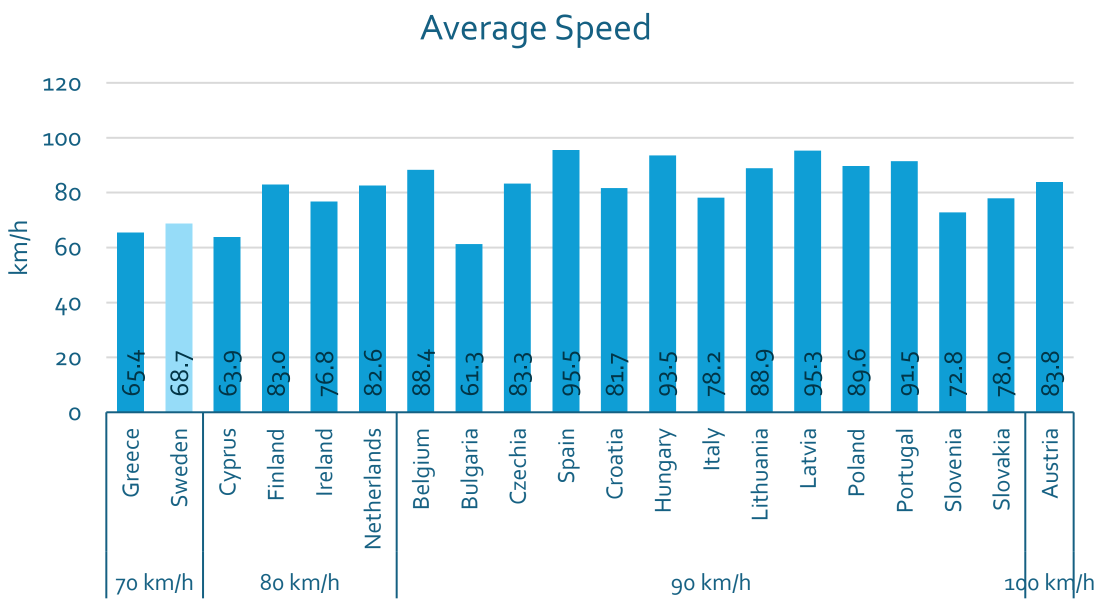
Figure 2.3 85th percentile of speed for passenger cars on motorways during weekday/daytime.



Light coloured: Countries deviating from minimum requirements: Sweden: Sample combining roads with different speed limits.

Figure 2.4 Percentage of passenger cars travelling within the speed limit on rural roads for passenger cars during weekday/daytime.

As for rural roads, the compliance varied from only 29% in Latvia to 96% in Bulgaria (see Figure 2.4). In countries with a 90 km/h limit, average speeds varied between 61 km/h (Bulgaria) and 95.5 km/h (Spain) (see Figure 2.5), while V85 values ranged from 75 km/h (Greece and Bulgaria) to 111 km/h Hungary) (see Figure 2.6).



Light coloured: Countries deviating from minimum requirements: Sweden: Sample combining roads with different speed limits.

Figure 2.5 Average speed for passenger cars on rural roads during weekday/daytime.

In countries with an 80 km/h limit, the average speed ranged from 63.9 km/h in Cyprus to 83km/h in Finland (see Figure 2.5). The V85 of countries with an 80km/h speed limit varies from 74.9 km/h (Cyprus) to 91 km/h (Netherlands) (see Figure 2.6). Overall, the V85 lied between 7 km/h to 18 km/h higher than the average speed.

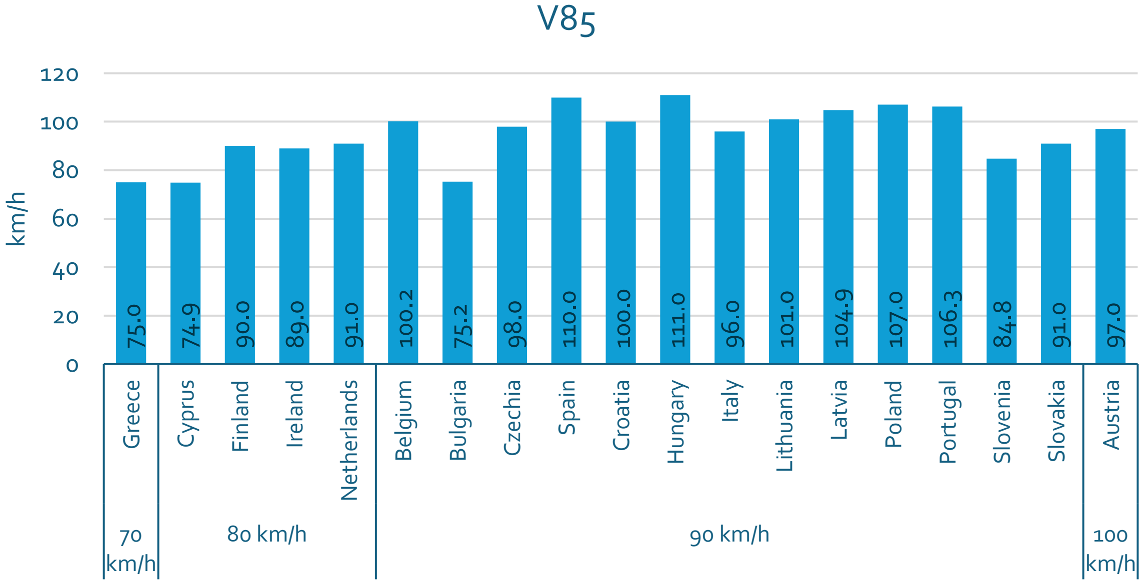
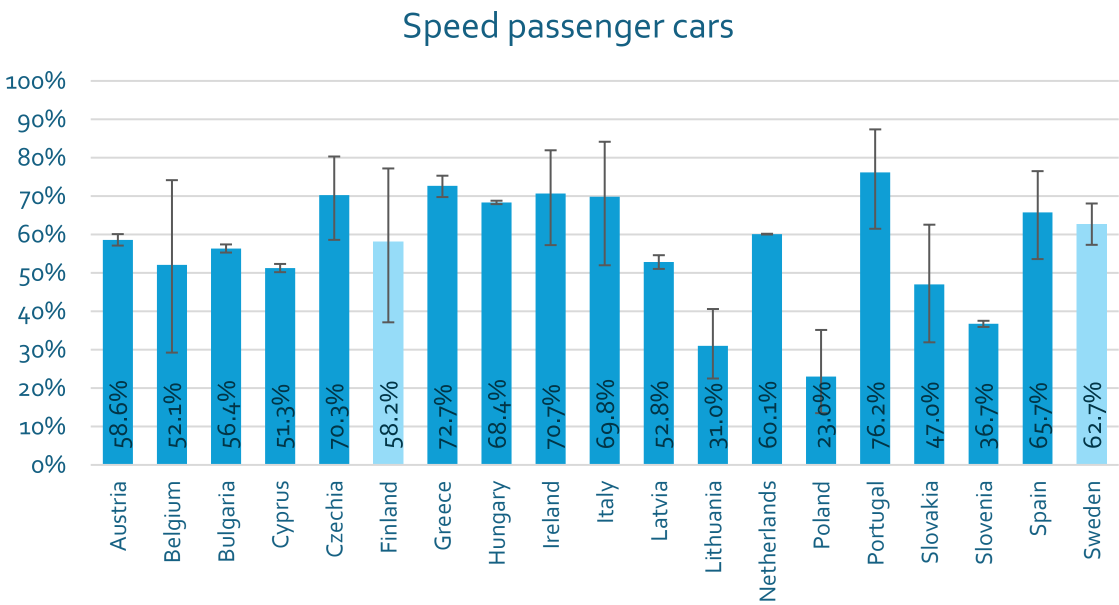


Figure 2.6 85th percentile of speed for passenger cars on rural roads during weekday/daytime.

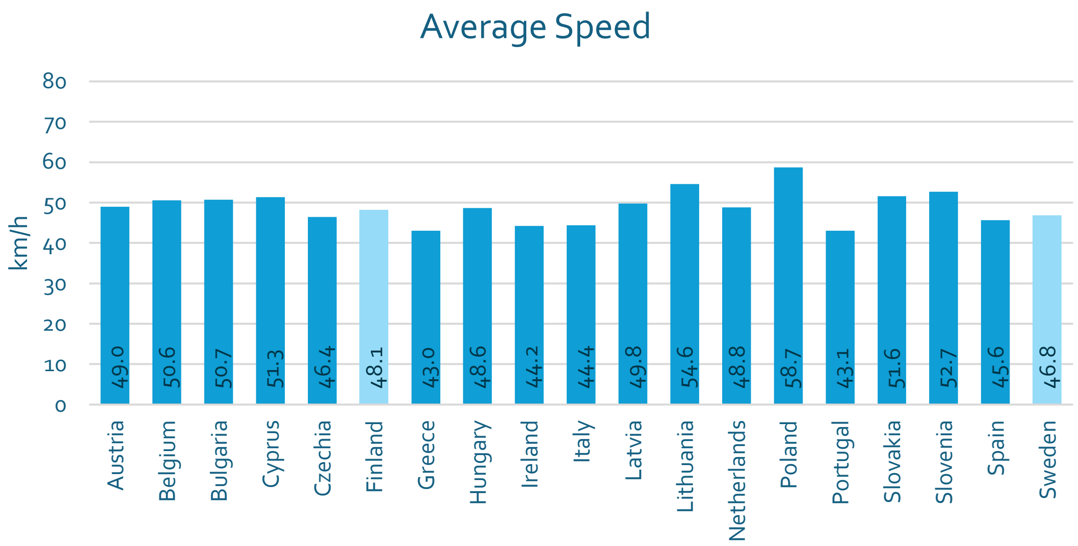
As for urban roads, typically having a 50 km/h speed limit, the KPI value varied from only 23% in Poland to 76% in Portugal, see Figure 2.7.



Speed limit: 50km/h; Light coloured: Countries deviating from minimum requirements: Sweden: Sample combining roads with different speed limits; Finland: Low number of locations.

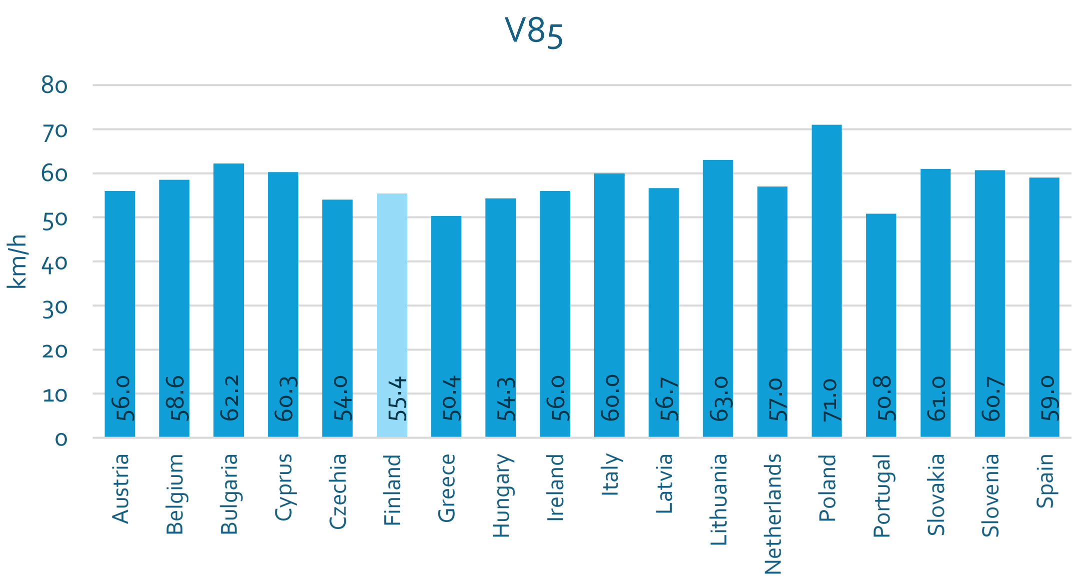
Figure 2.7 Percentage of passenger cars travelling within the speed limit on urban roads for passenger cars during weekday daytime.

Average speeds on urban roads ranged from 43 km/h (Greece and Portugal) to almost 59 km/h (Poland) (see Figure 2.8), while the V85 values varied from 50 km/h (Greece and Portugal) to 71 km/h (Poland) (see Figure 2.9). The V85 for urban roads lies between about 6 km/h to 16 km/h higher than the average speed. In most countries urban roads showed the lowest compliance of the three road types.



Speed limit: 50km/h; Light coloured: Countries deviating from minimum requirements: Sweden: Sample combining roads with different speed limits; Finland: Low number of locations.

Figure 2.8 Average speed for passenger cars on urban roads during weekday/daytime.



Speed limit: 50km/h; Light coloured: Countries deviating from minimum requirements: Finland: Low number of locations.

Figure 2.9 85th percentile of speed for passenger cars on urban roads during weekday/daytime.

2.3.1.3. Comparability across countries

Member States are considered comparable for the minimum requested indicator, despite minor methodological differences. However, comparing compliance across countries with different limits requires caution.

2.3.1.4. Comparison with Baseline results

Compared to Baseline, in Trendline most countries show improvements—higher compliance and lower averages and V85—on all road types (see Table 6, 7 and 8 for results for motorways, rural roads and urban roads respectively).

Table 6. Speed indicators for motorways (passenger cars/weekday daytime), Baseline versus Trendline.

	Baseline			Trendline		
	KPI	Average speed	V85	KPI	Average speed	V85
Austria	80.9%	120.8	131.0	81.8%	120.3	132.0
Belgium	56.4%	119.0	130.8	78.0%	113.1	123.2
Bulgaria	89.4%	116.2	136.8	92.5%	116.9	135.0
Cyprus	46.5%	97.7	108.8	47.8%	100.6	112.3
Czechia	39.8%	133.5	151.0	53.0%	127.1	145.0
Finland	54.5%	116.9	128.2	58.9%	116.3	127.0
Greece	77.7%	109.2	124.8	91.6%	99.0	114.4
Ireland*	88.0%	106.0	119.0	89.0%	106.8	119.0
Lithuania	76.8%	118.3	135.0	82.9%	114.7	132.0
Portugal	43.6%	124.2	144.0	69.1%	112.1	129.8
Poland – 140	71.3%	130.0	151.0	63.1%	134.9	155.0
Poland – 120	43.7%	124.4	144.0	35.8%	127.9	147.0
Spain	50.8%	121.3	136.0	63.7%	116.8	130.0
Sweden*	44.4%	108.1		49.8%	104.9	

**Results for Ireland and Sweden deviate methodologically from the other MS in the Baseline project*

Table 7. Speed indicators for rural roads (passenger cars/weekday daytime), Baseline versus Trendline.

	Baseline			Trendline		
	KPI	Average speed	V85	KPI	Average speed	V85
Austria	88.9%	85.0	97.0	89.5%	83.8	97.0
Belgium	46.0%	92.9	106.1	61.4%	88.4	100.2
Bulgaria	93.4%	64.2	77.7	95.6%	61.3	75.2
Cyprus	45.7%	69.4	77.7	71.4%	63.9	74.9
Czechia	54.5%	88.7	104.0	67.4%	83.3	98.0
Finland	38.7%	82.2	90.1	34.8%	83.0	90.0
Greece*	84.4%	68.1	78.9	78.9%	65.4	75.0
Ireland*	80.0%	91.0	102.0	61.1%	76.8	89.0
Latvia	29.0%	96.6	105.0	29.2%	95.3	104.9
Lithuania	47.2%	92.6	104.6	58.3%	88.9	101.0
Portugal	35.5%	97.1	115.9	52.1%	91.5	106.3
Poland	51.9%	91.2	109.0	55.7%	89.6	107.0
Spain	42.6%	94.4	109.0	39.0%	95.5	110.0
Sweden*	51.7%	69.7		55.4%	68.7	

**Results for Ireland and Sweden deviate methodologically from the other MS in the Baseline project; Different speed limits for rural roads have been considered for Greece*

Table 8. Speed indicators for urban roads (passenger cars/weekday daytime), Baseline versus Trendline.

	Baseline			Trendline		
	KPI	Average speed	V85	KPI	Average speed	V85
Austria	57.4%	49.8	56.0	58.6%	49.0	56.0
Belgium	49.9%	51.0	59.8	52.1%	50.6	58.6
Bulgaria	44.7%	52.5	63.3	56.4%	50.7	62.2
Cyprus	26.1%	56.2	65.1	51.3%	51.3	60.3
Czechia	57.3%	49.6	56.0	70.3%	46.4	54.0
Finland	43.0%	50.9	59.0	58.2%	48.1	55.4
Greece	58.8%	46.7	55.6	72.7%	43.0	50.4
Ireland*	25.0%	58.0	70.0	70.7%	44.2	56.0
Latvia	41.4%	52.1	58.0	52.8%	49.8	56.7
Lithuania	36.4%	53.6	63.0	31.0%	54.6	63.0
Portugal	73.0%	44.3	52.7	76.2%	43.1	50.8
Poland	20.5%	60.8	74.0	23.0%	58.7	71.0
Spain	64.9%	46.5	60.0	65.7%	45.6	59.0
Sweden*	66.0%	46.8		62.7%	46.8	

**Results for Ireland and Sweden deviate methodologically from the other MS in the Baseline project*

2.3.1.5. Conclusions and recommendations

The KPI on speed highlights persistent challenges. Although an overall trend suggests modest improvements in Trendline compared to Baseline, non-compliance remains widespread, especially on urban roads, where the risks to vulnerable road users are greatest. It is recommended that disaggregated data be collected by road type, time, and vehicle type to get important insights into risk patterns. Speed KPIs, when systematically collected and integrated into national strategies, are key tools for monitoring road safety performance towards targets and reducing crashes and injuries.

2.3.2. Safety belts and Child Restraint Systems

2.3.2.1. Definition

This indicator reflects the percentage of vehicle occupants using the safety belt or child restraint system (correctly).

2.3.2.2. Key results

For this indicator roadside observations were carried out to determine the use of safety belt and CRS including possible incorrect use (part A). To determine correct use, it was recommended to conduct in-vehicle inspections (part B).

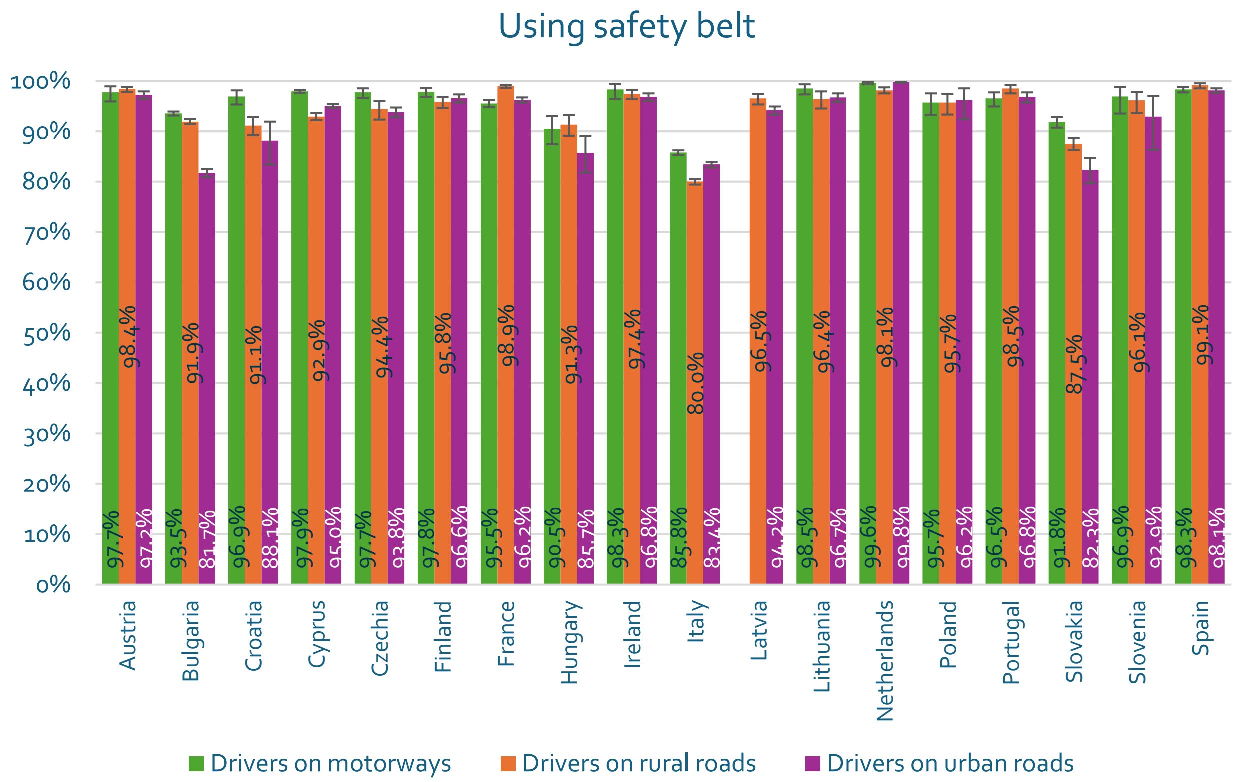


Figure 2.10 Percentage of drivers using safety belt by road type.

Seat belt use of drivers is generally high across motorways, rural roads, and urban roads, the highest on motorways (see Figure 2.10). On motorways, generally above 97% of drivers use a seat belt, varying from 85.8% (Italy) to 99.5% (the Netherlands) Rural roads show somewhat lower compliance, with percentages ranging from 80.0% (Italy) to 99.1% (Spain). Urban roads display the widest spread, with usage ranging from above 81.7% (Bulgaria) to 99.8% (The Netherlands). For the rear seats, compliance was lower on all types of roads. Generally, the compliance on all road types is lower for the front passenger and even lower for rear passengers: in a few cases (substantially) lower than 50%. Figure 2.11 shows the usage of safety belt on urban roads, where rear-seat use is below 30% in Croatia (28.6%), Italy (20.1) and Lithuania (26.4%).

Note: For Part A, the CRS is intended for the use of belts by children (both in the seat and in the CRS).

Figure 2.11 Percentage of passenger car occupants using safety belt on urban roads.

Seat belt use is higher on weekends than on weekdays, see Figure 2.12 and 2.13.

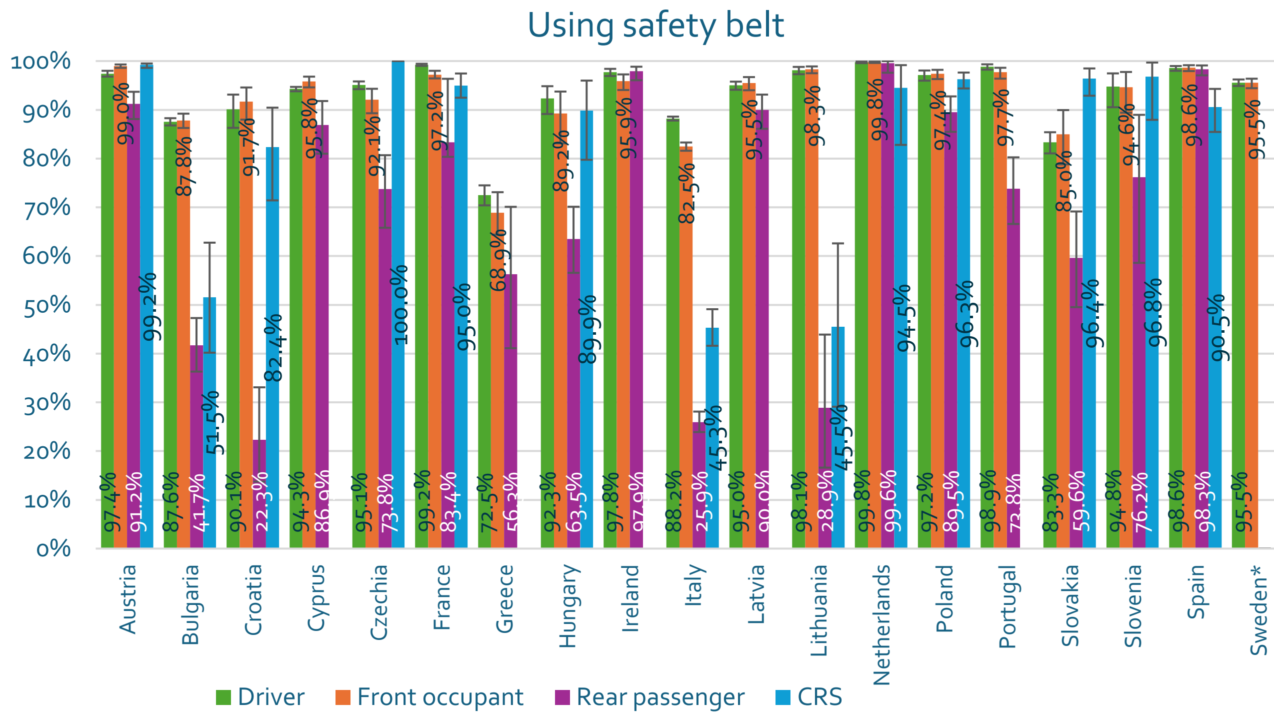
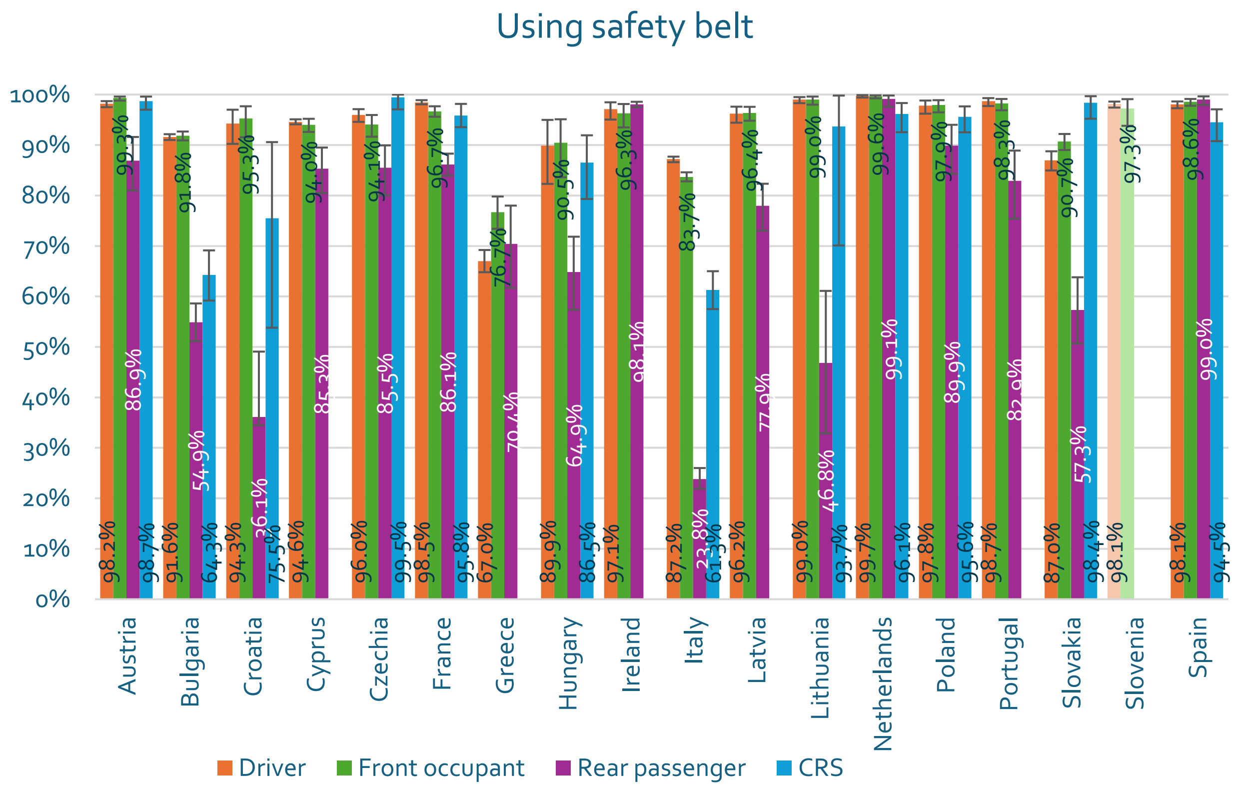


Figure 2.12 Percentage of passenger car occupants using safety belt during weekday/daytime.



Light coloured: Slovenia - fewer Number of location (weekend).

Figure 2.13 Percentage of passenger car occupants using safety belt during weekend/daytime.

CRS use is the highest on motorways, ranging from 61.7% (Italy) to 100% (Lithuania). On rural roads it varies from 42.6% (Italy) to 99.7% (Czechia), while on urban roads it ranges from 37.0 (Bulgaria) to 100% (Czechia). CRS misuse is more common. The percentage values of correct use of CRS in-depth vehicles inspection in some countries are only around 60% or lower, see Figure 2.14. The highest rates - about 92% - found in Portugal and the lowest - about 35% - in Italy. In most countries correct CRS usage was higher during the weekend than during the week (see Figure 2.14).

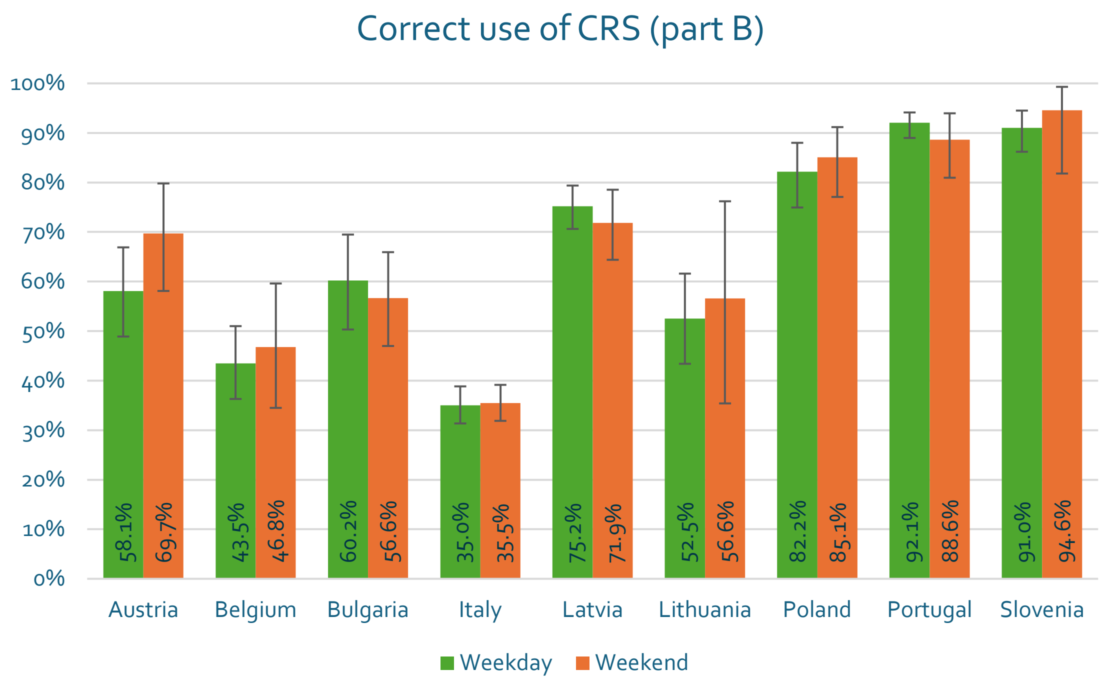


Figure 2.14 Percentage of children in passenger cars correctly using CRS, weekday versus weekend.

2.3.2.3. Comparison with Baseline results

Compared with the Baseline project, Trendline shows (slightly) higher seat-belt use among drivers, see Table 9. Front occupant seat belt use increased in some countries and decreased in the others. Rear-seat use generally improved, although it decreased in a few countries. CRS compliance increased in most countries, however correct CRS installation decreased in more countries than it increased (see Table 10).

Table 9101112. Percentage of passenger car occupants using safety belt, Baseline versus Trendline.

	Baseline				Trendline			
	Driver	Front occupant	Rear passenger	CRS	Driver	Front occupant	Rear passenger	CRS
Austria	97.3%	-	86.3%	99.4%	97.5%	99.0%	90.7%	99.1%
Bulgaria	83.3%	-	32.2%	50.0%	88.7%	89.0%	45.5%	55.5%
Cyprus	91.1%	91.2%	61.4%	87.3%	94.3%	95.6%	86.6%	-
Czechia	96.5%	96.3%	86.2%	36.9%	95.2%	92.4%	76.2%	99.9%
Hungary	88.5%	-	57.1%	60.9%	91.7%	89.7%	64.0%	88.9%
Italy	87.2%	87.2%	32.1%	50.6%	87.8%	83.1%	24.9%	51.7%
Latvia	93.2%	93.6%	90.4%	-	95.1%	95.7%	86.2%	-
Lithuania	97.9%	98.0%	62.4%	85.5%	98.3%	98.4%	36.1%	68.0%
Netherlands	-	-	-	88.3%	99.8%	99.7%	99.3%	95.1%
Portugal	98.5%	98.0%	78.3%	-	98.8%	97.8%	76.8%	-
Poland	96.1%	95.6%	88.2%	93.1%	97.4%	97.6%	89.7%	95.9%
Spain	96.0%	95.9%	92.8%	36.4%	98.4%	98.6%	98.5%	91.7%

Table 1301415. Percentage of children in passenger cars using CRS.

	Baseline		Trendline	
	Roadside observation Part A	In-vehicle inspection Part B	Roadside observation Part A	In-vehicle inspection Part B
Austria	99.4%	76.8%	99.1%	62.5%
Bulgaria	50.0%	60.8%	55.5%	58.4%
Italy	50.6%	59.9%	51.7%	35.2%
Latvia	-	61.9%	94.7%	74.2%
Lithuania	85.5%	68.6%	68.0%	54.4%
Portugal	-	90.7%	-	91.8%
Poland	93.1%	-	95.9%	83.6%

2.3.2.4. Comparability across countries

Most Member States met minimum methodological standards. In case of CRS use the international comparability is weakened by lower number of locations is some countries, differences in how countries define correct use and the use of surveys or simple roadside checks instead of in-depth inspections in some countries.

2.3.2.5. Conclusions and recommendations

The results show that while in Europe seatbelt use is a norm for drivers and front-seat passengers, important challenges remain. Rear-seat passengers are still often unprotected, and misuse of child restraint systems continues to compromise the safety of the youngest road users. The biggest safety gains lie therefore in rear seat and correct CRS compliance. Setting explicit national targets for both and monitoring progress is recommended. For countries where front-seat belt use is relatively low, targeted measures to enhance compliance are equally essential.

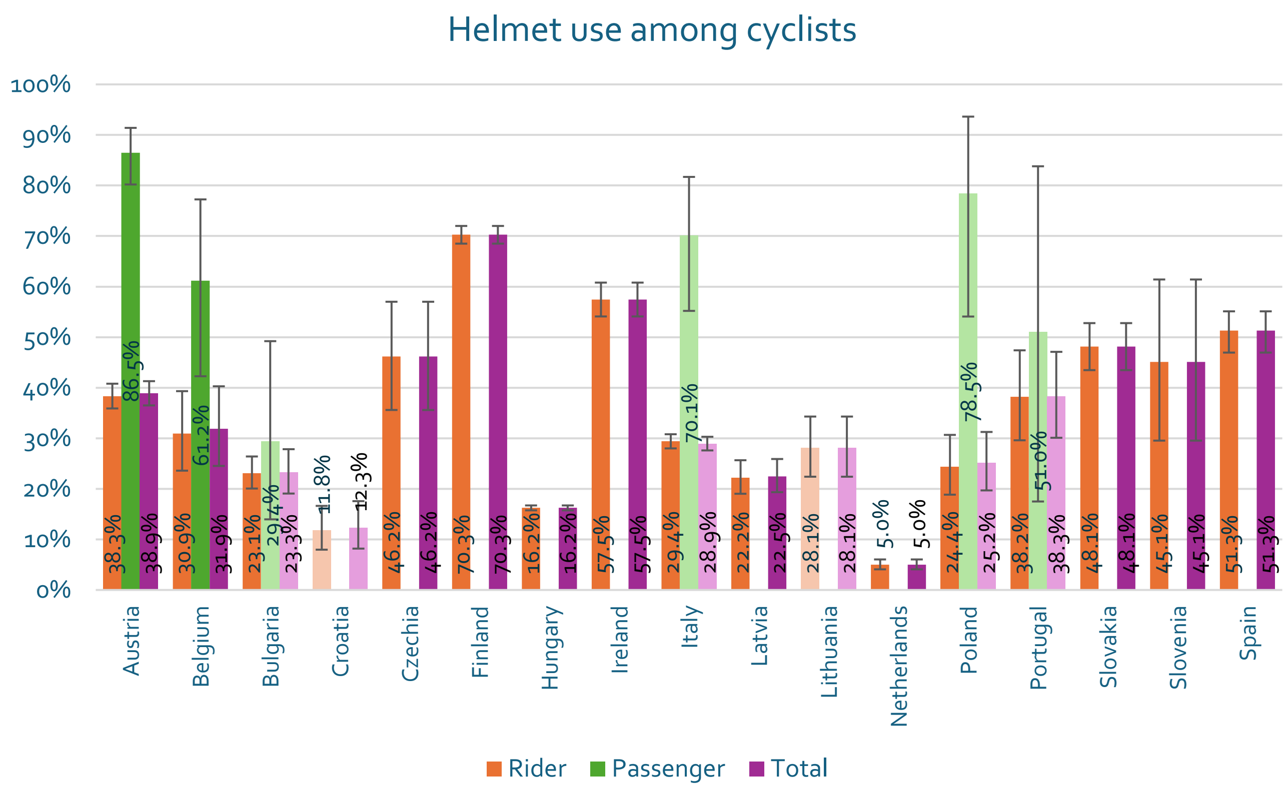
2.3.3. Protective equipment (helmets)

2.3.3.1. Definition

The KPI Protective equipment refers to the percentage of riders of powered two-wheelers (motorcycles and mopeds) and bicycles wearing a protective helmet.

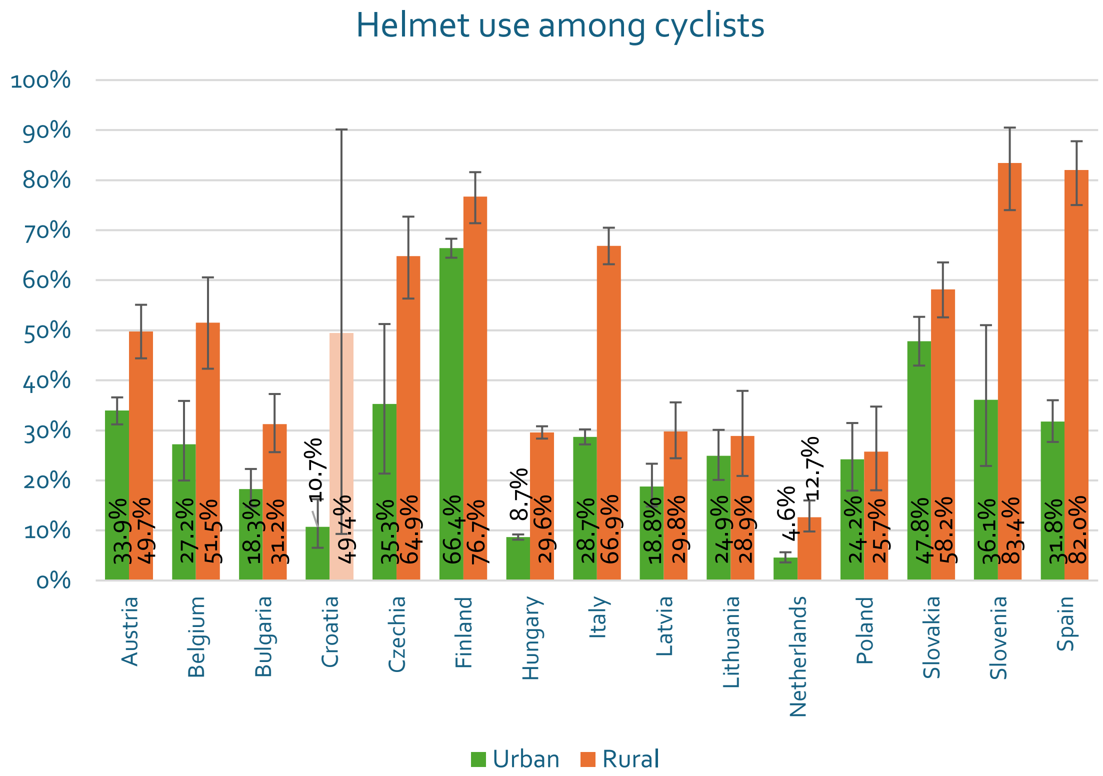
2.3.3.2. Key results

Cyclist helmet use varies largely: in two countries the usage exceeds 50% (or even 70% in Finland), whereas in others the values can be very low, e.g. about 5% in The Netherlands or 12% in Croatia, see Figure 2.15.



Light coloured: Fewer observations riders: Croatia (rural), Lithuania (weekend). Fewer observations passengers: Bulgaria, Italy (rural, weekend), Poland, Portugal.

Figure 2.15 Percentage of cyclists wearing a helmet.



Light coloured*: Fewer observations riders: Croatia (rural)Light coloured: Fewer observations riders: Croatia (rural).

Figure 2.16 Percentage of cyclists wearing a helmet by road type.

Rural cycling shows somewhat higher helmet use than urban cycling, see Figure 2.16. The percentage of cyclist riders wearing a helmet in urban areas ranges from 4.5% (the Netherlands) to 66.4% (Finland). In rural areas the KPI values range from 12.7% (the Netherlands) end 83.4% (Slovenia).

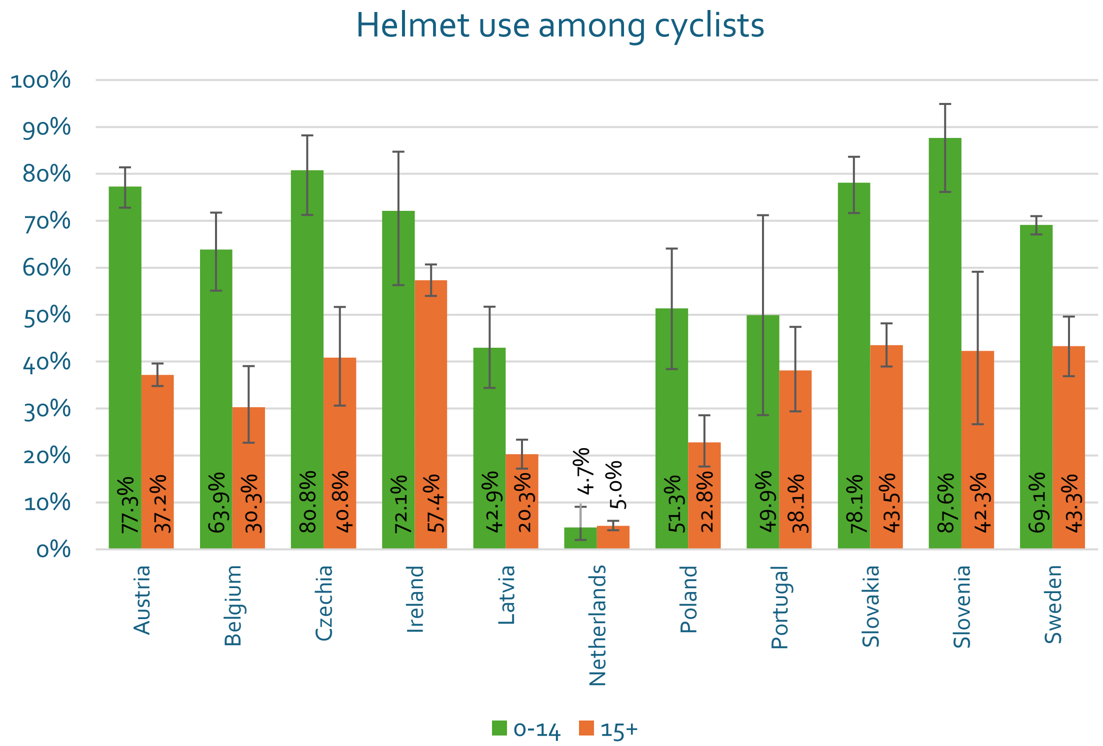
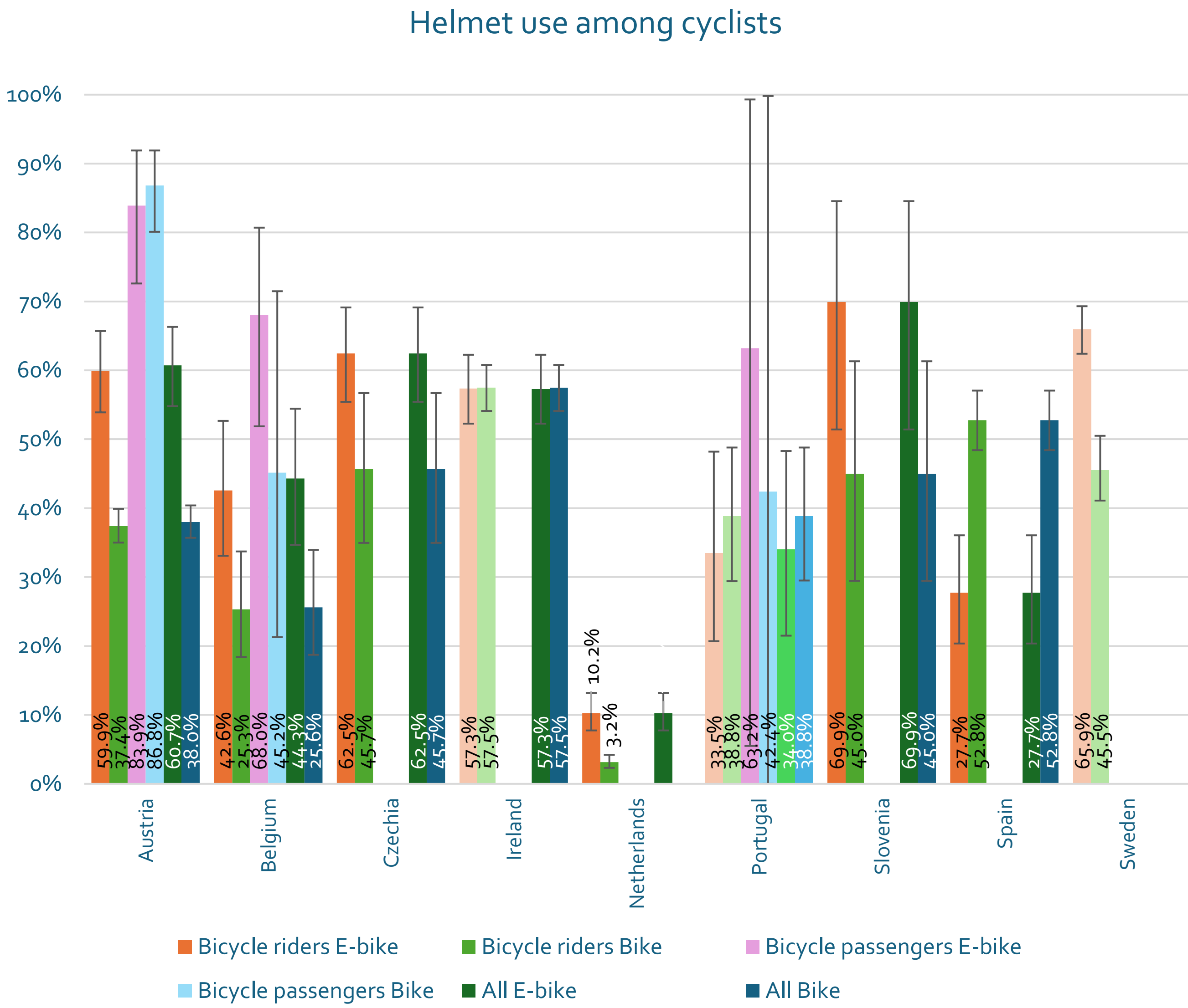


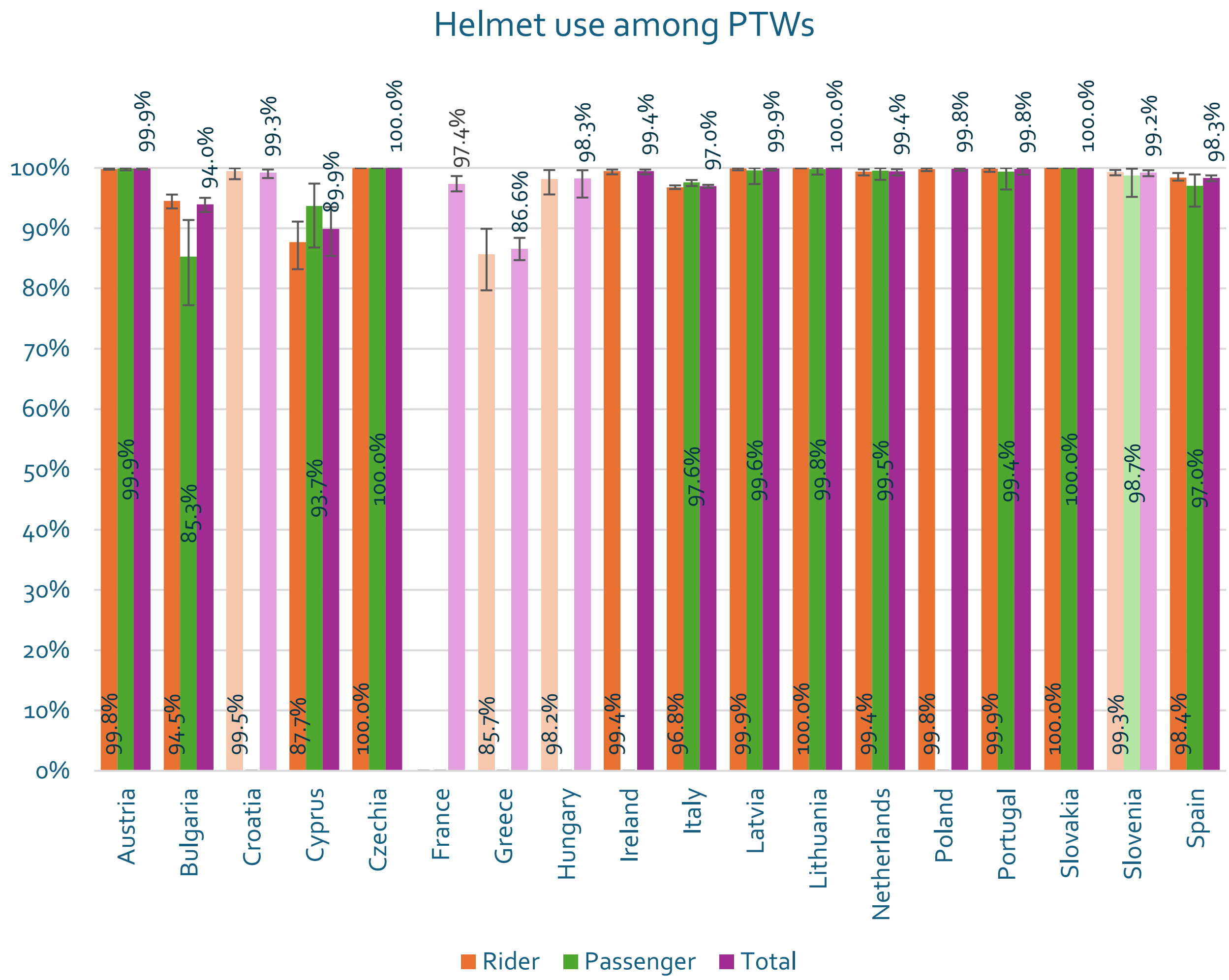
Figure 2.17 Percentage of cyclists wearing a helmet by age group.

Younger cyclists aged 0-14 years are more likely to wear a helmet than those aged 15 and older, see Figure 2.17. Furthermore, e-bike users tend to wear helmets more frequently than riders of conventional cyclists, see Figure 2.18.



Light coloured: Countries that included urban roads only.

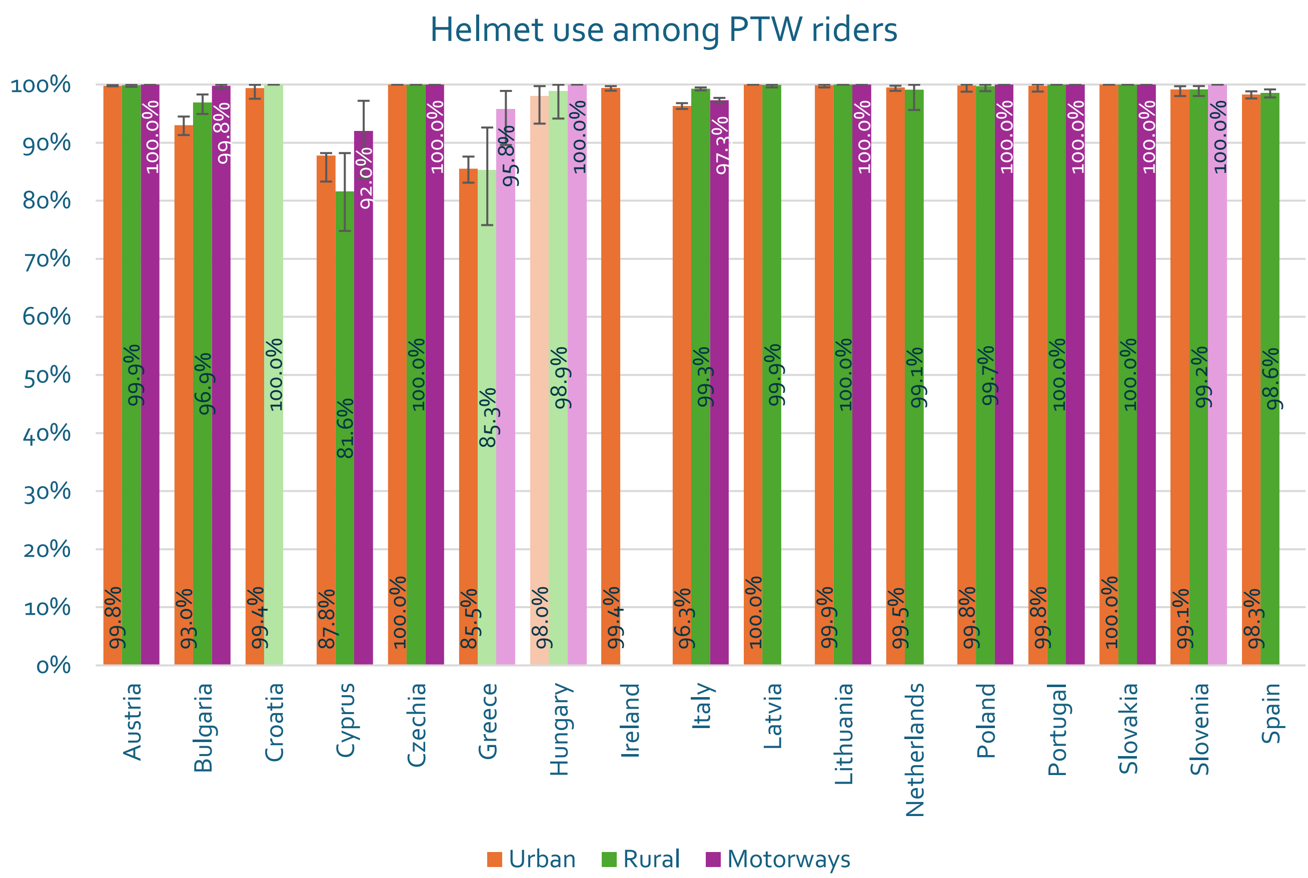
Figure 2.18 Percentage of cyclists wearing a helmet by vehicle type.



Light coloured: Fewer number of observations per road: Croatia (motorway, rural road), France (all categories), Greece (motorway, rural road), Hungary (all categories), Slovenia (motorway).

Figure 2.19 Percentage of PTW riders wearing a helmet.

As far as PTW riders are concerned, in most countries 99% or 100% of them wear a helmet (see Figure 2.19). The lowest values, about 86%, are found in Greece and the full compliance is found in Czechia and Slovakia.



Light colored: Fewer Number of observations per road: Croatia (rural road), Greece (motorway), Hungary (all categories), Slovenia (motorway).

Figure 2.20 Percentage of PTW riders wearing a helmet by road type.

Generally, PTW riders on motorways are more likely to wear a helmet than on rural or urban roads, see Figure 2.20.

2.3.3.3. Comparison with Baseline results

Cyclist helmet use among riders shows improvement in Trendline versus Baseline in most countries, see Table 11. In contrast, helmet use among passengers has generally declined. PTW helmet wearing has plateaued at a very high level, with some slight increases or decreases, see Table 12.

Table 161. Percentage of cyclists wearing a helmet, Baseline versus Trendline.

	Baseline		Trendline	
	Rider	**Passenger**	**Rider**	**Passenger**
Austria	35.5%	91.2%	38.3%	86.5%
Belgium	23.8%	66.3%	30.9%	61.2%
Bulgaria	20.8%	38.9%	23.1%	29.4%
Czechia	50.3%	-	46.2%	-
Latvia	17.9%	-	22.2%	-
Poland*	20.9%	75.0%	24.4%	78.5%

**Baseline – no weighting*

Table 12. Percentage of PTW riders wearing a helmet, Baseline versus Trendline.

	Baseline		Trendline	
	Rider	**Passenger**	**Rider**	**Passenger**
Austria	99.9%	100.0%	99.8%	99.9%
Bulgaria	96.0%	92.8%	94.5%	85.3%
Cyprus***	87.4%	87.8%	87.7%	93.7%
Czechia*	99.5%	100.0%	100.0%	100.0%
Greece*	80.3%	65.5%	85.7%	89.9%
Italy**	96.2%	96.5%	96.8%	97.1%
Latvia	100.0%	99.5%	99.9%	99.6%
Poland**	99.5%	100.0%	99.8%	-
Portugal*	99.8%	99.5%	99.9%	99.4%
Spain	99.4%	96.2%	98.4%	99.2%

*Baseline – minimum sample size not achieved for motorways
**Baseline – no weighting
***Baseline – minimum total sample size not achieved for riders and passengers of PTWs

2.3.3.4. Comparability across countries

International comparability is limited by some countries lacking motorway observations for PTWs or rural observations for cyclists: some countries having smaller samples than recommended.

2.3.3.5. Conclusions and recommendations

On the one hand, helmet wearing among PTW riders has essentially achieved (almost) full compliance, making it a success story of road safety policy, legislation and enforcement. On the other hand, cyclist helmet use remains much lower, often alarmingly low, with cultural and behavioural resistance proving difficult to overcome. The results highlight the need to set targets for improving helmet use, especially among cyclists. It is recommended to stimulate helmet use in countries with low usage. Special attention should be given to risk locations such as urban roads where usage rates are lowest.

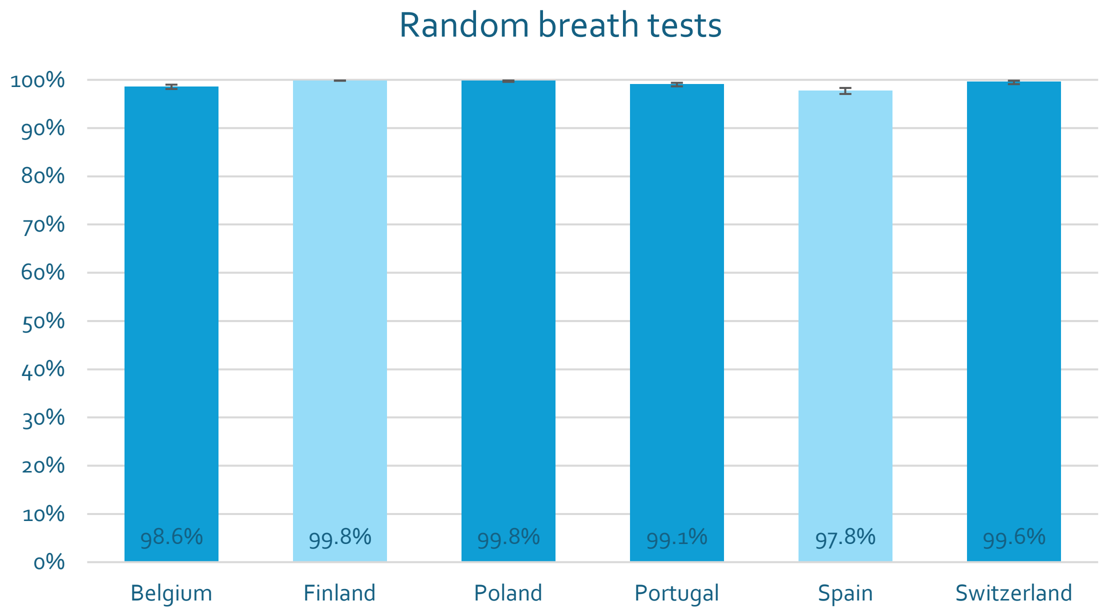
2.3.4. Driving under the in fluence of alcohol

2.3.4.1. Definition

The KPI Alcohol refers to the percentage of car drivers within the legal limit for blood alcohol content (BAC). It is important to note that the maximum legal BAC-limits differ among the EU countries and for different types of drivers, e.g. novice and professional drivers, ranging from 0,0 g/l to 0,5 g/l. Most of the countries that delivered alcohol KPIs have a general legal limit of 0,5 g/l BAC. Four countries have a lower general limit: Czech Republic (0,0 g/l), Poland and Sweden (0,2 g/l) and Lithuania (0,4 g/l). Twelve countries also have lower limits for novice and/or professional drivers.

2.3.4.2. Key results

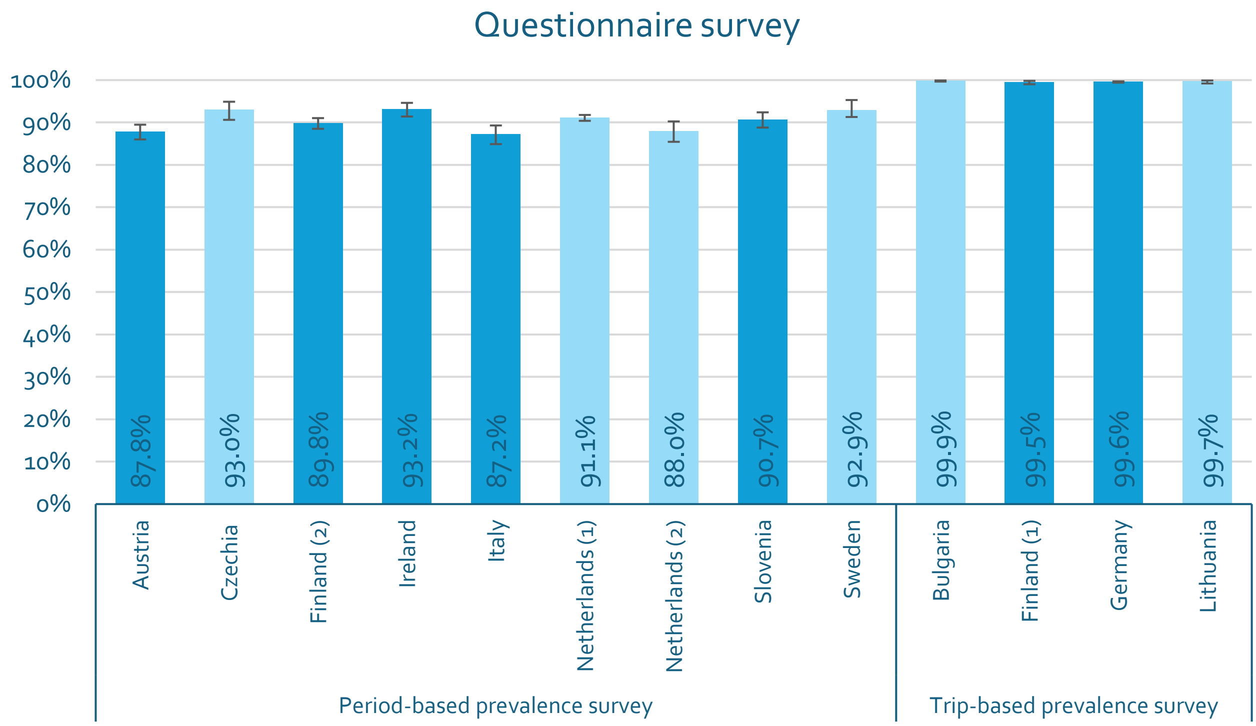
For this KPI two main measurement methods were allowed: 1) random breath testing (RBT), i.e., roadside breath testing of randomly selected drivers by police or 2) representative anonymous surveys among drivers concerning drink-driving behaviour. Based on the RBT, more than 98% of car drivers in most countries are found to be within the legal BAC limit, see Figure 2.21. It is underlined that these percentages are based on random testing. When the police in a country carries out targeted controls, the share of drivers driving under the influence of alcohol is typically higher.



Light coloured: deviations Finland: no motorways; Spain: motorway and weeknight N<250.

Figure 2.21 Percentage of car drivers within the legal limit for blood alcohol content (BAC): random breath tests. Totals of three road types and all week periods.

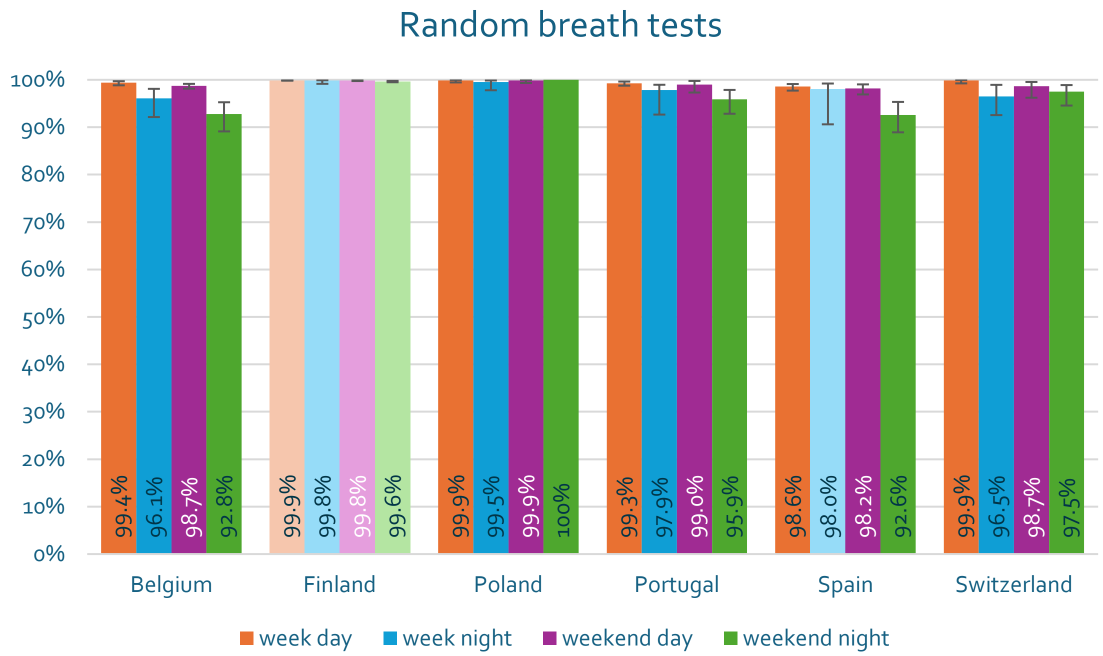
In Figure 2.22 the results of surveys are shown. According to the period-based prevalence survey — which measures the percentage of drivers who report never having driven when they may have been over the legal limit in the past 30 days — the KPI values range from 87.2% (Italy) to 93.2% (Ireland). The results of the trip-based prevalence survey— which estimates the percentage of drivers who report not having driven when they may have been over the legal limit on a randomly selected recent trip — indicate that more than 99% of drivers comply with the legal BAC limit.



Light coloured: deviations (Czechia, Netherlands (2), Sweden: total N<750; Netherlands (1): 12 months period; Bulgaria: different sampling method, no weighting; Lithuania: different weighting (by road type/week period, not population-based). Period-based prevalence KPIs based on ESRA3: Austria, Czechia, Italy, Netherlands (2), Sweden. Official KPIs for Netherlands, Finland are Netherlands (1) and Finland (1).

Figure 2.22 Percentage of car drivers reporting driving within the legal BAC limit: surveys.

Across all measurement methods, in most countries the KPI values are lower during night-time—particularly on weekends (see Figure 2.23 for the results for the RBT)—and among male drivers (see Figure 2.24 and 2.25).



Light coloured: deviations (Finland: no motorways; Spain: motorway, weeknight N< 250).

Figure 2.23 Percentage of car drivers within the legal limit for blood alcohol content (BAC) by week period: random breath tests, three road types.

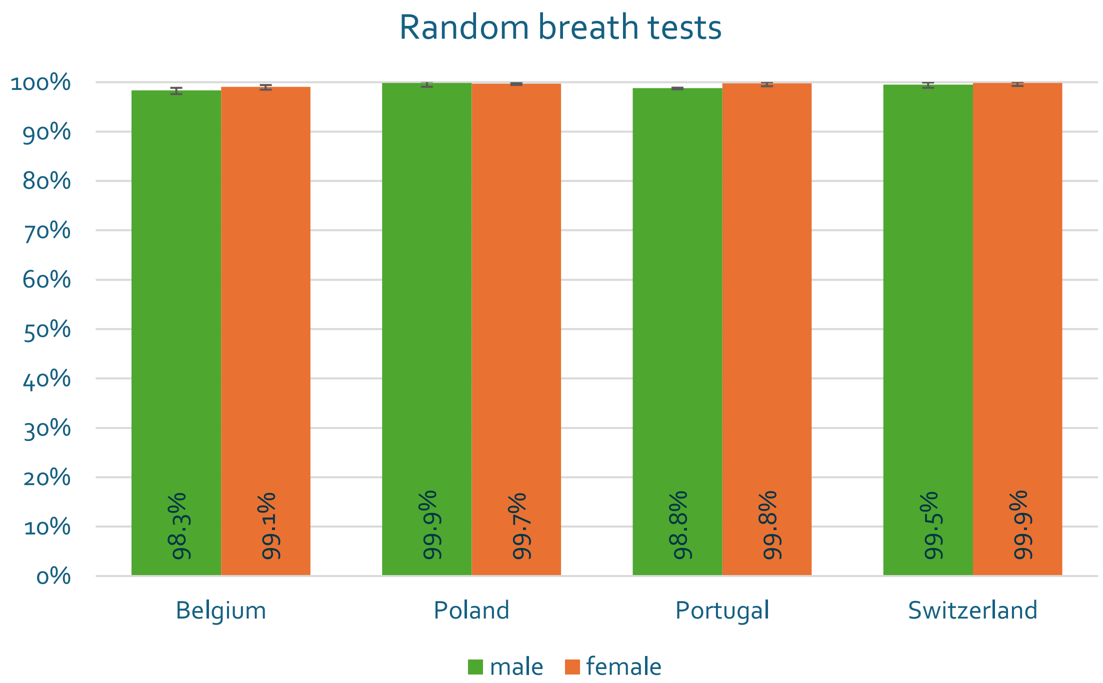
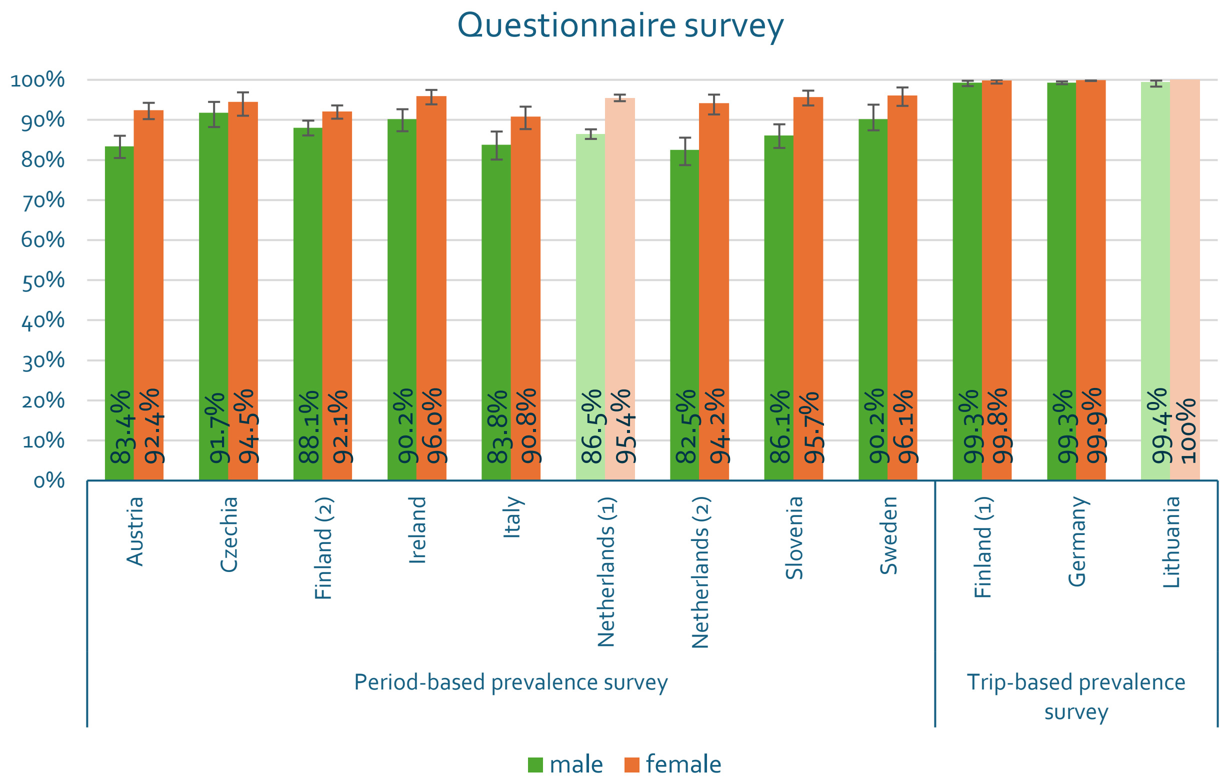


Figure 2.24 Percentage of car drivers within the legal limit for blood alcohol content (BAC) by gender: random breath tests, three road types, all week periods.



Light coloured: deviations (Netherlands (1): 12 months period; Lithuania: different weighting procedure (by road type/week period, not population-based).

Figure 2.25 Percentage of car drivers reporting driving within the legal BAC limit by gender: surveys.

The youngest age group, drivers aged 18–24, stand out for reporting the highest rates of driving above the legal limit in the past 30 days (see Figure 2.27). This is not always the case for RBT and trip-based surveys (see Figure 2.26 and 2.27).

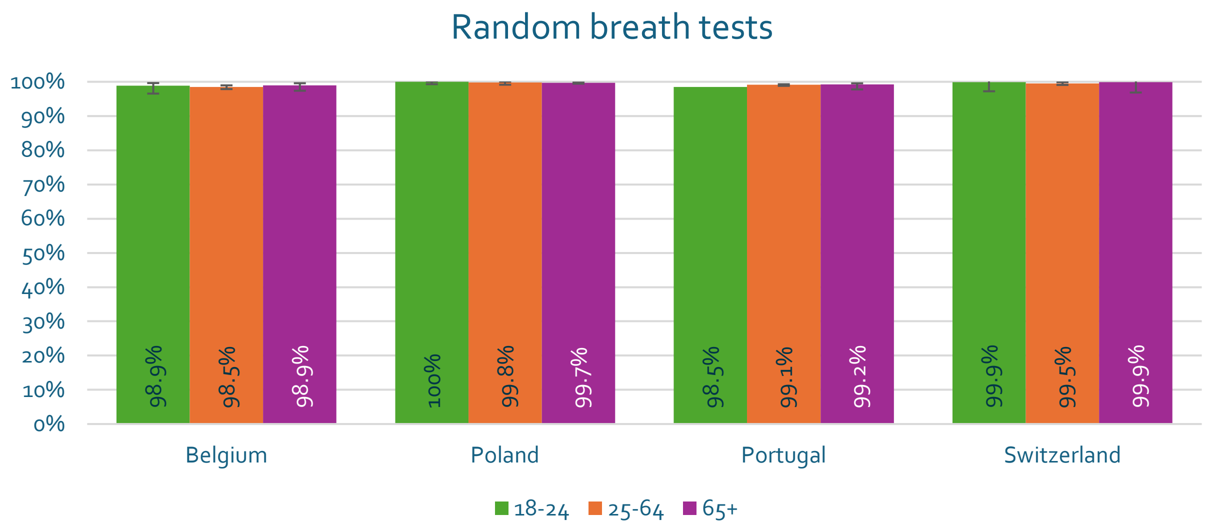
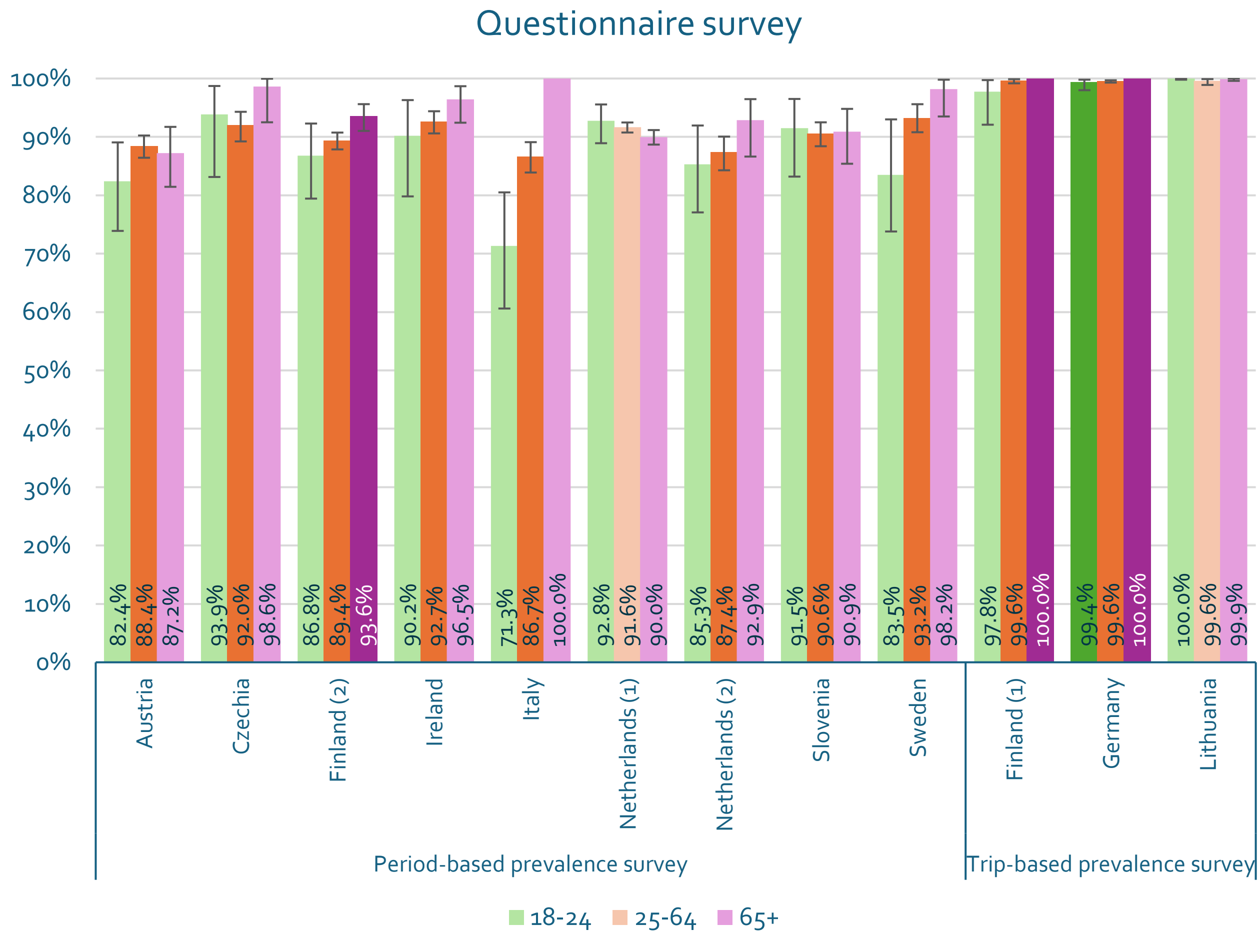


Figure 2.26 Percentage of car drivers within the legal limit for blood alcohol content (BAC) by age group: random breath tests, three road types, all week periods.



Light coloured: deviations (Austria, Czechia, Finland (2), Ireland, Italy, Netherlands (1), Netherlands (2), Sweden, Slovenia; Finland (1), Lithuania: subsample N<250; Netherlands (1): 12 months period; Lithuania: different weighting: by road type/week period, no population-based).

Figure 2.27 Percentage of car drivers reporting driving within the legal BAC limit by age group: surveys.

2.3.4.3. Comparison with Baseline results

Comparison with Baseline (see Table 13) shows that the KPI values have remained relatively the same for the random breath tests and trip-based surveys. However, the period-based survey KPI values generally decreased (indicating more driving under the influence), which may be (partly) due to methodological changes.

Table 13. Percentage of car drivers driving within the legal BAC limit, Baseline versus Trendline.

Roadside random breath tests: National KPI (95% CI) (3 road types, 4 week periods)

	Baseline	Trendline
Belgium	98.4% (97.9% - 98.8%)	98.6% (98.1% - 99.0%)
Poland	99.7% (99.4% - 100%)	99.8% (99.6% - 99.9%)
Portugal	99.2% (98.6% - 99.6%)	99.1% (98.6% - 99.4%)
Spain	97.6% (96.9% - 98.2%)	97.8% (97.1% - 98.3%)
	Poland: No motorways	*Poland: Including motorways*

Trip-based prevalence survey: KPI (95% CI)

	Baseline	Trendline
Germany	99.7% (99.4% - 99.8%)	99.6% (99.4% - 99.7%)
Bulgaria	99.4% (99.1%-99.7%)	99.9% (99.7%-100%)

Period-prevalence survey: National KPI (95% CI)

	Baseline	Trendline
Austria	91.9% (90.7% - 93.1%)	87.8% (86.0% - 89.5%)
Finland	96.1% (95.1% - 97.2%)	89.8% (88.5% - 91.0%)
Ireland	96.0% (93.0%-99.0%)	93.2% (91.4%-94.6%)
Sweden	94.3% (92.7% - 96.0%)	92.9% (91.3% - 95.3%)
	Austria, Finland, Ireland: N-over legal limit-never (30 days) / Finland: no weighting / Sweden: N-over legal limit-never (12 months)	*N-over legal limit-never (30 days) / Austria, Sweden: ESRA3*

2.3.4.4. Comparability across countries

International comparability of results is challenged by the use of three different methods and further inconsistencies within each method (e.g. varying operationalisations, data weighting)), as well as by differences in legal BAC limits.

2.3.4.5. Conclusions and recommendations

The alcohol KPI based on random breath testing (RBT) — the golden standard — and trip-prevalence surveys — considered the best alternative when RBT cannot be applied — shows a high compliance with legal BAC limits, exceeding 98% in most countries. The KPI Alcohol shows a relative status quo in Trendline compared to Baseline. Countries should prioritize RBT where legally possible and standardize survey wording and sampling when RBT cannot be used. When using RBT ideally also BAC risk related indicators are provided which are not subject to legal changes and differences within/between countries. Policy measures should especially focus on high-risk periods (weekend nights) and high-risk groups (male drivers).

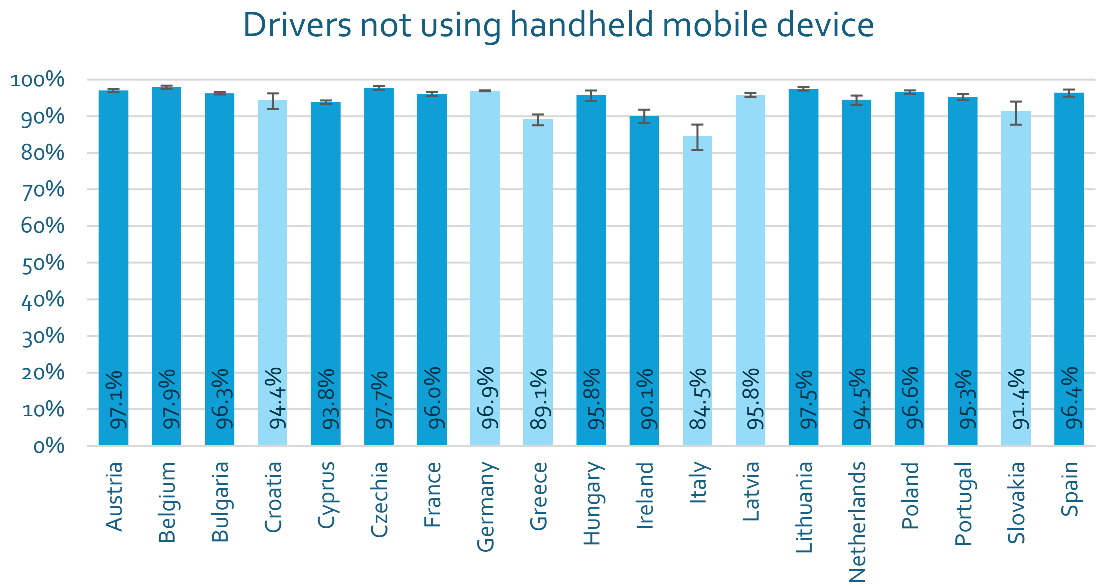
2.3.5. Distraction

2.3.5.1. Definition

The KPI Distraction refers to the percentage of drivers not using a handheld mobile device while driving.

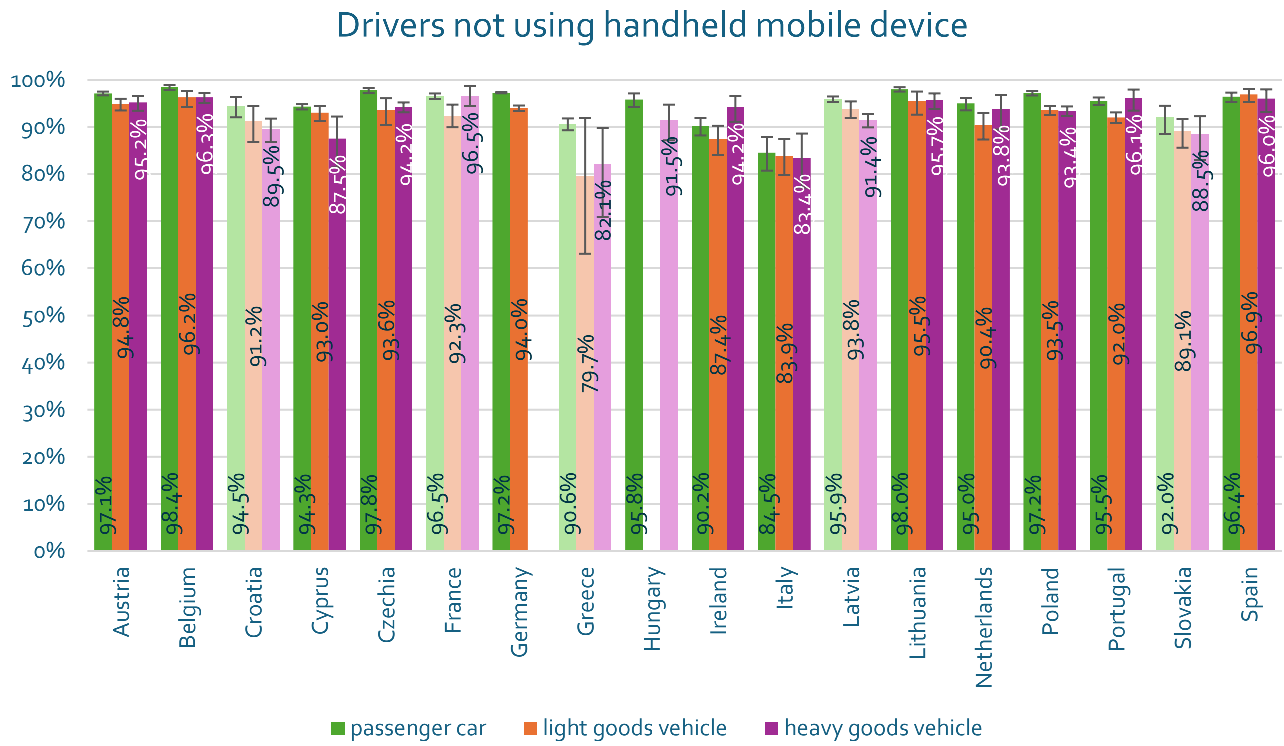
2.3.5.2. Key results

As shown in Figure 2.28, in most countries, more than 90% of drivers were not using a handheld device while driving, some reaching the values of 97% and above. Belgium reported the highest value (97.9%), while Italy recorded the lowest, 84.5%.



Light coloured: Croatia (9 locations for motorways), Germany (no HGVs, deviation from the weighting methodology), Greece (6 locations for motorways & for rural roads), Hungary (no LGVs, no urban roads for HGVs); Latvia (no motorways), Slovakia (a broader definition of distraction including engaging with infotainment systems).

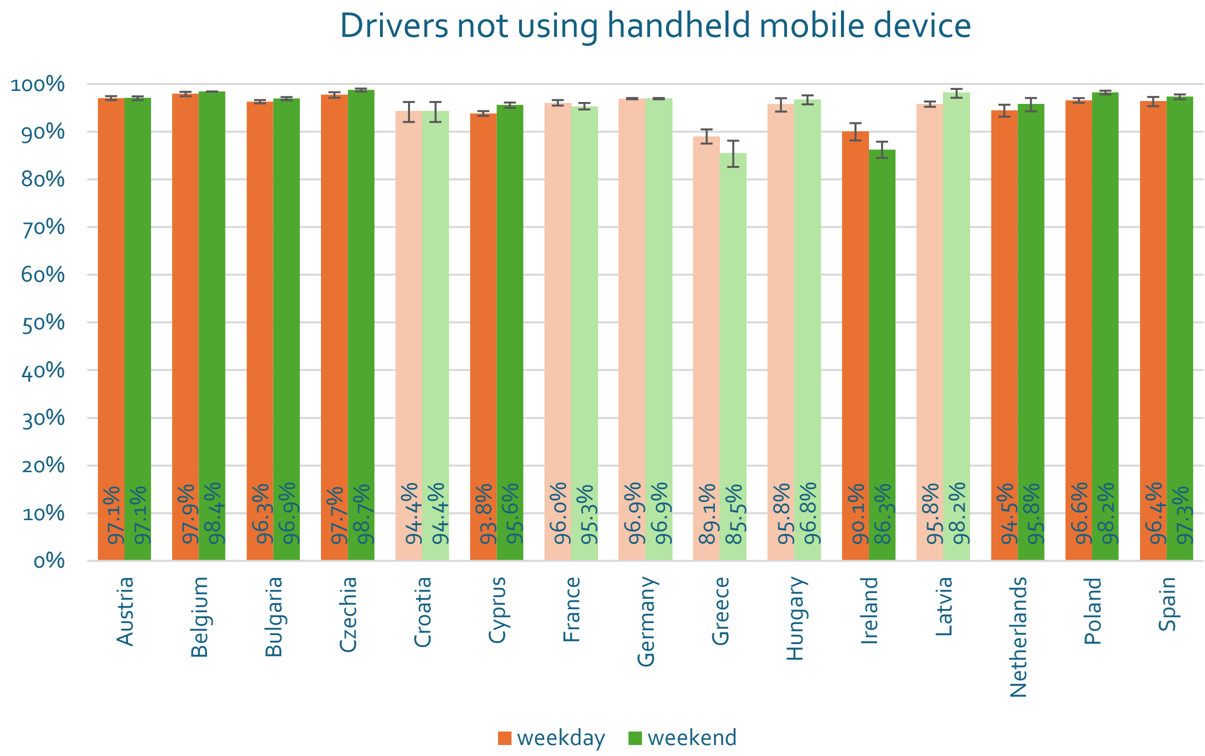
Figure 2.28 Percentage of drivers NOT using a handheld mobile device while driving on weekdays; three vehicle types, three road types.



Light coloured: France (only 4 locations for motorways; a broader definition of distraction including the use of a hands-free device), Germany (no HGVs), Croatia (9 locations for motorways), Greece (6 locations for motorways & rural roads), Hungary (no LGVs, no urban roads for HGVs), Latvia (no motorways), Slovakia (a broader definition of distraction including engaging with infotainment systems).

Figure 2.29 Percentage of drivers NOT using a handheld mobile device while driving by vehicle type; three road types, weekdays.

Figure 2.29 shows the KPI values by vehicle type. Passenger cars generally displayed the highest values, often exceeding 95%. For LGVs and HGVs, many countries failed to reach the recommended 2,000 observations per vehicle type. In some cases, samples were even below 500.



Light coloured: Croatia (low number of locations for motorways, France (low number of locations for motorways, a broader definition of distraction including the use of a hands-free device), Germany (no HGVs), Greece (low number of locations for motorways & for rural roads), Hungary (no LGVs, no urban roads for HGVs), Latvia (no motorways), Slovakia (a broader definition of distraction including engaging with infotainment systems).

Figure 2.30 Percentage of drivers NOT using a handheld mobile device while driving by week period; three vehicle types, three road types.

Generally, the shares for weekends were slightly higher than for weekdays (see Figure 2.30). In some countries the shares were the same for weekends and weekdays (for example Austria) or lower for weekends (for example Ireland).

2.3.5.3. Comparison with Baseline results

Compared to Baseline, most countries reported slight improvements in the KPI values for distraction, see Figure 2.31. It should be however noted that Baseline and Trendline differ in terms of the vehicle types included. While both cover passenger cars and light goods vehicles, Baseline included buses as a third vehicle category, and Trendline heavy goods vehicles. When comparing the results by vehicle type, most countries showed improvements for both passenger cars and light goods vehicles.

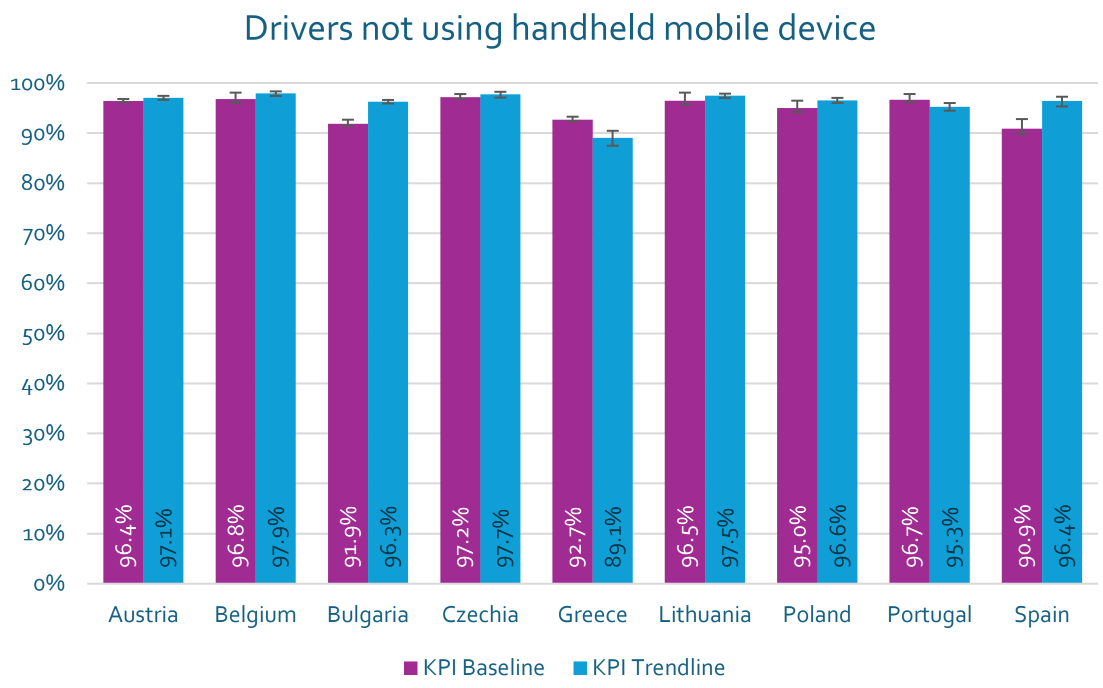


Figure 2.31 Percentage of drivers NOT using a handheld mobile device while driving on weekdays, Baseline versus Trendline; three vehicle types, three road types.

2.3.5.4. Comparability across countries

Most countries complied with the methodological requirements. However, deviations, mainly concerning sampling, lower number of locations, missing data for certain road or vehicle type, or weighting, limit cross-country comparisons. Two countries applied a broader definition of distraction than the handheld-use only.

2.3.5.5. Conclusions and recommendations

The KPI distraction shows generally a high proportion of drivers - typically more than 90% - not using handheld devices while driving. It should be noted that the KPI definition excludes operating a fixed mobile phone or onboard screen; including these sources of distraction would result in lower percentages. Concerning driver handheld device use, some countries and vehicle types reveal important challenges. Professional drivers (drivers of light and heavy goods vehicles) are significantly more likely to use mobile devices than drivers of passenger cars. Policy should therefore pay particular attention to professional drivers in targeting driver distraction given their lower compliance. For comparability among countries, it is important to keep the predefined definition for the KPI and, if desired, measure broader forms of distraction via additional indicators. Methodologically, adding weekend observations and ensuring adequate samples for goods vehicles is recommended.

2.3.6. Vehicle safety

2.3.6.1. Definition

The standard KPI calculates the percentage of new passenger cars with a Euro NCAP safety rating equal or above a predefined threshold (four/five stars). A recommended second indicator calculated the percentage of passenger cars aged 0–5 years to capture a broader slice of the active fleet.

2.3.6.2. Key results

Figure 2.32 shows the proportion of new passenger cars registered in 2022 that achieved at least four Euro NCAP stars. In most reporting countries, over 80% of new cars achieve at least four stars. The percentages vary from 61% (Italy) to 90% and above (Czechia and Sweden). The shares meeting five-star thresholds are lower and vary more widely ranging from about 47% (Italy) to 86% Sweden).

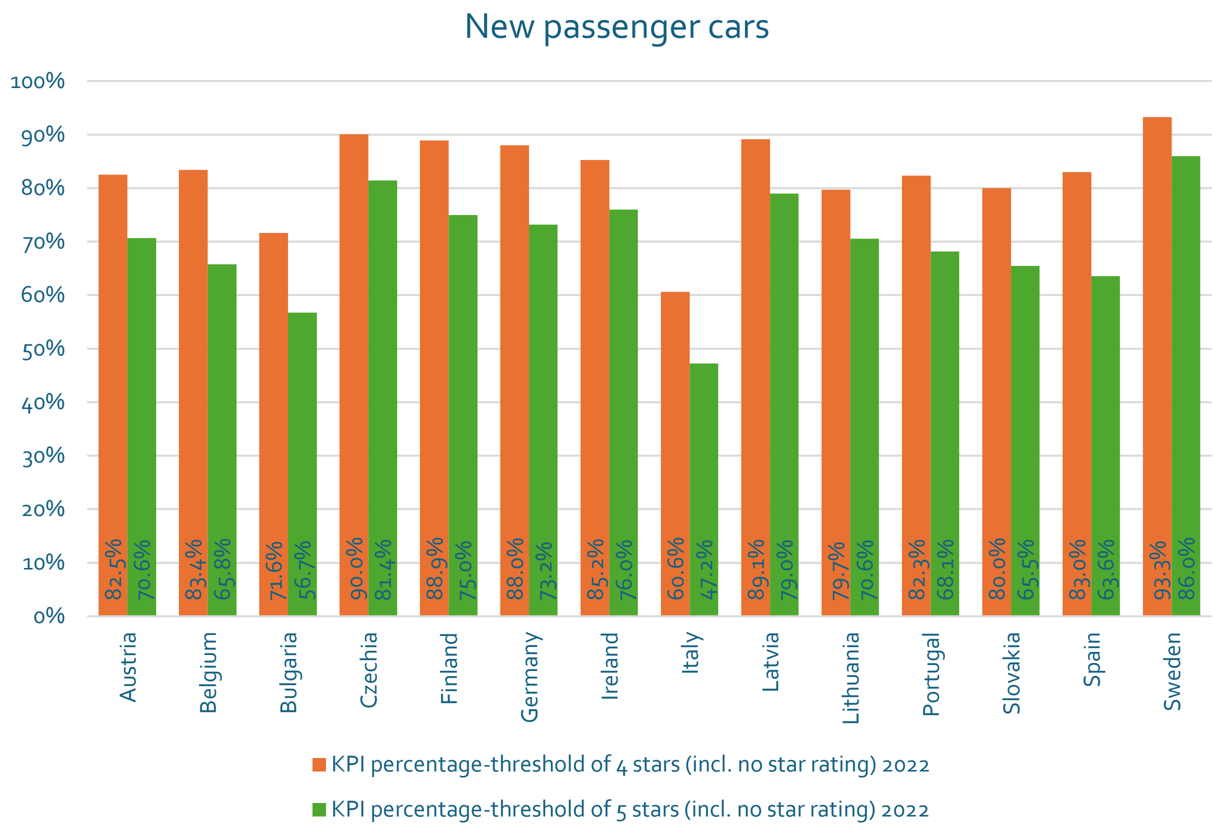


Figure 2.32 Percentage of newly registered passenger cars above the threshold of 4 and 5 stars (including no star rating cars) in 2022.

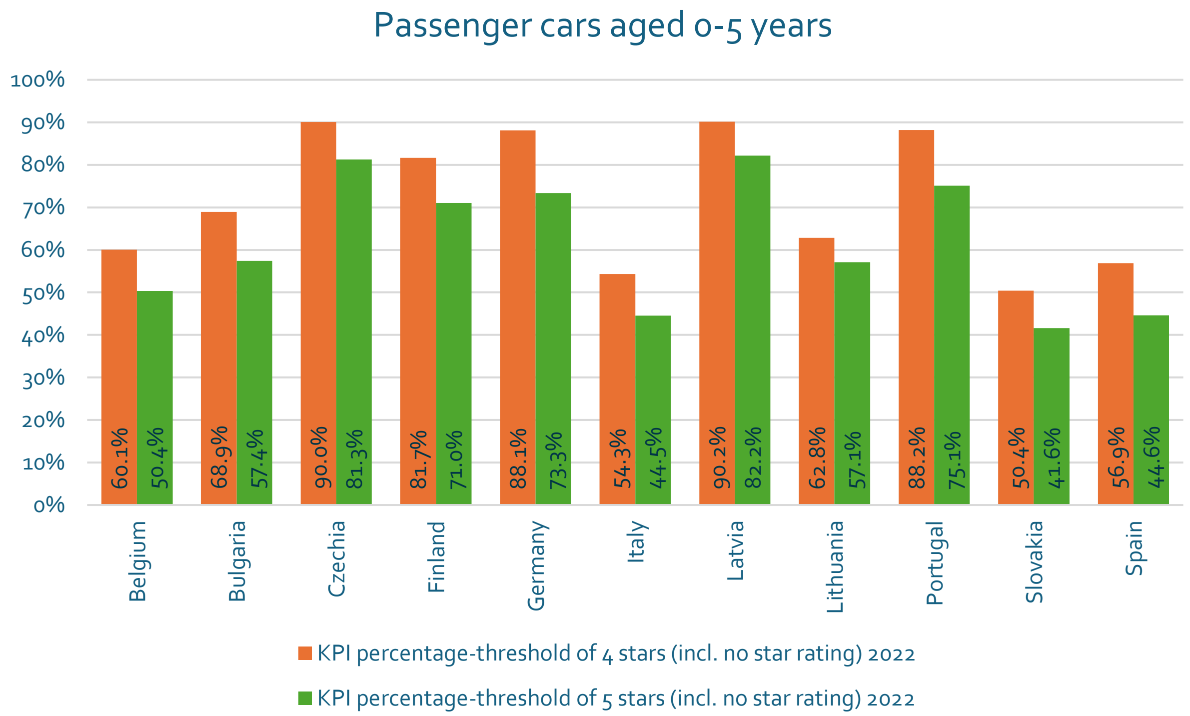


Figure 2.33 Percentage of passenger cars aged 0-5 years above the threshold of 4 and 5 stars (including no star rating cars) in 2022.

Figure 2.33 shows the percentages of cars aged 0-5 above the threshold of 4 and 5 stars. The values are generally lower than for new cars varying from 50% (Slovakia) to 90% (Czechia, Latvia) for the four-star threshold and from 42% (Slovakia) to 82% (Latvia) for the five-star rating. Comparing the KPI values between newly registered cars and cars aged 0-5, some countries for example, Germany and Latvia report similar values, while other countries, such as Belgium, Slovakia, and Spain show much higher figures for the new-car KPIs.

2.3.6.3. Comparison with Baseline results

Compared to Baseline, in most countries the indicator increased or stayed at the same level, see Figure 2.34.

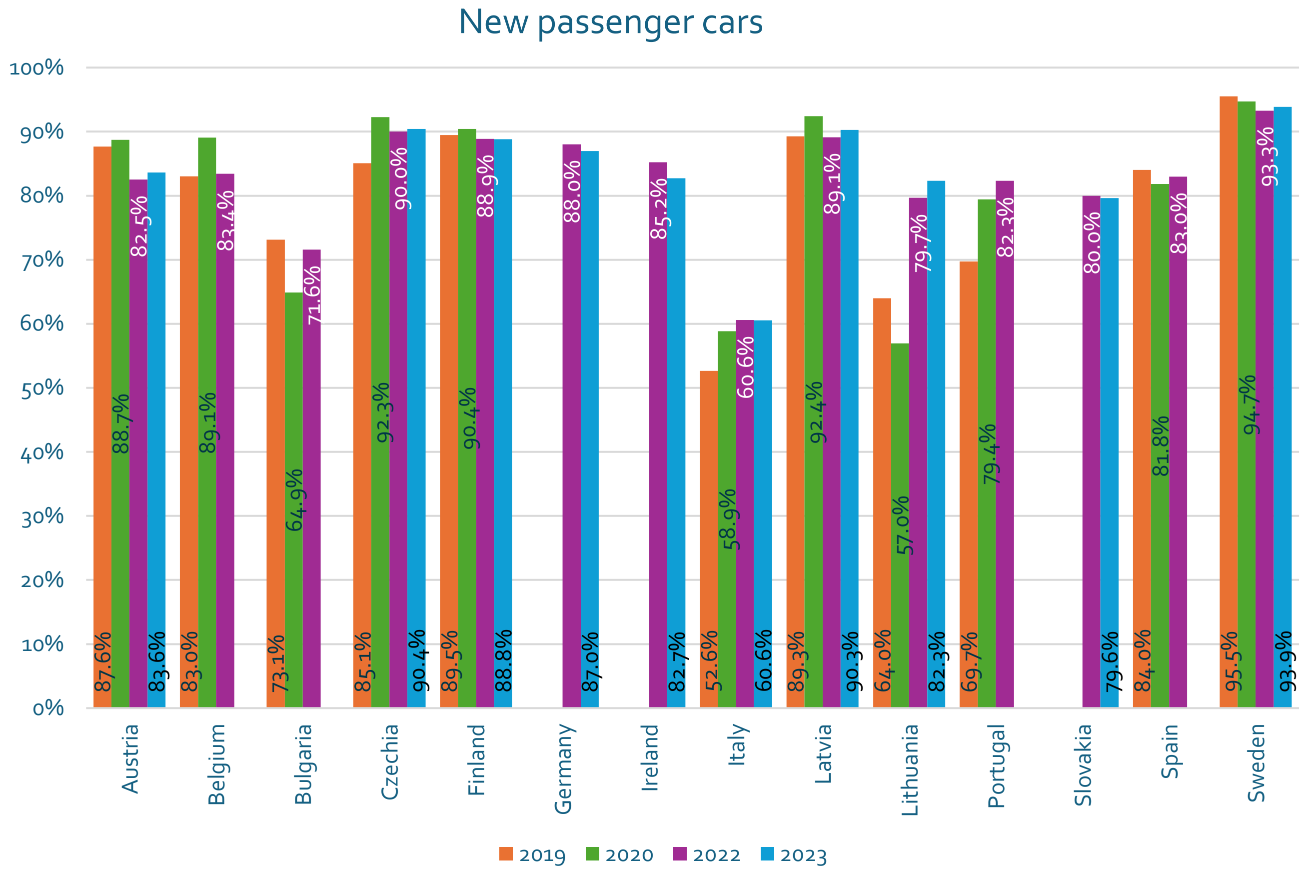


Figure 2.34 Percentage of newly registered passenger cars above the threshold of 4 stars (including no star rating cars) in the period 2019 -2023. Baseline covered 2019 and 2020,Trendline 2022 and 2023 (results for 2023 were optional).

2.3.6.4. Comparability across countries

Overall, the comparability of results across countries is reasonably good, despite a few small methodological differences.

2.3.6.5. Conclusions and recommendations

The KPI Vehicle Safety provides an indication of the safety performance of new passenger cars entering the European market, as assessed against international standards. The share of models with at least 4 stars of 80% or higher in most countries suggests that new vehicles with high level of safety characteristics are widely available across Europe. Authorities should take measures to further increase the share of high-rated models. The inclusion of a second indicator concerning cars aged 0-5 years has demonstrated added value. The indicator covers a larger share of the vehicle fleet than newly registered passenger cars, it is less affected by distortions arising from cross-border registrations, and appears feasible for countries to calculate with existing data sources. Currently, the KPI does not reflect the safety level of the entire fleet, which includes many older vehicles with expired ratings. Extending the KPI to represent the whole fleet remains, however, challenging.

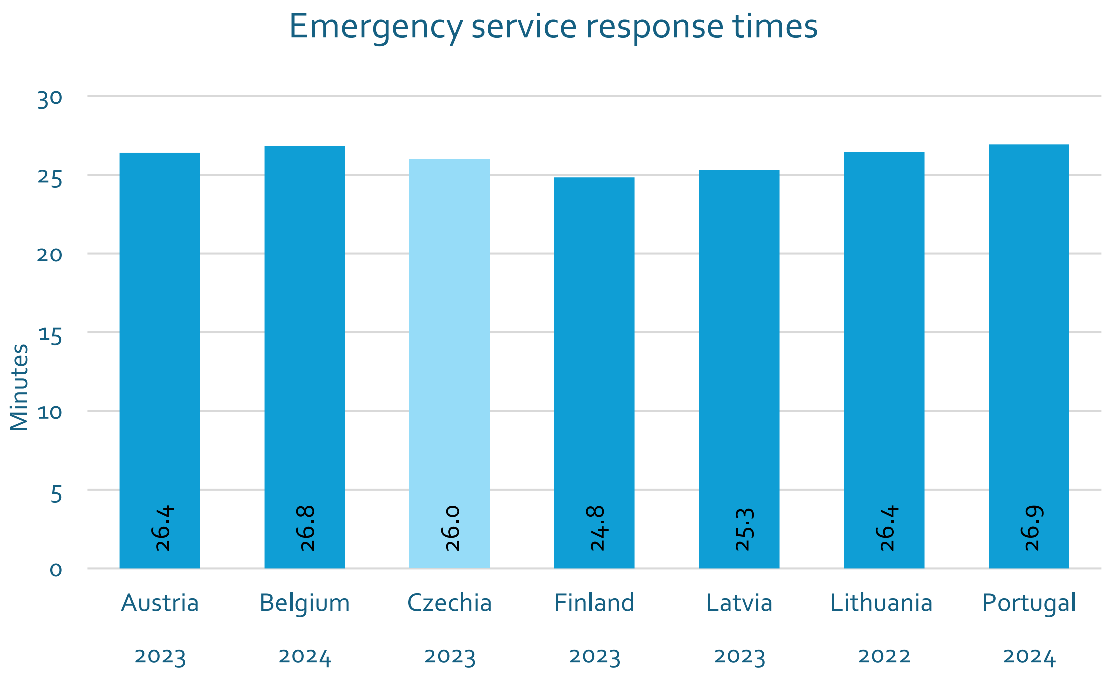
2.3.7. Post-crash care

2.3.7.1. Definition

The KPI Post-Crash Care is defined as the time elapsed in minutes and seconds between the emergency call following a road crash resulting in personal injury and the arrival at the scene of the road crash of the emergency services (to the value of the 95th percentile).

2.3.7.2. Key results

P95 values are commonly around 26 minutes (see Figure2.35) and can be over 30 minutes in some contexts, for example on weekdays during the night (see Figure 2.36). During daytime, the P95 values tend to be slightly higher during weekends then during weekdays (see Figure 2.36) .



Light coloured* Only one region in Czechia
Note: data in all graphs show minutes and fractions of minutes (e.g., 23 minutes and 30 seconds = "23.5")

Figure 2.35 Post crash estimates, P95 values of emergency services response times.

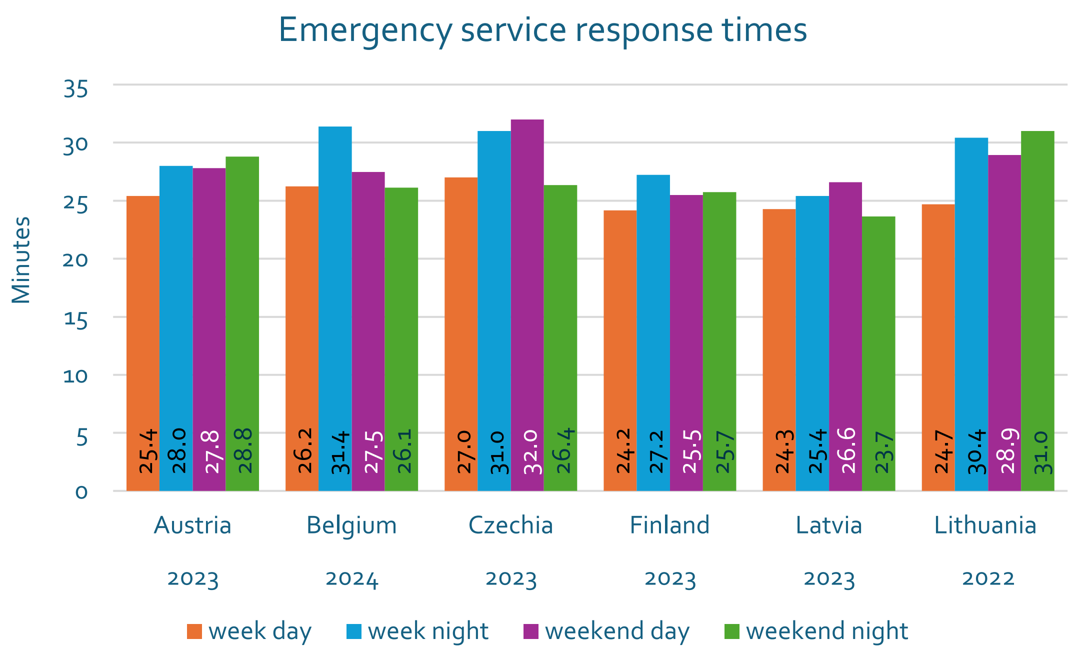


Figure 2.36 Post crash estimates, P95 values of emergency services response times by week period; three road types.

Figure 2.37 compares median values with P95 values for six countries. The results indicate that the median response time - about 11 minutes - is considerably lower than the P95 value, with little variation between countries. If similar patterns hold across the EU countries, this will mean that for about half of injury crashes medical emergency services arrive within 11 minutes.

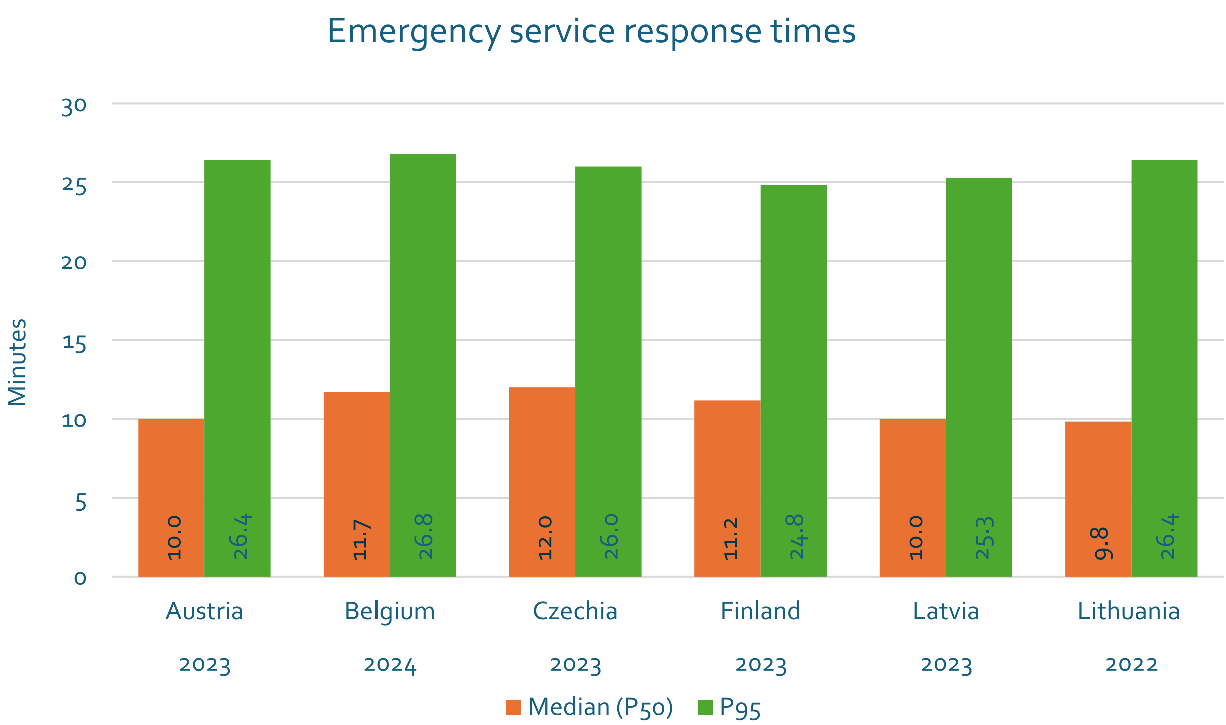


Figure 2.37 Post crash estimates, , median (P50) and P95 values of emergency services response times.

The results also demonstrate the potential of eCall, although the technology is still rarely used, accounting for only 3.3% of emergency calls in Finland in 2023. Early results concerning the use of E-call in Finland show that the indicator value is several minutes shorter for eCall-reported crashes than for other crashes, especially on high-speed roads (see Figure 2.38). However, the results cannot be generalized to other countries, and even to all regions within Finland.

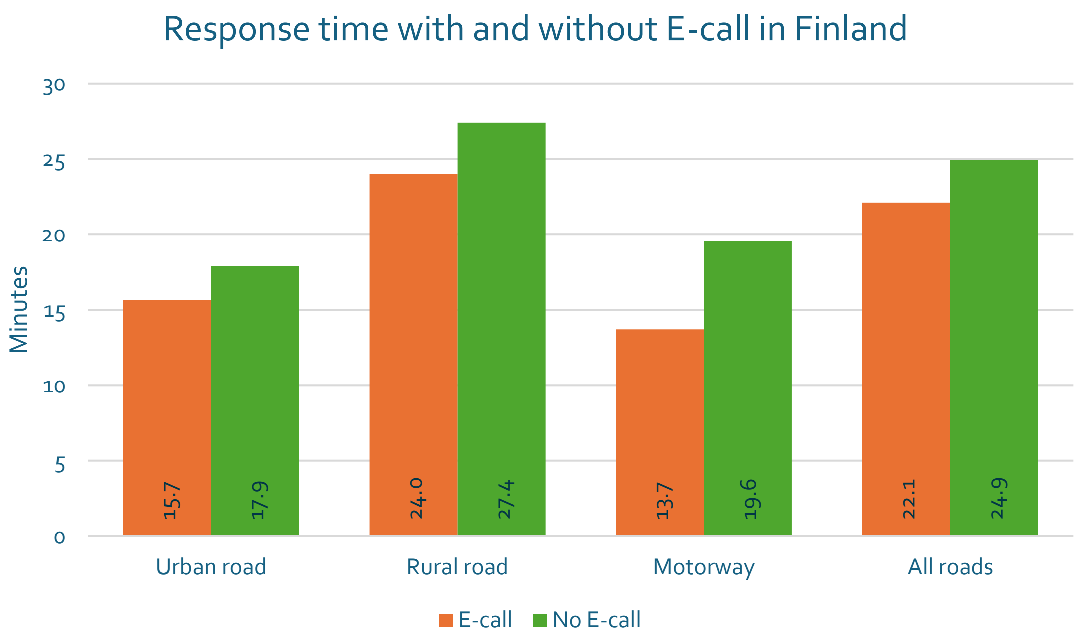


Figure 2.38 Post crash estimates, P95 values of emergency services response times.

Expressing response times as percentages provides an alternative way of presenting the results, which may be easier to communicate and interpret. Figure 2.39 illustrates the data from Latvia for 2022 and 2023 in this format. The results show a clear difference between urban and rural roads: in urban settings, medical emergency services reach the crash scene within 10 minutes in about two-thirds of cases, whereas on rural roads this occurs in only one out of six cases.

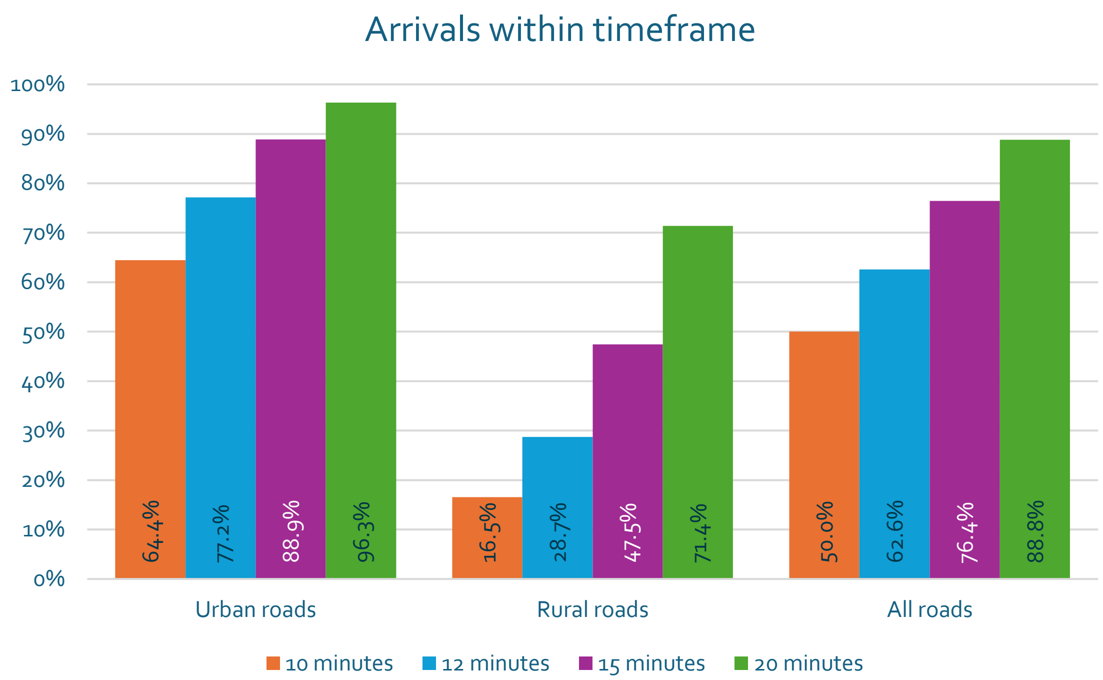
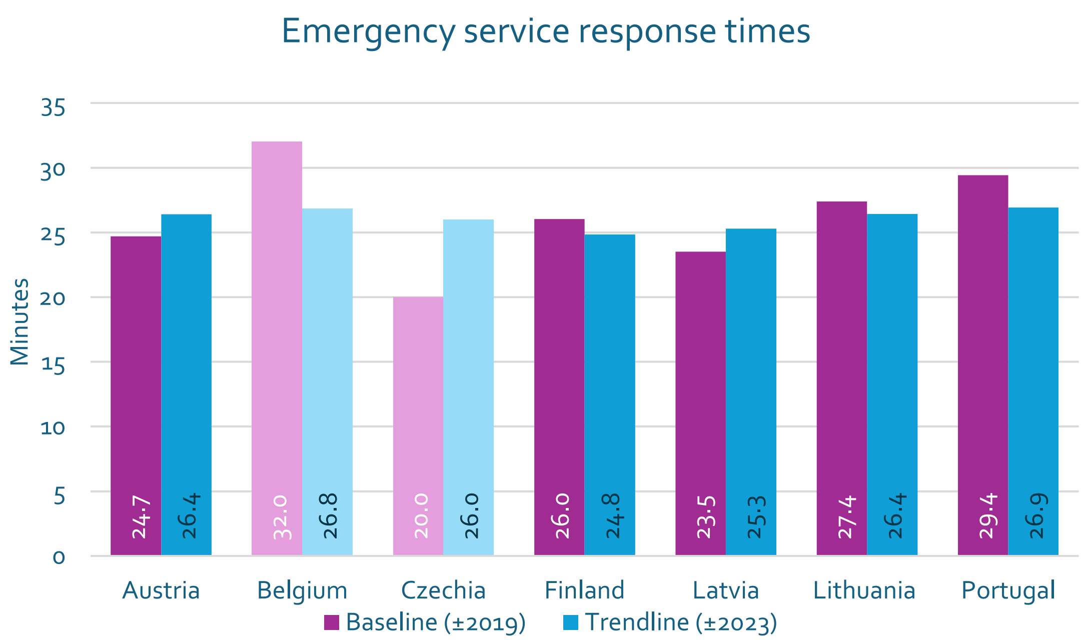


Figure 2.39 Post crash estimates, , P95 values of emergency services response times.

2.3.7.3. Comparison with Baseline results

Compared to Baseline, some generally small differences were found. Four countries showed some improvement, while three countries exhibited a deterioration, see Figure 2.40.



Light coloured: Belgium: methodology has changed *Czechia: only one region.

Figure 2.40 Post crash estimates, , P95 values of emergency services response times, Baseline versus Trendline.

2.3.7.4. Conclusions and recommendations

The results of the KPI Post-crash care show that emergency services in 7 countries reach crash victims within 26 minutes in 95% of cases. Median response times (P50) are around 11 minutes, suggesting quick response time in about half of the cases. Early findings from Finland suggest that eCall is associated with slightly shorter response times, although evidence from more countries is needed to confirm this and also identify possible co-founding factors. It is recommended that future KPI reporting include the median value and present results as proportions of response times (e.g. within 10, 12, 15, or 20 minutes).

2.3.8. Infrastructure

For the Infrastructure KPI Trendline supported only the methodological development, in particular a methodology that would align with the new EGRIS method of road safety assessment. This new methodology in documented in Dragomanovits & Van den Berghe (2023). There was no funding available for data collection and analysis. Nevertheless, three countries used their own resources to collect and analyse the data (Sweden, Lithuania and Luxembourg). The data provided are, however, difficult to compare with each other and with results from Baseline (where 5 countries participated) because of differences in road classifications and methodologies used. For these reasons no KPI infrastructure values are included in this report.

3. Experimental and complementary indicators and methodologies

3.1. Towards the new experimental KPIs and methodologies

3.1.1. Identification and selection of the new KPIs and methodologies

One of the components of the Trendline project was to extend the scope of KPIs by developing new experimental indicators in areas not yet systematically covered. The selection of the new and experimental KPIs in Trendline followed a structured process (see Figure 3.1).

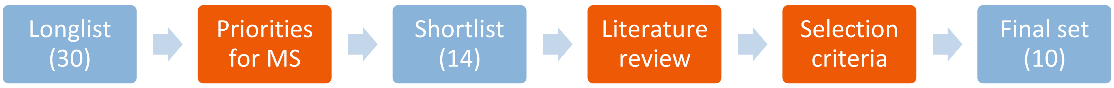


Figure 3.1 Process for the selection of the new indicators.

During the preparation of the Trendline proposal, all consortium members had the opportunity to comment on a longlist of complementary and experimental indicators proposed by the coordinator. They were asked to identify up to 3 indicators they thought would be useful for the road safety policy in their country. In this way, it was possible to gauge the national policy relevance of the new indicators. The policy relevance of certain indicators for the European level was also checked. This preparatory process led to a shortlist of 14 (groups of) potential indicators (each of these had been proposed by at least 3 Member States).

During the early stages of Trendline, these potential indicators were further scrutinized; for each of them a literature review was undertaken analysing topics such as possible scope, relevance, current good practice and likely feasibility of methodologies. Following the literature review, five selection criteria were applied to reduce the shortlist further: (1) link with road safety performance; (2) policy relevance; (3) comparability of values; (4) reliability of the method; and (5) operational feasibility. Further specifications of these criteria are given in Table 14.

The list of the ten experimental indicators finally retained is shown in Table 151715 (some of these names have been changed somewhat in the course of the project). For each indicator, a KPI Expert Group (KEG) was formed, bringing together specialists from different Member States to draft methodological guidelines, oversee pilot studies, and review results.

Table 14. Criteria used for the selection of the experimental KPIs and methodologies

Criteria	Specifications
Link with road safety performance	Strong causal effects or association with crash risk Or: strong link to mitigating effects of crashes
Policy relevance	Scale / size of the crash/injury risks Integrable in national / regional / local policies Important in European policies Existence of measures that can influence the KPI and reduce road crash risks Scope for specifying medium- and long-term target values Utility in measuring the effectiveness of measures and interventions Significance is easy to understand
Comparability of values	Trends can be interpreted unambiguously Comparisons across countries are meaningful Comparisons within countries are meaningful Absence or limited impact of confounding factors
Reliability of the method	Potential or existence of an evidence-based methodology Possibility to have representative samples or full population Accuracy of measurements Sensitivity of KPI values Reproducibility of the measurements / method Quality assurance possible
Operational feasibility	Availability of tools / equipment / infrastructure for the method Easy access to required data Cooperation of data owners No legal obstacles Limited or acceptable cost Tests possible in 2024 at the latest

Table 1517. Names of the new experimental indicators in Trendline

- Driving under the influence of drugs
- 30km/h on urban roads
- Compliance with traffic rules on signalized pedestrian crossings and intersections
- Compliance with traffic rules on unsignalized pedestrian crossings and intersections
- Helmet wearing by PMD (Personal Mobility Device) riders
- Self-report behaviour
- Attitudes
- Light use by cyclists in the dark
- Enforcement of traffic regulations
- Alternative speeding KPIs

This chapter focuses on the methodological obstacles encountered in developing these KPIs at an international level and the solutions adopted. Attention is also given to the cross-cutting dilemmas that emerged across multiple indicators. More details can be found in the Methodological Reports developed by the KEGs as well as some extra reports developed by some of the KEGs and that are published on the Trendline website.

3.1.2. Development process

As shown in Figure 3.2, the methodological development cycle in Trendline for new indicators followed an iterative structure, beginning with discussions within the KEG, moving through pilot testing and KEG revisions, and culminating in final methodological guidelines that have been submitted to EU Member States for final feedback before they were published on the Trendline website. This iterative process allowed both scientific robustness and practical feasibility to be tested.

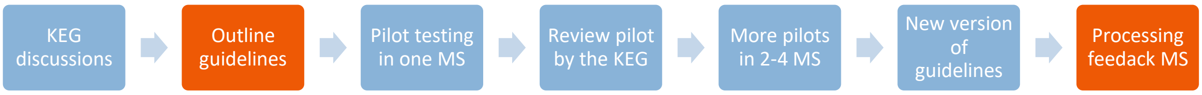


Figure 3.2 Typical process for the development of the methodological guidelines for the new indicators.

A central challenge across all KPIs was ensuring similarity of procedures and comparability of KPI values between countries with different legal frameworks, central databases, enforcement traditions, and cultural attitudes towards road safety. For example, while random roadside saliva testing is permissible in some Member States, it is prohibited in others, which necessitates alternative approaches. The accuracy of public databases with data on speed limits in cities varies widely. Similarly, there is no common typology of street crossings across Member States.

Another recurring theme was the balance between simple indicators that are easy to collect and understand, and can easily be compared across countries, versus more complex indicators that provide a richer picture but are less feasible to implement and are more difficult to compare internationally. The KPI on 30 km/h speed limits illustrates this: while the basic definition (share of road length with a 30 km/h limit) is simple, it does not account for traffic volume or design features, which more advanced but complex definitions attempt to capture (Weijermars et al., 2025). Moreover, an alternative definition can be used – share of cities with generalised 30 km/h speed limits – which is easier to calculate than the basic definition, but is less accurate.

3.2. Driving under the influence of drugs

3.2.1. Context and rationale

The dangers of driving under the influence of psychoactive substances are widely recognised. Alcohol has long been identified as one of the leading risk factors in road traffic crashes, and systematic enforcement and monitoring have led to measurable progress across Europe. Yet over the past two decades, the emerging challenge of drug-impaired driving has become increasingly visible. The expansion of recreational drug use, the diversification of substances available, and the spread of prescription medications with sedating or impairing effects all contribute to a growing share of crashes where drivers test positive for drugs.

Driver impairment due to driving under the influence of drugs remains a major contributor to road crashes worldwide (Brubacher et al., 2018; European Commission, 2023; World Health Organization, 2016). A meta-analysis by Elvik (2013) showed that drivers under the influence of cannabis, amphetamines, cocaine, or opioids face elevated crash risks, with odds ratios ranging from 1.5 to more than 20 depending on the substance. European research confirms that poly-drug use — often combining alcohol with cannabis or stimulants — is particularly dangerous. The European Monitoring

Centre for Drugs and Drug Addiction highlights that drug-driving prevalence in roadside surveys across Europe varies between two and ten per cent of drivers, depending on the country and methodology (EMCDDA, 2022).

While driving under the influence of alcohol has been extensively studied and continues to be prevalent (Walsh et al., 2010), much less is known about the proportion of European drivers under the influence of drugs. Some studies have reported that drug prevalence in traffic may have overtaken alcohol prevalence, revealing a varied and complex pattern of diverse and changing drug use among (injured) drivers, with some drug prevalence increasing and some decreasing (Alcañiz, Guillen, & Santolino, 2018, 2021; Daré et al., 2021; García-Mingo, Martín-Fernández, Gutiérrez-Abejón, & Álvarez, 2023). However, the large European DRUID study (2007-2009) has not been replicated, leaving recent trends unexplored. Given the evidence that drugs pose significant risks in traffic and the indications of rising drug-impaired driving, it is essential to periodically monitor the KPI driving under the influence of drugs to ensure effective road safety policies (Berghe et al., 2023).

From a policy perspective, addressing drug driving is complex. Unlike alcohol, where measurement and enforcement tools are standardised and broadly accepted, drug testing requires more sophisticated equipment and legal frameworks. The diversity of substances and the absence of throughout Europe agreed thresholds complicate enforcement. Public awareness is also lower: many drivers underestimate the impairment effects of cannabis or prescription drugs compared with alcohol.

Recognising this gap, the EU Road Safety Policy Framework 2021–2030 places emphasis on drug driving as a key challenge. While alcohol KPIs exist within the Baseline project, there was no harmonised measure for drug-driving enforcement or prevalence. The Trendline consortium therefore developed a methodology for an experimental KPI on Driving under the Influence of Drugs (DUI Drugs). Its objective was to create a feasible, replicable method for measuring drug-driving prevalence across Member States, drawing on roadside screening and survey methods.

This KPI complements the indicator on driving under the influence of alcohol, providing a fuller picture of impaired driving. It also reflects the Safe System principle that no road user should be seriously injured or killed due to predictable and preventable behaviours. Monitoring drug driving enables policymakers to track trends, evaluate the impact of enforcement campaigns, and design integrated deterrence strategies.

3.2.2. Definition and scope

The KPI on DUI Drugs is defined as the **Percentage of drivers not driving under the influence of drugs**.

More specifically, the scope covers:

- ***Substances included***. The KPI covers drugs (e.g., cannabis, cocaine, amphetamines, opioids) excluding medicines where testing is feasible. Prescribed medical drugs are not considered. Alcohol is excluded as it is measured separately.
- ***Testing method***. Screening should be based on oral fluid (saliva) tests, which are less invasive and more practical than blood tests for roadside application. Positive screenings may be confirmed by laboratory analysis where legally required.

- ***Population of interest***. The KPI applies to all motor vehicle drivers on public roads. Professional drivers, passenger car drivers, and motorcyclists are all in scope, though disaggregation is encouraged where sample sizes allow.
- ***Measurement setting***: When legally allowed in a country, the preferred method is random roadside checks conducted by police, without targeting based on suspicion, which provides the most representative data.
- ***Unit of measurement***: The KPI is expressed as the percentage of drivers tested who test negative for drugs – meaning zero % or below an agreed threshold. Subcategories may distinguish between single-substance and poly-drug use.

The KPI thus aligns with established international monitoring approaches, while being adapted to the practical realities of EU Member States.

The main decision concerned whether the KPI should be limited to illicit drugs or also include prescription drugs. As the legislation differs accordingly, problems with for example cannabis can rise as this drug can also be used for medical reasons; the choice between illicit and prescription drugs also has consequences on the method used to screen for drug use. For the regular KPIs in Baseline (and Trendline), it has been chosen to define the KPI referring to illegal behaviour. Doing so for the KPI drugs would mean that blood tests (or advanced saliva tests) are needed to determine whether drug use has exceeded the threshold for illegal use. Doing so will require a lot of police effort which might be impossible in some countries. Additionally, the inclusion of prescription drugs presents other challenges. Prescription medication cannot be detected using oral fluid tests and requires lab analysis, but lab capacity might be limited in certain countries. Oral fluid tests are easy to administer and they provide results within a couple of minutes, making them more practical for data collection compared to blood sample testing. However, interpreting the results of oral fluid tests can sometimes be ambiguous. Given these advantages, the expert group agreed to use oral fluid tests to measure the KPI. Preferably, the same oral fluid test is used in all countries, but this is probably not feasible as the police decide on their own testing devices.

3.2.3. Pilot testing and results

In the Netherlands pilot, the police faced challenges in carrying out random roadside saliva testing. Over a period of approximately three weeks, only 16 were conducted. Three drivers were caught driving under the influence (one for amphetamines/methamphetamine, one for cannabis and one for cannabis and amphetamine/methamphetamine). Several factors contribute to the low number of tests. First, police capacity was limited, and suitable locations for roadside testing were scarce. Additionally, patrolling police officers in the Netherlands are not dedicated solely to road safety. They also have to respond to other calls and emergencies, which makes it difficult to find the time and resources for random roadside testing. Also, Dutch legal requirements add additional complications. After a positive random saliva tests, a blood sample is required for confirmation. This requires transporting the driver to a medical facility and waiting for a medical professional to extract the blood. This can take up to two hours, requiring significant time investment from the police officers. Police emphasized that such delays are problematic, as they leave colleagues without sufficient backup.

The pilot study in Czech Republic aimed to test the feasibility of field drugs testing by researchers (without the police), and explored respondents' attitudes toward testing and evaluate self-report questions. Conducted through face-to-face interviews with 20 drivers at a gas station, the study revealed low willingness to participate. Only 11 drivers answered the questions, 7 agreed to perform an alcohol breath test and only 3 agreed to perform an oral fluid test. The findings from Czech Republic suggested a strong bias of non-response from individuals who might have consumed alcohol or drugs. Participants also expressed concerns about anonymity especially when the police were involved (which was not the case in this pilot). Drivers were also reluctant to provide bodily fluids, which is recognized as a broader issue in the Czech Republic.

The Portuguese pilot test also looked into the feasibility of conducting saliva drug tests and self-report surveys on car drivers without police involvement using researchers. 109 drivers were tested at gas stations using saliva tests. The results showed that 5.6% tested positive for cannabis, 0.9% for cocaine and 4.6% reported having driven under the influence of drugs in the past 30 days. Also, 11% admitted driving after taking medication that potentially could have influenced their driving abilities (mainly antihistamines). The pilot showed that non-police roadside saliva testing by researchers is feasible and well accepted in Portugal. However, the results might be an underestimation due to the voluntary participation.

The pilots confirmed that the methodology for the drugs KPI is, in principle, implementable in diverse Member States, but it will be challenging to do so at full scale. They also illustrated variation in prevalence, though methodological differences caution against over-interpretation. Importantly, the pilots revealed that poly-drug use was present in a significant minority of positive tests, underscoring the need to monitor not only single-substance use but also combinations.

3.2.4. Methodology[2]

The preferred methodology for the DUI Drugs KPI builds on lessons from roadside alcohol testing but adapts them to the complexities of drug detection.

Sampling strategy

Random roadside surveys are the gold standard. Police officers set up checkpoints and stop vehicles systematically (e.g., every third vehicle) to avoid bias. Time and location sampling is designed to cover different road types (urban, rural, motorways), days of the week, and time periods (daytime, evening, night). This ensures representativeness across the driving population.

Data collection

Drivers are asked to provide an oral fluid sample, which is analysed using portable screening devices capable of detecting multiple substances. Tests are conducted anonymously for research purposes, with results aggregated for KPI reporting. In enforcement contexts, positive results may lead to further action, but for KPI purposes only the aggregated prevalence matters.

Validation and confirmation

Because roadside screening devices may yield false positives, Trendline recommends confirmation of a subsample through laboratory analysis. This increases validity and provides confidence in prevalence estimates.

Metadata

Data collected during each observation should include:

- Location, date, time.
- Driver demographics (age, gender).

[2] Detailed information about the methodology can be found in van der Kint et al. (2025)

- Road type.
- Substances tested and device used.
- Legal thresholds in force.

It is recognised, however, that achieving this gold standard of random roadside saliva testing will be difficult to attain for most countries. In many EU states, police are not able to randomly test drivers for drugs. Even in countries where it is allowed, practical, strategic and resource limitations make random saliva testing costly resulting in hesitance (or unwillingness) to perform them.

As an alternative, researcher-led random roadside testing has been piloted as a more feasible option. The Portuguese pilot showed encouraging results, while the Czech pilot was less promising. However, both highlight the need for larger-scale trials in different countries, recognizing differences between country populations on their reactions towards methods like this. This approach currently appears more practical and realistic than police-led random testing.

For countries unable to conduct roadside testing, self-reported methods such as ESRA offer a viable alternative (like it is for the KPI on alcohol), although its current limitations such as the lack of detailed questions on drug-impaired driving should be addressed in the future.

For the future collection of this KPI it is highly recommended to remain ambitious, and actively measure behaviour in real traffic through saliva testing, whether police- or researcher-led. Additionally, it is recommended that measurement for Alcohol and Drugs should be combined, as both are very similar and highly intertwined.

3.2.5. Challenges and limitations

Implementing the preferred methodology for the DUI of Drugs KPI faces significant obstacles:

- ***Legal frameworks***. Many countries do not authorise random roadside drug testing. When testing is permitted only under suspicion, data are biased and unsuitable for KPI purposes.
- ***Resources required***. Using the preferred method requires substantial human resources as well as significant costs for the testing devices. Drug testing is more expensive and time-consuming than testing for alcohol use, limiting sample sizes.
- ***Device variability***. Screening devices differ in sensitivity and specificity. Without harmonised standards, results are not fully comparable.
- ***Substance coverage***. Not all devices detect the same drugs, and new substances emerge regularly. Some impairing medications are difficult to test at the roadside.
- ***Refusals***: Drivers are more likely to refuse drug tests than alcohol tests, affecting representative-ness with voluntary participation.
- ***Interpretation***: Presence of a substance does not always equate to impairment. Traces may remain after impairment has ceased.

These challenges explain why alternative options such as researcher-led tests and self-reported surveys should also be considered, despite their limitations.

3.2.6. Policy relevance and complementarity

The policy relevance of the DUI Drugs KPI is high. It provides an evidence base for a growing road safety problem, which is often underestimated compared with alcohol. By quantifying prevalence, the KPI supports enforcement planning, awareness campaigns, and evaluation of legislative reforms.

It complements the alcohol KPI, creating a comprehensive view of impaired driving. Together, they capture both the "traditional" impairment factor and the emerging challenge. The KPI also links to self-reported surveys on drug use and driving attitudes, enabling triangulation between observed prevalence and perceived norms.

In the Safe System approach, the KPI strengthens the safe road users pillar. It also has cross-cutting relevance: knowledge of drug-driving prevalence informs enforcement policy (safe speeds), infrastructure design (safe roads), and vehicle safety technologies (e.g., driver monitoring).

3.2.7. Conclusions and recommendations

The Trendline pilots have demonstrated that a harmonised KPI on Driving under the Influence of Drugs is feasible and valuable, though significant challenges remain. Oral fluid testing provides a practical method, but harmonisation of devices, substances tested, and legal frameworks is essential.

Recommendations include:

- Adopt a common definition of DUI Drugs KPI based on roadside saliva testing.
- Standardise device requirements to ensure minimum sensitivity and comparability.
- Encourage legislative reform to permit random roadside drug testing where not yet authorised.
- Integrate drug testing with alcohol testing to present a unified picture of impaired driving.
- Report poly-drug use separately, given its heightened risk.

Ultimately, while drug-driving prevalence may appear lower than alcohol, its risk profile is high. The KPI provides the first step toward systematic, evidence-based monitoring across Europe.

3.3. 30 km/h on urban roads

3.3.1. Context and Rationale

Speed is known to influence crash risk and crash severity (e.g., SWOV, 2021; OECD/ITF, 2018) and safe speed is one of the pillars of the Safe System approach (e.g., OECD/ITF, 2016). Research dating back to Nilsson's "power model" (2004) shows that even small reductions in mean speed translate into disproportionately large reductions in fatal and serious injuries. When motor vehicles interact with pedestrians or cyclists, the stakes are even higher. The human body can only tolerate limited kinetic energy transfer, and survival probabilities fall steeply as impact speeds exceed 30 km/h (Rosen & Sander, 2009). Where conflicts between motorised traffic and vulnerable road users (i.e., pedestrians and cyclists) are possible, a speed of 30km/h or less is considered safe (e.g. Tingvall & Haworth, 1999; European Commission, 2021).

For this reason, global and European policy frameworks increasingly promote 30 km/h as the default maximum speed in urban areas where vulnerable road users and vehicles mix. The Stockholm Declaration (2020), endorsed at the Third Global Ministerial Conference on Road Safety, explicitly called for a 30 km/h default. This was subsequently adopted in UN resolutions and embedded in EU policy discourse. The European Parliament (2021) recommended 30 km/h in all residential and high-pedestrian areas, while numerous European cities, including Graz, Brussels, Paris, Oslo, and Bologna, have implemented citywide 30 km/h zones (Yannis & Michelaraki, 2024).

Despite this momentum, systematic monitoring of the extent to which 30 km/h has been adopted is lacking. Compliance-focused KPIs, such as the Baseline speeding indicator, measure driver behaviour relative to posted limits, but they do not tell us how much of the urban road network is actually subject to safe limits in the first place. The Trendline consortium therefore developed the KPI 30 km/h on urban roads as an experimental measure. It sought to quantify the proportion of urban road length where 30 km/h or lower is legally in force.

This KPI complements behavioural measures by assessing infrastructure and policy provision. It is an addition to the KPIs developed in Baseline as it deals with the safety level of urban infrastructure which is not yet covered by other KPIs. Tracking this KPI supports benchmarking between countries and provides incentives for governments to adopt safer speed limits.

3.3.2. Definition and scope

The basic definition of the 30 km/h KPI is defined as

(1) ***"Share of 30km/h road length of the total length of urban roads. "***

The basic idea behind this KPI is that speeds should be low when conflicts can occur between pedestrians/cyclists and motorized vehicles. The basic definition provides a good first indication of the share of urban roads with a safe speed. However, there are three issues that are not (yet) covered by this KPI. First, in case conflicts between motorized traffic and cyclists/pedestrians cannot occur, higher speeds are considered to be safe as well. This aspect is covered by the additional definitions that are proposed (see below). Second, not the speed limit, but the actual driving speed is relevant for the probability and severity of a crash. Therefore, ideally, next to the speed limit, also the actual driving speeds should be considered. In this respect, the guidelines for the KPI Speed (Laiou e.al, 2023) are relevant. Third, the basic KPI uses road length as exposure measure, whereas the exposure to road unsafety actually depends on the amount of traffic on the roads. Two potential additional definitions concerning exposer are proposed (see Section 1.4).

Several potential additional definitions are proposed in the methodological guidelines for this KPI. First of all, two potential additional KPIs related to the concept of safe speeds for vulnerable road users are proposed. These are:

(2) "Share of 30km/h road length of the total length of urban roads with mixed traffic."

(3) "Share of urban roads with a safe speed limit for cyclists and pedestrians."

Roads with mixed traffic are roads on which pedestrians and/or cyclists are allowed and are not physically separated from motorized traffic and/or are expected to cross at road sections. Roads with a safe speed limit for cyclists and pedestrians are roads that (a) have a speed limit of 30km/h or lower, (b) at which pedestrians and cyclists are not allowed, and (c) at which pedestrians and cyclists are physically separated from motorized traffic and are not expected to cross at road sections. These additional indicators better reflect whether the speed limit is actually safe for pedestrians and cyclists, but they are more difficult to operationalise and estimate; e.g. what is physical separation and how to estimate whether pedestrians are expected to cross at road sections. Moreover, these indicators only deal with road sections and not with intersections.

Second, two potential additional KPIs are proposed with alternative exposure measures:

(4) Share of 30km/h road lane length of the total lane length of urban roads.

(5) Share of distance travelled on 30km/h roads of the total distance travelled on all urban roads.

These indicators better reflect the actual exposure to road unsafety, but they are more complicated to determine. Another disadvantage is that more exposure on 30km/h roads (or a shift in use from 50km/h to 30km/h roads) results in a better score on the KPI, whereas this is not desirable. Traffic should use the 50km/h roads as much as possible as 30km/h roads are mainly located in residential areas (see for example SWOV, 2023).

In case no national exploitable database exist, the following alternative definition of the KPI can be considered:

(6) Share of towns with a default speed limit of 30km/h on urban roads.

This KPI should be expressed as a percentage. It is recommended to calculate this KPI not only for the country as a whole, but also to make breakdowns by size of the town.

Another alternative definition takes the population of the towns as a weighting factor:

(7) Share of the population in towns with a default speed limit of 30km/h on urban roads.

The approach taken thus balances simplicity (percentage of urban roads with 30 km/h limits) with flexibility (allowing alternative variants where relevant) and feasibility (when no appropriate road databases exist).

3.3.3. Methodology for the standard method[3]

Use of databases

The KPI relies primarily on road network databases, such as:

- Official national databases: some Member States maintain detailed digital road registries, including speed limits.
- Municipal databases: cities often track speed limits in GIS layers for planning.
- Commercial providers: companies like Google, TomTom and HERE maintain datasets with speed attributes for road segments.
- OpenStreetMap: this database is publicly available, crowdsourced, and increasingly accurate, though quality varies by country.

Calculation procedure

The calculation procedure is fairly straightforward for each of the variants proposed: it comes down to identifying the length of the particular road segments (or the traffic on it) with a speed limit of 30 km/h and calculating its share in the total.

Metadata requirements

For comparability, countries should report:

- Definition of "urban area" and/or "urban roads"
- Road categories included
- Data source(s) used.
- Date of dataset.
- Method for calculating length or traffic.
- Clarify which variant of the definitions has been used.

[3] The full methodology is described in Weijermars et al.(2025a).

3.3.4. Pilot testing[4]

The Trendline pilots tested the KPI in several Member States, using different data sources and approaches (see Table 1816).

Table 186. Summary of pilot studies.

Pilot area	Pilot period	Indicators	Databases	Validation of data
Netherlands	Spring 2024	Basic def + safe speeds	National databases + OSM	Comparison Dutch database and OSM
Sweden	Spring/summer 2024	Basic def + safe speeds	National databases	
Finland	Spring/summer 2024	Basic def + safe speeds	National databases + OSM	
Lisbon (2 areas)	Summer 2024	Road lane length + safe speeds	Local databases	Field surveys
Bulgaria: Sofia, Burgas and Silistra	Autumn/winter 2024	Basic definition + safe speeds	TomTom data	

The Netherlands led the initial pilot. Researchers compared official national road databases with OpenStreetMap to assess consistency. They tested not only the share of 30 km/h road length but also a variant including roads where cyclists were allowed and a "safe speed indicator", whereby roads were assessed as safe if they had either 30 km/h limits or infrastructure protecting cyclists and pedestrians. This reflected the Sustainable Safety approach, which stresses that safety can be achieved either through speed management or design. Results showed that both official and OSM data could produce estimates, but discrepancies existed due to coding practices. The exercise confirmed that calculating the KPI was technically feasible, but comparability required standardised definitions of "urban road" and careful handling of shared-space streets.

Sweden applied the KPI using national road data. Beyond simple 30 km/h limits, researchers also explored the alternative "safe speed" indicator: counting roads as safe if they had either 30 km/h limits or infrastructure protecting cyclists and pedestrians. This reflected Sweden's Vision Zero policy, which stresses that safety can be achieved either through speed management or design. Results highlighted differences between cities. The "safe speed" variant was more generous but raised questions about comparability across countries.

Finland combined national databases with OpenStreetMap. Since the national database lacks a variable that indicates roads that have a physically separated pedestrian and cyclist path running alongside them, Finland (like the Netherlands), developed a way to detect streets with street-adjacent VRU paths. This variable is also not present in OpenStreetMap OSM was used as a supplement since it contained a more detailed coverage of physically separated VRU paths.

[4] More details on the activities carried out in, and the results of the pilots, can be found in Weijermans et al. (2025b).

Portugal tested the KPI in Lisbon, where city-level GIS data were available. Researchers also conducted field surveys to validate and update missing entries. An innovative aspect was testing a lane-based definition: since speed limits can differ by lane (e.g., bus lanes), they calculated both road length and lane length shares.

Bulgaria piloted the KPI using commercial TomTom data. While national coverage was not available, purchasing data for three cities allowed calculation of the share of 30 km/h road length in 3 cities of different size: Sofia, Burgas and Silistra. Researchers also tested a "safe speed" definition. Results varied by city. The exercise demonstrated feasibility even in countries without comprehensive official databases, though costs and licensing posed challenges.

The results of the pilots show that share of 30km/h roads differs between the pilot countries (Figure 3.3). As the available data and specific criteria that were used to select urban roads and 30km/h roads differ between countries, the results are not fully comparable between the countries and small differences might be due to differences in selections. However, the differences in share of 30km/h roads are quite obvious between the countries. In the Netherlands, the share of 30km/h roads is highest (73%), whereas the city of Silistra shows the lowest share of 30km/h roads (0,2%). With regard to Sweden, it should be noted that many urban roads have a speed limit of 40km/h. The reason for this is that 40km/h is recommended as a new default speed limit in urban areas. In areas with frequent mixing of vulnerable road users and motor traffic, such as residential areas, school zones, and city centres, a **30 km/h** limit is advised.

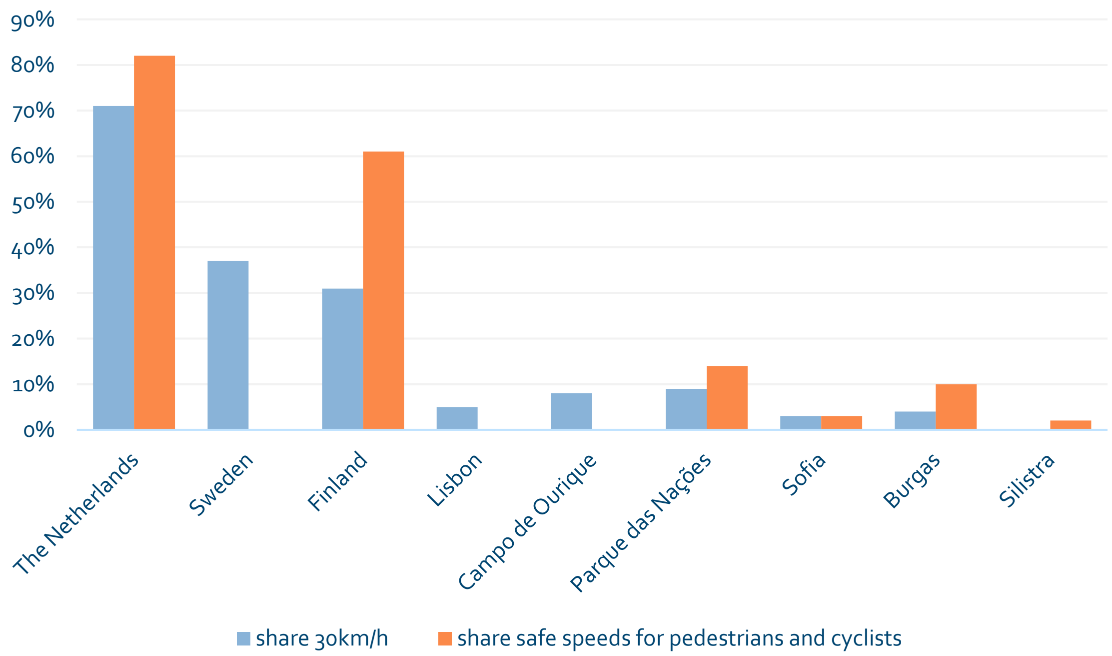


Figure 3.3 Pilot results: shares of 30km/h roads (%) and shares of roads with a safe speed limit for pedestrians and cyclists (%),

From the pilots, a number of lessons can be learned regarding the estimation of this KPI:

- Urban roads and 30km/h roads can be selected in different ways. The local context and database characteristics affect the estimation of KPI and choices that need to be made. In Lisbon for example, speed limit can vary between lanes. Identification of urban roads, differ between countries. Using municipal border data in OSM did not work for the Netherlands but might work for other countries.

- In some countries, it might be possible to select urban roads and 30km/h roads in multiple ways and with multiple databases. In the Dutch pilot, road length appeared to differ between databases. Moreover, the share of 30km/h roads varied slightly depending on choices regarding selection criteria.
- In Lisbon, field studies were carried out to complete and update the speed limit data in the database. From the field study in the pilot parishes, it was concluded that the quality of the data differed between areas and was outdated for one of the areas.
- The Bulgarian pilot showed that it is possible to purchase commercial data for obtaining the share of 30km/h roads. As it concerns quite extensive GIS-data, it was decided to work with a contractor that is familiar with the data.
- The Swedish, Finnish and Dutch pilot show that the share of 30km/h roads differ considerably between cities/municipalities.
- It is important to check the quality of the data in the available databases. Speed limit information could be missing, could be set default to the standard speed limit or could be outdated.
- It turned out to be quite complicated to estimate the 'safe speed' KPI. Especially the exact operationalization of 'separation of cyclists and pedestrians' needs further attention.
- In the Netherlands, both variations of the 'safe speed KPI' were determined and they resulted in comparable shares of roads with a safe speed limit.
- Verifying data quality is a difficult task which is time consuming and requires sufficient human resources. A more automated and smart method of collecting data could be considered, for example through various GIS applications.

3.3.5. Challenges and limitations

The pilots revealed several challenges:

- ***Data availability***. Not all countries maintain comprehensive speed limit databases. Reliance on OSM or commercial providers is sometimes necessary.
- ***Definitions and selection of urban areas and urban roads***: Boundaries vary — some based on legal signs, others on population density. Moreover, urban areas and urban roads can be selected in several ways, based on different variables and criteria. This affects comparability.
- ***Unit of measurement.*** There are different options, such as road length, lane length, traffic volume. For comparability of values, harmonisation is essential.
- ***Data quality***. OSM quality is uneven; official databases may lag behind reality.

Despite these issues, all pilots demonstrated feasibility. The KPI can be calculated with available data, though interpretation requires transparency.

3.3.6. Policy relevance and complementarity

The 30 km/h KPI is highly policy-relevant for several reasons:

- Alignment with Safe System: it directly measures whether road environments support survivable crash forces.
- Actionable: authorities can improve KPI scores by extending 30 km/h zones or redesigning streets.
- Benchmarking: the KPI enables comparison across cities and countries, creating peer pressure for safer limits.
- Complementarity: it adds context to the core speeding KPI. Compliance data show whether drivers respect limits; the 30 km/h KPI shows whether limits themselves are safe.

- Sustainability: the KPI ties into broader agendas (SDGs, SUMPs, climate). Promoting cycling and walking requires safe speeds.

3.3.7. Conclusions and recommendations

The KPI 'share 30km/h' is a valuable addition to the KPIs that were developed in BASELINE as it enables policy makers to monitor and improve the safety of their road infrastructure in built-up areas. The addition of this KPI to the standard set of KPIs could be a motivation for road authorities to increase data availability and data quality. The KPI "30 km/h" operationalises the Safe System vision of survivable streets. By measuring the extent of 30 km/h adoption, it makes visible the policy choices that protect vulnerable road users and create conditions for sustainable urban mobility.

The Trendline pilots confirm that the 30 km/h Urban Roads KPI is both feasible and meaningful. It fills a critical gap by measuring infrastructure readiness for safe speeds, complementing behavioural indicators.

It is recommended to start with the basic indicator ***Share of 30km/h road length of the total length of urban roads*** as it provides a good first indication of the share of urban roads with a safe speed for pedestrians and cyclists and is not too complicated to determine. In addition to this indicator, countries can also estimate the share of urban roads with a safe speed limit for pedestrians and cyclists, which better reflects the actual safety level of urban roads but is more complicated to estimate. Another important note is that the safety level depends on the actual driven speeds rather than the speed limit. So, ideally, in addition also the safe speed KPI should be applied to 30km/h roads. In case data is only available for a number of cities, it is recommended to determine this KPI for the cities for which data is available. We recommend to not base a nationwide KPI value on a (limited) sample of cities.

Finally, for this KPI, the target value should not be set to 100%. To prevent rat running through residential areas it is important to have main arterials with a speed limit of 50km/h or 70km/h (that are designed in such a way that 50km/h or 70km/h is the safe speed). Experience from the Netherlands (Dijkstra & Van Petegem, 2019), suggests a target value around 85% could be used as a first indication in the Netherlands; however, this target may be too high or too low in countries and regions with different road network infrastructure and/or traffic composition. It is recommended to do more research into the optimal target value.

3.4. Compliance with traffic regulations at signalised and unsignalized crossings and intersections

3.4.1. Context and rationale

Intersections are among the most complex and hazardous elements of the road network. They bring together flows of motor vehicles, pedestrians, and cyclists, requiring users to make rapid judgements, negotiate priority, and comply with signals or rules. Within the Safe System framework, intersections represent "conflict points" where trajectories converge. For vulnerable road users, particularly pedestrians, these points can be especially critical. In the European Union, pedestrians still represent around 20 per cent of fatalities, and a disproportionate share of these occur at or near crossings (ETSC, 2024).

Compliance with traffic rules is frequently associated with enhanced traffic safety (Evans, 2004). Therefore, it makes sense to use compliance in the sense of an 'intermediary objective' (Laurent et al., 2021) or a KPI. In fact, the European Transport Safety Council recommended using the KPI 'Failure to stop or give way at junctions or pedestrian crossings' already in its seminal SPI report more than 20 years ago (ETSC, 2001).

Two behavioural dimensions are critical in this context: driver compliance with red traffic signals at signalised crossings and driver compliance with pedestrian priority rules at unsignalised crossings. Both are codified in traffic law but differ in how the rules are signalled and enforced. At signalised crossings, the expectation is simple: when the light is red, vehicles must stop, regardless of whether pedestrians are present. At unsignalised crossings, the rule is more conditional: drivers must yield to pedestrians who are crossing or about to cross at designated zebra crossings.

The safety rationale is clear. Red-light running dramatically increases crash risk, especially for pedestrians who have entered the crossing lawfully. Studies show that drivers disobeying red lights are involved in a substantial share of severe intersection crashes (Retting et al., 1999). Similarly, failure to yield at unsignalised crossings places pedestrians in direct conflict with moving vehicles. Rosenbloom et al. (2004) and other international studies have shown that yielding rates vary widely but that low compliance directly correlates with higher pedestrian injury rates. Actually, the road safety relevance of the obtained KPIs was illustrated during the project by testing a statistical relationship between safety (rate of specific casualties to total casualties) and the pilot measurements for the KPIs. For illustration, the difference in KPI of pedestrian red light violations between Czechia and Portugal is reflected by a difference in safety: the lower compliance, the higher casualty rate (and vice versa). Of course, more larger scale analyses will be needed in the future to confirm the causal relationship.

The European Commission's Road Safety Policy Framework 2021–2030 emphasises the protection of vulnerable road users and the role of safe intersections in achieving Vision Zero. Monitoring compliance at intersections and road segments is therefore not only a behavioural measure but a proxy for the quality of interaction between road users. It reflects respect for rules, effectiveness of enforcement, and cultural attitudes toward pedestrian priority.

Against this background, the Trendline consortium selected two complementary experimental KPIs: Compliance at signalised intersections and crossings (red-light running) and Compliance at unsignalised intersections and crossings (pedestrian yielding). Each addresses a different aspect of intersection safety but together they provide a comprehensive picture of how well the system protects pedestrians in daily traffic.

3.4.2. Definition and scope

The KPI on **signalised crossings** looks at both motor vehicles and pedestrians. The most general KPI definition is the share of compliant road users, which can be further detailed based on various characteristics. The KEG group focused on (a) pedestrian compliance with traffic light priority and (b) driver compliance with traffic light priority, both independently of crossing location on an intersection or a road segment. The main focus is on urban roads, considering different speed limits and different traffic volumes, on "simplified" locations.

The KPIs are defined as the proportion of the specific road users that comply with traffic lights at pedestrian crossings, measured by the percentage that stop when the light is red. A violation occurs when a road user enters the crossing after the signal has turned red. Some protocols include "late entries" during the change from amber to red, though Trendline recommended harmonising definitions to count only clear red-light violations for comparability.

The KPI on **unsignalised crossings** covers two aspects. The first is **pedestrian-vehicle interactions**, defined as the share of pedestrian-vehicle interactions complying with priority rules on pedestrian crossings. The second applies to **driver compliance**: the share of drivers complying with priority rules at intersections. Since priority rules on pedestrian crossings may be different across countries, the definitions are open for adaptation to the national conditions.

Both KPIs share common scope considerations. Observations should include a representative mix of urban road types (arterial streets, collector roads, residential areas) and should be conducted during daylight hours to minimise measurement error. Night-time behaviour may differ but introduces additional confounding factors, such as reduced visibility, that complicate interpretation. The KPIs apply to all motor vehicles, including cars, vans, trucks, and buses. Motorcycles are included where feasible, though their lower numbers often limit statistical reliability.

Pedestrians themselves are not the unit of analysis, but their presence is critical for the unsignalised KPI. Observations are only valid when a pedestrian is waiting to cross or has begun to cross, as only then can driver compliance be assessed. For signalised crossings, observations can be made regardless of pedestrian presence, since red-light rules apply universally.

The KPIs are therefore conceptually simple but operationally nuanced. They measure visible, enforceable behaviours that are widely recognised as key to pedestrian safety, while also capturing dimensions of traffic culture and respect for rules.

3.4.3. Methodology[5]

Both KPIs rely on direct observation at selected sites. Observers are stationed where they can clearly see approaching vehicles, traffic signals or zebra markings, and pedestrian presence. Observations are recorded manually or with video for later coding. Like for other KPIs, data protection requirements must be taken into account; these may vary between countries.

For signalised crossings, the sample frame consists of intersections with pedestrian traffic lights. Sites should be chosen to represent different traffic volumes, road types, and neighbourhoods. Observers record each vehicle approaching the crossing during a red phase and note whether it stops or violates the signal. Where automated red-light cameras exist, data could in principle be used, but for comparability manual or video observation remains the standard.

Recommended criteria for observation conditions are presented in Table 17.

[5] The full methodologies for both related KPIs can be found in Ambros et al. (2025a; 2025b)

Table 197. Criteria for observation conditions for signalised crossings.

	Recommended	To avoid
General conditions	Free-flow traffic Two-lane and two-way Sufficient signing/marking	Frequent congestions One-way, four lanes, etc. Insufficient signing/marking
Signalized crossings	No pedestrian countdown No push button	Pedestrian countdown Push button
Intersections	3 or 4 legs Protected turn phase	4+ legs or roundabouts Permissive turn phase

For unsignalised crossings, site selection is more complex because the KPI requires pedestrian presence. Observers must be positioned at zebra crossings with sufficient pedestrian flow to generate meaningful samples. Each time a pedestrian approaches, the behaviour of the first approaching vehicle is recorded. Subsequent vehicles may also be recorded, but priority is usually given to the first interaction. Observers note whether the driver yielded as required.

Recommended criteria for observation conditions are presented in Table 18:

Table 208. Criteria for observation conditions for unsignalised crossings.

	Recommended	To avoid
General conditions	Free-flow traffic Two-lane and two-way Sufficient signing/marking	Frequent congestions One-way, four lanes, cycle lanes Insufficient signing/marking
Signalized crossings	No central island or median Sufficient sight conditions	Central island or median Insufficient sight conditions
Intersections	3 or 4 legs	4+ legs or roundabouts

Sampling strategies emphasise variety and balance. Observations should cover weekdays and weekends, peak and off-peak hours. Sites should include both city centres and suburban areas. The Trendline methodological guidelines require that at least 2,000 interactions per KPI (and 1000 per condition) would be desirable to ensure robust estimates. Conditions may be defined, e.g.:

- based on traffic volume (condition 1: busy roads; condition 2: less busy roads)
- based on location (condition 1: intersections; condition 2: segments)
- based on week periods (condition 1: weekdays; condition 2: weekends)
- based on speed limits

Metadata are essential for interpretation. For each observation, the dataset should include: site location, road type, traffic volume, time of day, presence of pedestrians (for unsignalised), crossing length, red/green cycle time, and weather. For signalised crossings, the definition of a red-light violation must be specified: whether "all wheels past the stop line" or "any encroachment" counts, and how amber-light situations are treated.

Video-based methods have advantages for quality assurance. They allow repeated coding, resolution of ambiguous cases, and larger samples. However, they require ethical clearance in some jurisdictions, especially where pedestrians are identifiable. Manual observation remains feasible and cost-effective for smaller studies, provided observers are trained with clear coding protocols.

3.4.4. Pilot testing and results

The Trendline pilots confirmed both the feasibility and the policy relevance of crossing KPIs. They also highlighted significant variation in compliance levels, underscoring the importance of harmonised monitoring.

Signalised crossings

Red-light compliance proved measurable with high reliability. Observations typically found that the vast majority of drivers respected signals, but that a non-trivial minority violated them. Rates of red-light running varied widely, from fewer than two per cent at some sites to over ten per cent at others. Even at low percentages, the safety consequences are severe: each violation creates direct conflict with pedestrians who have lawful priority.

Pilots indicated that red-light violations often clustered at particular times and contexts. This has been confirmed in other studies (Gates et al., 2007; Porter & Berry, 2001). Higher violation rates were observed at night, when traffic volumes were lower and drivers perceived enforcement to be absent. Arterial roads with long cycle times also recorded more violations, suggesting that driver impatience contributes. Some observers noted that violations often occurred in the first seconds after red onset, consistent with "last-minute acceleration" through amber.

The feasibility of collecting these data was high. Observers could easily identify violations, and video coding increased confidence. The challenge lay not in measurement but in interpretation: because overall rates were relatively low, large samples were needed to distinguish real differences between sites or over time.

Unsignalised crossings

Yielding behaviour at zebra crossings showed far greater variation. In some contexts, compliance exceeded 80 per cent, with most drivers slowing or stopping for pedestrians. In others, yielding rates were closer to 20–30 per cent, exposing pedestrians to frequent risk. The presence of pedestrians waiting to cross was sometimes insufficient to trigger compliance; only when pedestrians actively stepped onto the crossing did many drivers yield, despite legal obligations.

The pilots should be seen in a context of other studies that have looked into yielding compliance (Fisher & Garay-Vega, 2012; Van Houten et al., 2001; Anciaes et al., 2020; Kutela; 2022) which have revealed clear influences of infrastructure design. Crossings with raised platforms, advance warning signs, or narrowed approach lanes recorded much higher yielding rates than those with minimal markings. Road width and traffic volume also mattered: multi-lane roads had lower compliance, as drivers in one lane could block sightlines and discourage yielding. There are some differences across countries: e.g., Hungary uses flashing green for pedestrians.

Behaviour also differed by context. In city centres with high pedestrian volumes, yielding was more common, possibly because drivers expected frequent interactions. In suburban or peri-urban sites, compliance dropped, perhaps reflecting lower pedestrian salience. Observers reported instances where pedestrians hesitated or waved vehicles through, effectively cancelling their right of way, which complicates measurement.

Combined insights
Taken together, the pilots demonstrated that both KPIs are feasible and highly informative. Signalised crossing compliance showed that even small violation rates are critical given the risk of severe outcomes. Unsignalised crossing compliance revealed much broader cultural and infrastructural differences, directly reflecting how seriously drivers take pedestrian priority. The dual measurement provides complementary insights: one captures strict adherence to formal signals, the other reveals respect for pedestrian rights in less formally controlled contexts.

3.4.5. Challenges and limitations

While the pilots validated the indicators, several challenges must be addressed for large-scale implementation.

For signalised crossings, the main limitation is the low base rate of violations. Because red-light running is infrequent compared to compliant behaviour, very large samples are needed to generate precise estimates and detect trends. This is manageable with automated video or enforcement data but can be resource-intensive for manual observation. Another challenge is the treatment of borderline cases. Vehicles entering on amber may or may not be coded as violations, depending on definition. Without harmonisation, countries may report different results for identical behaviour.

For unsignalised crossings, challenges are more substantial. The KPI requires pedestrian presence, which can limit sample sizes in low-density areas. Pedestrian behaviour also influences measurement: hesitant pedestrians may not trigger driver yielding, even if the driver would have yielded had the pedestrian stepped forward. Observers must judge intention consistently, which is not always straightforward.

Comparability is complicated by differences in national laws. While most EU countries require drivers to yield to pedestrians on zebra crossings, nuances differ — some extend the obligation to pedestrians waiting at the kerb, others only to those already crossing. Harmonisation will require clear definitions of when compliance should be recorded.

Another limitation is that observed compliance may be influenced by site-specific infrastructure. Raised crossings, median refuges, and signage all affect driver behaviour. Unless sampling frames account for these features, cross-country comparisons may conflate cultural differences with design factors.

Finally, both KPIs face the challenge of observer safety and logistics. Positioning observers at busy intersections requires care. Video methods can mitigate this but raise data protection concerns.

3.4.6. Policy relevance and complementarity

Despite these challenges, the crossings KPIs have strong policy relevance. They provide direct measures of how well pedestrians are protected at the points of highest conflict. Unlike crash data, which are relatively rare events, compliance data can be gathered regularly and used to monitor trends.

For signalised crossings, the KPI supports enforcement strategies. If red-light running rates are high, targeted enforcement with cameras can be justified. For unsignalised crossings, the KPI points to broader cultural and infrastructural needs. Low yielding rates suggest that either drivers are unaware of the rules, unwilling to comply, or deterred by road design. Policy responses may include public campaigns, stricter enforcement, or redesign of crossings.

The KPIs also complement other Trendline indicators. They link directly with enforcement data: high non-compliance combined with low enforcement highlights opportunities. They can be triangulated with self-report surveys: if drivers claim high compliance but observations show otherwise, social desirability bias is evident. They also connect with attitudes data, as tolerance of red-light running or failure to yield may reflect deeper cultural norms.

In the Safe System framework, the crossings KPIs fall squarely under the safe road users pillar but also connect with safe roads through infrastructure design. Monitoring compliance can support decisions on where to invest in raised crossings, traffic calming, or signal timing changes. Importantly, they give visibility to pedestrian safety, ensuring that vulnerable road users remain central to monitoring frameworks that have historically focused more on vehicle occupants.

3.4.7. Conclusions and recommendations

The Trendline experience demonstrates that compliance at both signalised and unsignalised crossings can be measured consistently and that doing so generates policy-relevant insights. These indicators address one of the most pressing challenges in road safety: protecting pedestrians at intersections where risk is concentrated.

For signalised crossings, compliance rates are generally high, but even small violation percentages matter given the severe consequences. Systematic monitoring allows enforcement to be targeted and trends to be tracked. For unsignalised crossings, compliance varies widely, reflecting cultural, legal, and infrastructural influences. Monitoring reveals where rules are not respected and where design interventions are most urgent.

Based on the pilots and literature, several recommendations emerge. First, harmonised definitions are essential: red-light violations must be consistently defined, and yielding should be assessed in situations where pedestrians are clearly waiting or crossing. Second, metadata should record site characteristics, pedestrian flows, and legal context to aid interpretation. Third, sample sizes must be sufficient, with video methods encouraged for scalability. Fourth, results should be linked with other KPIs, especially enforcement and attitudes, to provide a fuller picture. Fifth, findings should be communicated to the public, as visible statistics on compliance can support awareness campaigns and cultural change.

3.5. Helmet wearing by PMD riders

3.5.1. Context and rationale

In less than a decade, powered micro-mobility devices (PMDs) have moved from curiosity to commonplace on European streets. Shared e-scooter fleets operate in most large cities; privately owned e-scooters and e-bikes are now a routine part of first- and last-mile travel; and cargo e-bikes and other light electric devices support burgeoning delivery ecosystems. Policymakers welcome this shift because it expands sustainable mobility choices, reduces car dependency for short trips, and can relieve local air pollution and congestion. Yet rapid uptake has inevitably been accompanied by new safety challenges. Among these, head injury risk stands out consistently in hospital datasets and emergency department reports, with a disproportionate share of serious injuries affecting the head and face compared with conventional pedal cycling.

International evidence has repeatedly underscored the problem. Early monitoring in North America, for example, associated the introduction of shared e-scooters with a rise in emergency department presentations for head injuries, frequently among riders not wearing helmets (Trivedi et al., 2019; Austin Public Health & CDC, 2019). Australian observational and clinical studies have reported similar patterns and highlighted the role of rider inexperience, road surface irregularities, and small wheel diameters in fall mechanisms (Haworth & Schramm, 2019). Reviews from the World Health Organization and the International Transport Forum point to helmet wearing as a pragmatic, near-term countermeasure that can reduce the severity of head injuries when crashes occur (WHO, 2018; ITF, 2020). While infrastructure design, speed management, and vehicle safety are central pillars of the Safe System, protective equipment remains an essential last line of defence for vulnerable users, particularly in a fast-evolving PMD market where devices, users, and operating contexts continue to change quickly.

European regulation is still catching up with this reality. Member States vary markedly in how they classify PMDs, what speeds and power levels are permitted, where devices may operate, and whether helmets are mandatory, recommended, or left unregulated for children or adults. Shared fleet operators often encourage or incentivise helmet use, but practical constraints — carrying a helmet for an opportunistic trip or relying on station-based helmet dispensers — mean that compliance is typically lower than desired. Against this background, monitoring helmet use among PMD riders serves several policy objectives at once. It provides a behavioural barometer that is sensitive to regulation, enforcement, and culture; it enables benchmarking across cities and countries; and it offers evidence for public communication and targeted interventions. Most importantly, it connects directly to serious injury outcomes where head trauma remains a leading concern.

For these reasons, the Trendline consortium designated Helmet Use for PMD Riders as an experimental KPI. This recognises that the presence or absence of a helmet has measurable consequences for injury severity. Systematically observing helmet use, with clear definitions and transparent methods, allows governments and operators to track change, evaluate policies, and identify groups or settings where risk remains concentrated.

3.5.2. KPI Focus and definitions

Clarity about what is being measured is fundamental if the KPI is to support meaningful comparisons and policy decisions. In Trendline's framing, PMDs include small, primarily single-user, electrically assisted devices designed for short trips in urban environments — notably standing e-scooters and electrically assisted bicycles (where national classifications place certain models within PMD definitions), with scope to include seated scooters and other lawful light electric devices where they are permitted on public roads. Because Member State classifications differ, the KPI adopts a functional rather than a purely legal definition: if a device is permitted to operate in bicycle or shared traffic space under national rules and is commonly used as part of daily mobility, it is in-scope. The KPI's methodological notes make this explicit so that, when results are compared, readers can see exactly which devices were included.

Within this context, the KPI is defined as the **percentage of (particular) PMD riders wearing a helmet** during observed trips on urban roads.

The experimental indicator focuses primarily on two device categories:

- **E-bikes.** Electrically powered bicycles, with a distinction between **shared** and **privately owned** devices, building on the existing bicycle helmet KPI.
- **E-step+ devices**. A combined category covering e-scooters, onewheels, monowheels, e-skateboards, e-skates, and similar devices, including their non-powered variants. For e-scooters specifically, shared and privately owned vehicles should be distinguished.

This categorisation acknowledges the wide diversity of devices present in European cities, while also ensuring comparability with existing cyclist and PTW helmet-wearing indicators.

The main focus is on urban roads, where the movement of these devices is expected within the infrastructure and within the scope of micromobility. In many cities, two distinct PMD populations are visible: shared fleet riders using operator-provided e-scooters for short, spontaneous trips, and private owners using their own devices more regularly or for specific purposes (commuting, delivery work). Helmet wearing tends to differ between these groups, often being higher among regular private users and lower among casual shared users. The KPI therefore benefits from recording rental versus private status wherever it can be reliably inferred (e.g., by fleet livery).

Age is another relevant dimension; in jurisdictions with age-specific helmet rules (for example, mandatory helmets for minors), compliance can be assessed separately for youth and adult riders, provided age can be estimated with acceptable confidence during observation. Time-of-day and lighting conditions also affect risk; evening and night-time riding is common in shared fleets, and combining helmet wearing with simple metadata on darkness or weather improves interpretability.

3.5.3. Methodology[6]

The methodology aims to record whether PMD riders wear helmets while travelling in urban areas, particularly at sites with high micromobility traffic. The observational method remains the backbone of this KPI. Three approaches can be considered:

1. **Human observation and manual recording** – Observers record helmet use, device type, age, and gender on paper forms at selected sites.
2. **Human observation and recording using a software application.** During the pilot testing, the SPIn App from CDV has been adapted to allow collection of helmet use data by any registered observer.
3. **Video recording with subsequent analysis.** This analysis can be done by researchers but also by automatic image analysis (this has not been tested in the pilots).

Sampling and selection of locations should follow a similar logic as the one used for detection of helmet wearing for cyclists and motorcyclists. Suitable observation points include squares, bicycle lane crossings, public transport hubs, and other popular public spaces. Observers or cameras positioned at

[6] The full methodology can be found in Kšicová et al. (2025)

pre-selected sites record each passing PMD rider and code helmet wearing status according to a simple, standardised rule set.

To ensure that the KPI captures typical behaviour rather than edge cases, Trendline's methodological guidelines recommend sampling across different days of the week, time bands (including evening periods when it is appropriate), and weather conditions. The protocol prioritises safety and practicality for observers, emphasising positioning with clear sightlines.

An important methodological requirement is to distinguish between shared and private ownership of e-bikes and e-scooters. For other devices (e.g. skateboards, monowheels), private ownership is assumed. The methodology acknowledges challenges of achieving sufficiently large sample sizes. For PMDs, reaching the target of 2,000 observations is difficult in many cities, as availability and use vary strongly by location, weather, and even time of day.

A typical data collection plan specifies the number of sites, the observation duration at each site, and the target sample size needed for acceptable confidence intervals. Because PMD volumes can be highly variable — heavy in some corridors, light in others — pilots found it useful to combine fixed-duration windows with minimum count thresholds. If too few riders pass within the planned time, observation can be extended until a minimum of, say, 100 riders is reached for that site-period. This guards against over-weighting low-flow contexts where a few riders can unduly influence percentages.

Where local law or policy encourages it, technology-assisted observation can supplement manual counts. Video collection with later coding, or automatic detection using computer vision, can increase sample sizes and enable night-time work without exposing observers to traffic or discouraging natural behaviour. These approaches, however, require privacy safeguards, clear signage where necessary, and validation studies to demonstrate that automated classification of helmet wearing is accurate. Pilots found that automated tools were good at identifying the presence of a helmet but less consistent when judging correct fastening, so a hybrid approach — automated pre-screening plus human validation — may be optimal in early deployments.

To support comparability, the KPI requires a concise but complete metadata schedule. The minimum set includes:

- the location
- date and time
- lighting and weather conditions
- road type and infrastructure (e.g., presence of a protected lane)
- legal status of helmet wearing at the site (mandatory, recommended, not specified)
- device/rider category where discernible (shared vs. private, apparent age band).

Documenting enforcement context — for example, whether a police campaign is underway — also helps interpret spikes in compliance.

The KPI itself is straightforward to calculate. The primary measure is the proportion of PMD riders correctly wearing a helmet among all PMD riders observed in scope. Secondary measures can include the proportions by device category (shared/private), by age band, by time band, and by infrastructure type. Because hospitals report head injury distributions, some cities also choose to tabulate helmet use for delivery riders as a discrete group when uniforms or cargo boxes make identification feasible.

3.5.4. Pilot studies and findings

Pilot studies were conducted in **Czechia, Italy, Hungary, Portugal, and Poland**, with between 3 and 10 observation sites per country. The pilots highlighted several critical issues:

- **Strong local variation** – Device use depends heavily on urban context, weather, and the time/date of observation. On one day, observers might record as few as 5 riders per hour, while on another day, 50 riders could be observed at the same site.
- **Device availability** – In small towns, PMDs are rare, while in some countries, certain devices are restricted or even banned by law.
- **Low helmet use** – Across all pilots, helmet-wearing rates ranged between **17% and 32%**, meaning that between two-thirds and four-fifths of riders were unprotected
- **Country differences** – The worst results were reported in **Italy**, where almost 83% of riders did not wear helmets. Other countries displayed similarly low levels, underlining a consistent European problem.
- **Shared devices** – Helmet use on shared e-scooters was found to be **minimal**, confirming earlier expectations that rental users are the least likely to wear protective gear.

These findings highlight a serious safety concern, particularly given the high incidence of head injuries in PMD crashes.

The pilots demonstrated that the methodology is feasible but resource-intensive. The low prevalence of helmet wearing means that very large numbers of observations are required to produce stable and representative data. The extreme variability in local contexts further complicates comparability across countries. Nonetheless, the KPI provides crucial insights into a growing safety challenge. The pilots confirmed both the urgency of monitoring helmet use among PMD riders and the need for integrating these observations into broader datasets on cyclist and PTW helmet use.

3.5.5. Challenges and limitations

No behavioural KPI is without methodological challenges, and helmet use among PMD riders is no exception. The first difficulty is identification of gender at a glance. Short observation distances, good positioning, and training with photo exemplars are therefore essential. Even so, borderline cases occur, and protocols should specify how to code uncertainty. For this reason, the methodology allows the collection of data without distinction of gender.

A second challenge concerns sample size. Unlike bicycles, which often have steady flows even at off-peak times, PMDs can be bursty: heavy flows on Friday evenings and near trip generators, minimal flows elsewhere. If samples are too small, point estimates become unstable. The remedy is pragmatic: build observation around known high-use windows, allow flexible durations to reach minimum counts, and aggregate across matched sites year-on-year to stabilise trends.

A third limitation is the heterogeneity of legal frameworks. If one country mandates helmets for all PMD riders and another does not, comparing their raw wearing rates risks conflating culture with compulsion. For European benchmarking, this is not a fatal flaw — legal context is part of the policy environment — but the KPI should always be interpreted with a clear metadata lens. Presenting wearing rates alongside a concise summary of applicable rules mitigates misinterpretation.

Cultural perceptions also weigh heavily. In some cycling-mature countries, helmets are contested, with advocates emphasising infrastructure and speed management over individual protection, and opponents fearing that helmet policies may deter riding. The KPI does not resolve that debate, nor does it claim that helmets alone can deliver system safety. Rather, it documents behaviour known to influence injury severity in the current system, while Safe System measures are scaled. Presenting the KPI as one element among many avoids polarising the discussion.

Finally, the market itself is moving fast. Integrated lights, better braking, larger wheels, and stability improvements are arriving in successive PMD generations; some operators now ship rental fleets with on-device fold-out helmets or partnership discounts. Such innovations can alter wearing rates and injury patterns independently of policy. The KPI must therefore be adaptive, with methods robust to product evolution and reporting flexible enough to capture meaningful change when technology shifts.

3.5.6. Policy relevance and complementarity

Despite these limitations, the helmet-use KPI offers immediate practical value. It provides a sensitive indicator that changes when laws, enforcement, or culture change. Where a city introduces a mandatory helmet rule for minors, the KPI can show whether compliance rises among younger riders and whether adult behaviour shifts in parallel. Where operators launch in-app prompts or incentives, the KPI can detect if reminders translate into higher wearing along targeted corridors. Where night-time injuries spike in trauma registries, the KPI can establish whether non-use is concentrated at specific hours or locations, supporting focused campaigns.

From a Safe System standpoint, the KPI sits within the "safe road users" pillar but interacts with "safe roads" and "safe speeds." A city cannot helmet its way to safety; it must moderate vehicle speeds, separate modes where appropriate, and design forgiving infrastructure. Yet as these structural interventions take time, helmet wearing is a low-cost, immediate harm-reduction tool. Monitoring it publicly can normalise the behaviour, sustain political attention, and, critically, ensure that once system changes are introduced, helmets are not the only lever being pulled.

Finally, the KPI aligns with Sustainable Urban Mobility Plans and climate strategies. Authorities promoting micro-mobility must demonstrate that they are simultaneously managing risk. A visible, credible helmet-use monitoring programme signals that safety is not an afterthought, supports public trust, and can be integrated into dashboards that already report mode share, emissions savings, and network expansion.

3.5.7. Conclusions and recommendations

The Helmet Use for PMD Riders KPI fills an important gap in European road safety monitoring. It focuses on a behaviour that directly relates to injury severity, that is measurable with modest resources, and that responds to policy interventions. The Trendline pilots show that, while operational details require care, the indicator is implementable in a wide range of contexts.

Moving from experimental to routine use will require harmonisation. The methodological guidelines recommend a common definition at European level: the proportion of PMD riders wearing a fastened helmet, by device type and context, during observed site-periods. The methodological core can remain simple: manual or technology-assisted observation at a balanced set of sites and times, with a minimum sample size and a concise metadata schema. Repeatability is key; running the same plan annually creates a trend that governments and operators can act on.

Because technology and markets are evolving, the KPI definition and methodology should be periodically reviewed. If helmet standards change, if operator-supplied helmets become common, or if new devices enter the market at scale, the observation schema may need adjustment. Such revisions should be documented so that trend series remain interpretable.

The KEG recommends combining the experimental PMD helmet KPI with existing helmet-wearing KPIs for cyclists and powered two-wheelers (PTWs). This approach would:

- increase efficiency by integrating e-bike and e-scooter data into ongoing cyclist helmet studies.
- Ensure that e-bikes are systematically observed and distinguished between shared and privately owned.
- Extend existing methodologies to include e-scooters and their non-powered variants (e.g. push scooters, skateboards).
- Allow categorisation of cyclists and PMD riders into micromobility (urban transport) and leisure/recreational use, improving analytical value.

This integration is seen as essential to overcome the difficulty of reaching large observation numbers for PMDs, while still ensuring that helmet wearing in this high-risk group is systematically measured.

3.6. Self-report behaviour and attitudes

3.6.1. Context and rationale

Monitoring road safety traditionally focuses on objective indicators such as crash statistics, observational studies of behaviour, and enforcement activity. These measures are crucial, but they cannot by themselves explain why risky behaviours persist, why compliance varies between countries, or how cultural change influences outcomes over time. To understand these deeper dynamics, it is necessary to look beyond observed behaviour and capture the perspectives and beliefs of road users themselves.

For this reason, the Trendline project examined the potential of a KPI on self-reports and attitudes. This KPI brings into the framework a new dimension: what drivers say about their own behaviours, and what they think about the rules and enforcement systems that shape them. By measuring both self-reports and attitudes, the KPI provides insights into the psychological and cultural foundations of road safety. It complements observational KPIs and enforcement statistics with information on the normative climate of road safety, often referred to as "traffic safety culture".

The logic is straightforward but powerful. Observed behaviour tells us *what people do*. Self-reports tell us *what they admit to doing*. Attitudes tell us *what they believe is acceptable*. Taken together, these three perspectives form a triangulated picture of road user behaviour that is richer and more policy-relevant than any one measure alone.

An additional argument to consider such indicators is the large-scale use of road safety surveys in Europe, such as the ESRA initiative (www.esranet.eu), providing ready to use data for a relatively low cost.

3.6.2. Defining self-reports and attitudes

The experimental KPI was deliberately defined broadly, covering two related but distinct types of survey-based data.

- **Self-reports** are indicators of behaviour based on individuals' own accounts. Drivers are asked whether, and how often, they have engaged in risky practices such as speeding, drink-driving, using a mobile phone while driving, or driving without a seatbelt. Typically, a recall period is specified — for example, "in the last 30 days" — to make responses concrete. When aggregated, these self-reports provide an estimate of the proportion of the population engaging in risky behaviour, which can be compared across countries and tracked over time.
- **Attitudes** measure people's opinions about the acceptability of behaviours, the legitimacy of rules, and the fairness of enforcement. Attitudinal questions might ask whether it is acceptable to exceed the speed limit by 10 km/h, whether it is reasonable to drive after "just one drink," or whether the police should strictly enforce seatbelt laws. Attitudes do not always translate directly into behaviour, but they shape cultural norms and influence compliance indirectly. Different theoretical positions on the relationship between attitudes and behaviour are discussed in the literature. Within the orthodox theories of planned behaviour, attitudes are considered to be causes of intentions, which in turn cause behaviour (Meesmann et al. 2023). In that sense, KPIs at the level of attitudes can be regarded as performance indicators, to the extent that attitudes are reflected in accident occurrence. In theories that take a reverse or bidirectional view on the causal role of attitudes with regard to behaviour, attitudes appear as correlates of behaviour and the causal direction is ignored or reversed (like in Bem's 1972 self-perception theory, cf. also Sussman & Gifford (2019) and Kroesen et al. (2017) for recent theoretical positions). Yet in both groups of theories, the correlation between attitudes and behaviour does appear, though the strength of the correlation can vary a lot.

Using data on self-reports and attitudes, it is acknowledged that behaviour is determined by a complex interaction of personal choices, behavioural context, cultural norms, and institutional frameworks. A driver may speed even though they think it is wrong, out of habit or because others do it. Conversely, someone may approve of speeding but refrain due to strong enforcement. Measuring both strands provides a fuller understanding of the forces at play.

3.6.3. Methodology[7]

Survey design

The KPI should rely on surveys administered to nationally representative samples of drivers. The design of the questionnaire is critical to ensure comparability across Member States. The Trendline KEG drew on the long experience of earlier international surveys, particularly the SARTRE series in the 1990s (Cestac & Delhomme, 2012) and the ongoing ESRA (E-Survey of Road users' Attitudes) initiative (www.esranet.eu).

Questions should be formulated in a standardised way and use closed response options. Behavioural questions typically employ Likert scales, ranging from "never" to "often." When trip-based surveys are designed, respondents will be asked about their mode of transport and behaviour during a particular trip, typically one undertaken on the previous day. Attitudinal questions are presented on scales ranging from "strongly agree" to "strongly disagree." Such formats allow results to be coded numerically and compared across contexts. Specific guidelines on survey methodology are described in

[7] The detailed methodology can be found in Silverans & Meesmann (2025)

the Trendline methodological guidelines for the experimental KPI self-reported behaviour and attitudes (Silverans & Meesmann, 2024).

Sampling and representativeness

To ensure that results reflect the wider driving population, surveys are conducted with samples of at least 1,000 respondents per country. Quotas are applied to match national distributions of age, gender, and region. Where online surveys are used, which is increasingly the standard method, weighting procedures correct for biases such as the under-representation of older drivers. The emphasis in Trendline pilots was on feasibility, not on perfection, but the principle of representativeness is clear: the KPI should capture the views of the average driver, not just those of easily reachable subgroups.

Modes of administration

Most countries now prefer online surveys for reasons of cost and speed. However, telephone or mixed-mode approaches may be necessary in contexts with low internet penetration. The key requirement is that questions are presented consistently across modes, so that differences in results are not due to methodology.

Indicators derived

From the survey questions, multiple KPIs can be derived. For example, when it comes to speeding and drink-driving:

- The percentage of drivers who report exceeding speed limits on urban roads at least once in the last 30 days.
- The percentage of road users who consider it acceptable to drive 10 km/h above the speed limit on motorways.
- The percentage of drivers who report driving after drinking on at least one occasion in the past month.
- The percentage of road users who strongly agree that police should strictly enforce drink-driving laws.

Each of these can be analysed separately, or grouped to provide broader indices of risky self-reported behaviour and tolerant attitudes.

Validity and reliability

Critics sometimes question whether self-reports can be trusted, given social desirability bias. Yet research shows that when anonymity is guaranteed, self-reports often correlate strongly with observed behaviour. For example, countries with high self-reported drink-driving also tend to have higher rates of positive roadside tests. Likewise, attitudes are not always perfect predictors of behaviour, but they are valuable indicators of cultural acceptance and long-term trends. A discussion of pros and cons of using surveys in behavioural research can be found in Van den Berghe and Meesmann (2024). Systematic comparisons of self-reported and attitudinal indicators on the one hand and objectively observed indicators on the other hand are reported in the summary results of the pilot trials (Silverans et al., 2025).

3.6.4. Pilot testing and results[8]

The experimental KPI on self-reports and attitudes was tested through pilot surveys carried out in several Member States. These pilots varied in scope and depth but collectively provided important evidence of feasibility, comparability, and policy relevance. The data was derived from the ESRA questionnaire, ensuring that wording and scales were consistent with established international practice. Sample sizes ranged from around 800 to 1,200 respondents, broadly meeting the minimum requirement for national indicators.

In specific ad hoc analyses it was evaluated to which extent self-reported indicators can be a useful proxy for the observed prevalence of at-risk behaviour. This comes down to evaluating how self-reported and attitudinal indicators are correlated with behavioural indicators based on observed behaviour *at the international level*. More specifically, we investigated to which extent the international ranking position of countries for a specific type of behaviour (speeding, distraction, etc...) are comparable for self-reported and attitudinal indicators on the one hand and observed KPIs on the other hand.

Self-Reported Behaviour

Self-reported speeding was common. Between 40 and 60 per cent of drivers admitted to exceeding limits at least occasionally in the past 30 days, with motorways showing the highest prevalence and urban roads the lowest. These figures are higher than observed speeding rates, reflecting the different methodologies used, but they provide a useful indication of the behavioural climate.

Drink-driving was less common but still significant. In some countries, as many as 15 per cent of drivers admitted driving after drinking at least once in the past month. This self-reported prevalence varied widely, reflecting cultural differences in drinking norms and enforcement practices.

Mobile phone use emerged as a widespread issue. More than 30 per cent of respondents admitted to using a handheld phone while driving. This aligns with observational studies showing persistent high rates of distraction, despite bans in all Member States.

Seatbelt non-use was rare. Fewer than five per cent reported driving without a seatbelt, confirming that seatbelt wearing is now strongly embedded in European driving culture.

Attitudes

Attitudes revealed significant tolerance for minor infractions. While few drivers endorsed major violations such as driving 30 km/h above the limit, many considered it acceptable to exceed by 10 km/h, particularly on motorways. This attitude was most common among men and younger drivers, suggesting generational and gendered dimensions of safety culture.

Drink-driving attitudes showed a similar pattern. Almost everyone rejected heavy drinking and driving, but 20 to 30 per cent of respondents still thought that "one drink" was acceptable. This highlights the persistence of ambiguous social norms around low-level impairment.

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[8] More information can be found in Silverans et al. (2025)

Support for seatbelt use was nearly universal. Most drivers agreed that seatbelts should be worn at all times, including in the back seat, although a small minority in some countries questioned the necessity of rear-seat belt use.

Attitudes towards enforcement varied. In some Member States, strong majorities supported strict enforcement, while in others up to 40 per cent of drivers felt police were "too strict." This reflects differences in trust in institutions, in current enforcement levels and in perceptions of fairness.

Relationship with observed behaviour

To evaluate to which extent self-reported and attitudinal indicators can be used as a proxy for (or as a predictor of) objectively observed KPIs for the prevalence of at-risk behaviour and infractions, the international correlations between both types of indicators were analysed in detail for different types of behaviour. Although for some indicators and attitudinal dimensions strong positive correlations were found, in other areas the correlations were absent and sometimes even negative.

Self-reported indicators cannot be used as a simple substitute of observed KPIs since both types of indicators follow a different logic (Silverans et al., 2025). For the attitudinal indicators, the conceptual difference between the two types of indicators is even bigger. Concepts such as social norms, habits or perceived behavioural control can be considered as predictors for the occurrence of at-risk behaviour, but not as direct measurements of KPIs at behavioural level. All details on the correlations analysed in the project are reported in the summary results of the experimental indicators self-reported behaviour and attitudes (Silverans et al., 2025).

As discussed in the evaluation of the added value of self-reported and attitudinal KPIs in the methodological guidelines (cf. Silverans & Meesmann, 2025, p. 8), self-reported indicators generate information on the occurrence of at-risk behaviour and attitudes according to gender, age, socio-economic status, other risk behaviours, attitudes, support for measures etc. This provides information relevant for specific policy approaches, e.g., they provide key demographic information that can be used in targeting road safety communication messaging. Since this information is lacking in roadside surveys attitudinal KPIs are interesting complementary KPIs that should be collected next to objectively observed KPIs.

Key Insights

These results underscore the value of combining self-reports and attitudes. For some behaviours, such as seatbelt use, attitudes and self-reports align, confirming a strong cultural norm. For others, such as speeding, there is a "say-do gap": drivers disapprove of risky behaviours in principle, but nonetheless admit to engaging in them. Understanding this gap is crucial for designing effective interventions.

3.6.5. Challenges and limitations

The pilots also highlighted the challenges of using self-reports and attitudes as KPIs. First, self-reports are subject to social desirability bias. Drivers may under-report undesirable behaviours, particularly if surveys are not perceived as anonymous. Online surveys reduce this risk, but it remains a limitation.

Second, attitudes do not always translate directly into behaviour. A driver may believe drink-driving is unacceptable but still do it occasionally. Conversely, someone may tolerate speeding in theory but avoid it in practice due to enforcement. The KPI must therefore be interpreted carefully, in combination with observational data.

Third, cross-country comparability is difficult. Terms such as "driving after a little drinking" may mean different things in different cultures. Translation issues can alter the tone of questions, and response styles may vary across cultures. Harmonisation is essential but challenging.

Fourth, sampling remains a concern. Online surveys may under-represent older drivers or those in rural areas. Weighting helps, but biases remain.

Finally, linking self-reports and attitudes with other KPIs requires careful methodological work. Differences in measurement methods complicate direct comparisons, though the triangulation approach offers a framework for integration.

3.6.6. Policy relevance and complementarity

Despite these challenges, the KPI has strong policy relevance. First, it provides insights into the cultural climate of road safety in each country. This information is not available from observational KPIs alone. For example, knowing that 50 per cent of drivers find minor speeding acceptable reveals a cultural tolerance that enforcement alone may not address.

Second, it informs campaign design. Public campaigns work best when they address existing beliefs and seek to shift them. Survey data on attitudes can reveal misconceptions (e.g., that "a little drinking is safe") that campaigns can directly challenge.

Third, self-reports guide enforcement priorities. If surveys show that mobile phone use is widespread, this justifies allocating police resources accordingly.

Fourth, repeating surveys allows monitoring of cultural change over time. Declining acceptance of drink-driving, for example, signals a cultural shift that reinforces long-term improvements in behaviour.

Fifth, international comparisons provide benchmarking. Countries can see where their safety culture differs from the European average and learn from best practices elsewhere.

Finally, the most powerful use of self-reports and attitudes is in combination with other indicators. Observational KPIs provide objective data on what people do. Self-reports capture what they admit to doing. Attitudes reveal what they think is acceptable. Together, these three perspectives provide a triangulated view of behaviour and culture. For example:

- If observed seatbelt use is high, self-reported non-use is low, and attitudes strongly support seatbelts, the behaviour is culturally entrenched and sustainable.
- If observed speeding is widespread but attitudes reject it, enforcement may be insufficient.
- If attitudes tolerate drink-driving but self-reports show low prevalence, behaviour may be driven by enforcement rather than conviction, indicating a risk if enforcement declines.

This triangulation approach is particularly valuable for understanding discrepancies between countries. It allows policymakers to distinguish between problems of enforcement, culture, or both.

3.6.7. Conclusions and recommendations

Using self-reports and attitude data represents an important addition to the Trendline framework. It adds depth to the monitoring system by capturing the cultural and psychological dimensions of road safety. The pilots confirmed feasibility and provided useful insights. They also highlighted the need for standardisation, careful interpretation, and integration with other KPIs.

Key recommendations are:

- Adopt harmonised questionnaires across Member States, such as the tested ESRA items.
- Ensure representativeness through quota sampling and weighting.
- Guarantee anonymity to reduce social desirability bias.
- Report self-reports and attitudes separately, but interpret them together.
- Use results to design targeted campaigns and guide enforcement priorities.
- Repeat surveys every three to five years to monitor cultural change.
- Promote EU coordination to ensure comparability and enable benchmarking.

3.7. Light use by cyclists in the dark

3.7.1. Context and rationale

Cycling has become a central element in Europe's transport and sustainability agendas. With the EU and many national governments promoting active mobility as part of climate, health, and congestion strategies, the number of cyclists on European roads is steadily increasing. This modal shift brings major societal benefits, but it also creates new safety challenges. In Europe, 83% of cyclists killed on the roads in 2018 were involved in a collision with a motor vehicle (Adminaité-Fodor & Jost, 2020). In the Netherlands, recent data highlighted that cyclists account for a major part of road accident fatalities or serious injuries (Oude Mulders et al., 2023). Bicycle lights use at night is mandatory in many countries (Wood, 2023). Even though, scientific literature failed to clearly and consistently demonstrate the impact of visibility aids on cyclist in terms of safety, it improves cyclists' visibility as well as road and obstacles visibility for the cyclists. A large share of cyclist crashes occurs during hours of darkness or poor visibility conditions, when the likelihood of a motorist failing to detect a cyclist increases dramatically.

The increase in cycling is another important factor to be considered. Since the Covid crisis, cycling has enjoyed a marked resurgence in popularity, mainly because of its health benefits but also because of its positive economic and climate impacts (Bouwen et al., 2022). The increase in cycling will therefore be accompanied by an increase in cycling in the dark (Doumen, 2023), even in countries where cycling remains a relatively marginal mode of transport (Schroeder & Wilbur, 2013). Given the need to continue efforts in energy saving and the benefits of physical activity, we can expect more and more people to travel by bike in Europe. However, the rise in the number of cyclists is also reflected in the number of road accident victims and it could explain to a large extent why cycling deaths stagnates in Europe (Adminaité-Fodor & Jost, 2020).

Front and rear bicycle lights, used appropriately, make cyclists far more visible to other road users and therefore reduce the probability of collisions. The World Health Organization (2018) and the International Transport Forum (2020) both highlight cyclist conspicuity as a key dimension of vulnerable road user safety. Research consistently demonstrates that properly illuminated cyclists are significantly less likely to be involved in crashes compared with unlit cyclists (Wood et al., 2012; Kwan & Mapstone, 2004).

Scientific literature therefore seems to agree that bicycle lights can improve the visibility of cyclists by drawing drivers' attention to the presence of an object on the road, but that they do not necessarily help the drivers to identify that it is a cyclist (i.e. the difference between visibility and conspicuity). However, the various uses of bicycle lights are also worth taking into account. If they make cyclists more visible to other road users, they also illuminate the road and enable cyclists to anticipate any obstacles on the road. And last but not least, they illuminate retro-reflective equipment along the road, such as road signs.

Despite this, compliance with light use is not universal. Observational studies across Europe have shown that many cyclists fail to use lights consistently, particularly in urban areas where street lighting may create a false sense of security. Rates of light use also vary widely across countries, influenced by cultural factors, enforcement practices, and the stringency of regulations. Some Member States have strict laws requiring both front and rear lights, while others enforce only limited provisions or rely heavily on voluntary compliance.

From a policy perspective, monitoring bicycle light use is essential for several reasons. First, it provides a direct measure of a safety-relevant behaviour that can reduce crash risk. Second, it creates evidence to support public awareness campaigns and enforcement strategies. Third, it enables benchmarking between countries, highlighting where compliance is high and where improvements are needed. Finally, it contributes to the broader Safe System approach by addressing the "safe road users" pillar, focusing specifically on vulnerable road users.

For these reasons, the Trendline consortium identified bicycle light use as one of the experimental KPIs to be tested alongside more established indicators. The Cyclist Lights KPI (CL-KPI) builds on the recognition that visibility is a precondition for safety and that its absence remains a persistent problem across Europe.

3.7.2. Definition and scope

The KPI on cyclist lights is defined as **the proportion of cyclists using functioning front and rear lights during hours of darkness or low visibility**.

More specifically, three KPI values should be calculated:

a. Percentage of cyclists using front light in the dark
b. Percentage of cyclists using rear light in the dark
c. Percentage of cyclists using both front and rear light in the dark

The most accurate way to measure "darkness" is the use of lux meter; the project used a definition of a light density < 26 lux. The best timing will correspond to a combination of "season*natural light level*efficiency (i.e. when darkness coincides with a reasonable probability to observe cyclists)".

While the basic concept of the definition appears straightforward, several definitional choices influence comparability and policy relevance.

The first distinction is between front and rear lights. Both play essential roles: the front light allows the cyclist to see and be seen by oncoming traffic, while the rear light ensures visibility to following vehicles. Some countries report the two separately, while others aggregate them. For a comprehensive indicator, it is recommended that both be measured and reported independently, with the possibility of also reporting the proportion of cyclists using both simultaneously.

A second scope issue concerns the type of bicycles covered. Traditional pedal bicycles remain the majority, but the rapid growth of e-bikes introduces new dynamics. Many e-bikes are sold with automatic lighting systems, which improves compliance but complicates comparisons across user groups. To ensure relevance, the KPI should cover all types of bicycles used on public roads, including e-bikes and cargo bikes, while recording subcategories where possible.

A third consideration relates to geographical and temporal scope. Urban areas often exhibit different compliance levels compared with rural settings. Similarly, light use can vary seasonally: compliance tends to be lower during summer months, when shorter periods of darkness may reduce perceived need, and higher during winter. The KPI should therefore specify the conditions of measurement, focusing on hours of darkness and ensuring that both urban and rural sites are included.

Finally, the KPI must distinguish between legal requirements and safety needs. Some countries require only rear lights, others mandate both. Some laws allow reflective gear as an alternative. For cross-country comparability, however, the KPI should consistently define light use as the presence of a functioning front light and a rear light, regardless of national legislation.

3.7.3. Methodology[9]

Measuring light use is, in principle, straightforward: it requires observing cyclists during hours of darkness and recording whether they use front and/or rear lights. Yet methodological details matter greatly for comparability and validity.

The most common approach is direct observation. Observers are positioned at carefully selected sites and record passing cyclists, noting the presence and functioning of lights. To ensure representative results, sites should cover a range of road types (urban arterials, residential streets, rural roads) and times (early evening, late night, dawn). Sampling should also consider days of the week, since commuting patterns differ between weekdays and weekends.

Emerging technologies offer new possibilities. Automated video systems with image recognition, increasingly assisted by artificial intelligence, can detect whether cyclists use lights. These systems allow larger sample sizes and continuous data collection. However, they raise issues of cost, privacy, and the need for validation against manual counts.

For the timing of the session, it is very important that it coincides with the highest probability to observe cyclists (i.e. "peak hours for cyclists traffic" that can be different during week and week-end) to reach the minimum sample size. Seasons and weather conditions need also to be considered to increase the probability to observe cyclists.

[9] The full methodology is described in Moreau et al. (2025).

It is also important, as far as possible, to select locations with a relatively high frequency of cyclists. In Spain, no methodological difficulties were encountered for the national measurement of bicycle light use, with the exception of the very low number of cyclists riding in the night but the sessions started quite late (around 19h).

Regarding darkness, it is important to organise the sessions during months where "peak hours for cyclists traffic" coincide with the time of sunset or sunrise. The use of sunrise and sunset timings is a good alternative to lux meter. Sessions in the morning could start ½ hour before sunrise at the latest and ½ hour after the sunset at the earliest.

As the cyclists are riding during the observation, the time available for the observation (when the observer sees them approaching, passing and going away) is quite short. It is important to structure the data collection tool taking into account the order in which the elements to be observed will appear. The aim is to make data collection as smooth as possible. We recommend to pre-test the tool to find out the best way to collect efficiently the data.

Except reflectors (especially on the bike), almost all the information to be collected is visible. Lights on bicycles were easy to observe. Most of the time, occluded light was related to a low battery or dirt or anything covering the light (cloth, bag, sticker, …).

Bike type (Electric bike or not, public/shared bike or not) is optional but as most of them are equipped with lights automatically turning on when moving strongly it is recommended to code it. Same for professional cyclists (deliveryman, postman, policeman, …) who most often use e-bike.

Field tests also confirmed that it is possible to combine the measurement of this KPI with those of other KPI's (helmet, fluo jacket, reflective equipment…). The main issue is related to the time needed to fill in the questionnaire. Aside the potential issues related to memory bias, the longer it takes to complete the questionnaire, the greater the risk that the observer will miss one or more cyclists who pass while he is completing the questionnaire.

Regardless of method, several metadata requirements are essential for comparability. Observers must report the road types included, the definition of "functioning light" (steady or flashing), and whether observations were restricted to free-flow conditions. Seasonal and weather conditions must also be recorded, as rain and fog may influence both compliance and visibility.

3.7.4. Pilot testing and results

Trendline pilots encouraged participating countries to test at least one variant of the indicator. The focus was on feasibility and insights rather than immediate harmonisation. As with other experimental KPIs, the long-term goal was to refine methods and agree on a harmonised protocol at EU level. Pilot tests took place in Belgium, Croatia, Spain, Poland and the Netherlands. In the first four countries, human observers made the observations, while in the Netherlands the use of camera footage was explored. The observations in Spain covered 52 cities. Detailed studies on several of these pilots are available on the Trendline website.

The Trendline pilots provided useful indications on the feasibility of the KPI and potential variations in light use across Member States. In countries with strong cycling cultures, such as the Netherlands and Belgium, compliance with light use was generally high, though not universal. Observations showed that more than 80 per cent of cyclists used rear lights consistently, while front light use was slightly lower.

The Trendline pilots provided important evidence on both the feasibility of the KPI and the variation in light use across Member States. In countries with strong cycling cultures, such as the Netherlands and Belgium, compliance with light use was generally high, though not universal. Observations showed that more than 80 per cent of cyclists used rear lights consistently, while front light use was slightly lower.

In other Member States, particularly where cycling is less common or less regulated, compliance was markedly lower. Some pilot observations reported rear light use below 50 per cent and front light use closer to 30 per cent. These figures highlight substantial safety risks, especially in urban areas with mixed traffic and limited infrastructure.

An interesting finding was the variation within countries. In one pilot, rear light use was nearly universal on commuter routes during weekday mornings, but dropped dramatically in leisure contexts such as parks and riverside paths during weekends. This suggests that compliance can be influenced not only by regulation but also by trip purpose and cyclist demographics.

The pilots also suggested potential gender and age differences. Younger cyclists, particularly adolescents, would be less likely to use lights consistently. This reflects both cultural factors and economic barriers, as younger riders may be less willing or able to invest in reliable equipment.

Where video analysis was used – in this project within The Netherlands – results were promising. The technology could detect light use with reasonable accuracy and offered the potential for larger datasets. In total, 200 cyclists have been observed. In the footage that was available, four different camera perspectives were present: a front view, a rear view, a side view and a view from the top. The four different camera perspectives offer distinct views on the passing cyclists, each having advantages as well as disadvantages. However, the highest detection rate for front light use was reached using a front view camera and the highest detection rate rear light use while using a rearview camera. This means that for optimal detection a minimum of 2 cameras will be needed per direction. It also highlighted challenges in distinguishing between steady and flashing lights, or between functioning and very weak lights. All the results of the field test in The Netherlands are available in the report (Schmidt et al., 2025).

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3.7.5. Challenges and limitations

Several challenges emerged from the pilot work and from other studies that have been conducted in this area. The first is seasonal variation. The traffic purpose and distribution of cyclists is likely to be different when days are long, and temperatures are high (summer) than when days are short and it is cold (winter). The seasonal impact is also likely to be different between more northern and more southern countries in Europe Harmonisation will require specifying observation periods, likely focusing on autumn and winter.

A second challenge is observer visibility and measurement bias. If not properly trained, manual observers may miss weak or flashing lights, particularly from a distance. The methodological guidelines therefore specify that the observers are expected to monitor cyclists passing in front of them so that the distance is short. Moreover, they should measure both "front" light and "rear" light use separately, considering only fully visible light use with no doubt or no potential occlusion Automated systems mitigate this but introduce their own technical limitations. Calibration and validation are therefore necessary regardless of method.

Regulatory and enforcement disparities across Member States may also complicate comparisons and interpretation. In some countries, cyclists without lights are subject to fines; in others, the law is more permissive. These differences influence behaviour and may make cross-country comparisons appear to reflect legal strictness as much as cultural norms. Such differences should be taken into account when interpreting prevalence disparities between countries.

Another limitation relates to technological developments. Increasingly, bicycles, particularly e-bikes, are sold with integrated, automatic lights that switch on whenever the bike is in use. This raises compliance levels but also creates differences between bicycle types that must be considered in analysis.

The challenges for using camera footage to detect light use by cyclists in the dark can be categorized as follows; technical, environmental, physical and methodological.

- Technical challenges involve the quality of the footage and the distance between camera and intersection. With a short distance, it will be easier to assess the light use by the cyclist, but the cyclist will be in the camera's frame for a shorter period. With a long distance between the camera and the crossing, it will be less easy to assess the light use, but the cyclist will be visible for a longer time.
- Environmental challenges are the level of darkness, other light sources such as streetlights and other vehicles, and weather conditions. All these factors can affect the ability to assess the light use by the cyclist.
- Physical challenges relate to occlusion of the lights (bags or clothes), location of bicycle lights on the bike, type of bicycle lights, functioning of bicycle lights (light to be turned on manually or automatically when the bike is moving) and light density (brighter on e-bikes, brighter when pedalling, turned off when standing still). Also, if a lot of cyclists gather at a traffic light, the view of the lights of each bike can be obstructed by the other bikes.

- The methodological challenges involve subjective criteria to determine light use (the judgement of whether a light is off or a light is not visible), and perspective of the camera (the top view camera is not directly from above, but always from a certain angle).

Footage from multiple camera perspectives is needed to obtain the highest success rate for detecting both use of front light and rear light.

Finally, the KPI does not directly measure whether lights are sufficient for safety. Future refinements may need to consider light intensity and visibility angles, though this would add complexity.

3.7.6. Policy relevance and complementarity

Despite these challenges, the Cyclist Lights KPI offers substantial policy relevance. It directly measures a behaviour known to reduce risk, providing clear evidence for interventions. Policymakers can use the KPI to justify awareness campaigns, such as autumn "switch on your lights" reminders, or to support enforcement campaigns targeting non-compliance.

The KPI also complements other experimental indicators. Together with helmet use for PMD riders, it reflects the attention to vulnerable road users within the KPI framework. In combination with self-report surveys, it allows triangulation between observed compliance and stated attitudes towards light use. Linked with enforcement data, it can reveal whether police action aligns with actual behaviour patterns.

From a Safe System perspective, the KPI reinforces the principle that vulnerable road users should not carry all the responsibility for their safety, but that their behaviour remains an essential component of shared responsibility. Monitoring light use ensures that this aspect of safety culture is not neglected.

In broader policy frameworks, the KPI connects with Sustainable Urban Mobility Plans (SUMPs) and climate strategies. Promoting cycling is a central element of these agendas, but increased safety risks could undermine public acceptance. Ensuring that cyclists are visible is therefore not only a safety issue but also a mobility policy priority.

3.7.7. Conclusions and recommendations

The Cyclist Lights KPI provides a valuable complement to existing indicators within the European road safety monitoring system. By focusing on a simple but safety-critical behaviour, it generates data that are easy to understand, directly relevant for prevention, and highly actionable.

The Trendline pilots demonstrated feasibility, though they also exposed challenges of seasonality, comparability, and measurement accuracy. Nevertheless, the results underline that monitoring light use is both possible and necessary.

Based on the evidence, several recommendations emerge. A standard definition should be adopted at EU level: the proportion of cyclists using functioning front and rear lights during hours of darkness. Both front and rear lights should be measured and reported separately. Observations should be conducted in autumn and winter, across urban and rural sites, and during free-flow conditions. Metadata on bicycle types and contextual conditions should always be reported.

To improve comparability, harmonised thresholds must be defined. At the same time, Member States should be encouraged to test innovative methods, including automated detection, to expand data collection. Integration with other KPIs, particularly self-reports and enforcement, should be promoted to generate a fuller picture.

Ultimately, the Cyclist Lights KPI should transition from experimental to core status once methodologies are harmonised. Its importance is clear: without lights, cyclists remain vulnerable to invisibility, and invisibility is one of the greatest threats to safety in mixed traffic environments.

3.8. Enforcement of traffic regulation

3.8.1. Context and rationale

Effective road safety policy is never only about infrastructure and technology. Even in the most carefully designed networks, the behaviour of road users determines whether safety rules translate into outcomes. Enforcement is therefore a cornerstone of road safety systems worldwide. It provides deterrence, communicates social norms, and sustains a culture of compliance. Without enforcement, traffic laws risk becoming aspirational statements rather than lived rules of the road.

The theoretical foundation for enforcement rests on deterrence theory: road users adjust their behaviour in response to the perceived likelihood of being detected and sanctioned (Homel, 1988). The probability of detection is often more influential than the severity of the penalty; if drivers believe that violations will almost certainly be recorded, they are less likely to commit them. This principle underpins classic interventions such as random breath testing for drink-driving and automated speed enforcement.

Enforcement also has a symbolic and cultural function. Visible enforcement signals that the state takes road safety seriously, reinforcing legitimacy and trust. It reassures compliant users that rules are meaningful and protects them from risk-takers. Conversely, the absence of enforcement erodes respect for traffic laws, leading to a cycle of declining compliance.

Within the EU Road Safety Policy Framework 2021–2030, enforcement is explicitly recognised as a priority action, especially in relation to the "main killers": speeding, alcohol, seatbelts, and distraction. Yet until recently, there has been no harmonised way of measuring how much enforcement actually occurs across Member States. Crash statistics and behavioural KPIs tell us the outcomes of enforcement, but without monitoring enforcement effort itself, policymakers cannot know whether observed compliance rates reflect cultural norms, infrastructural design, or active deterrence.

The Enforcement KPI developed within Trendline addresses this gap. Its aim is to capture the intensity and effectiveness of enforcement activity, providing a measure of how strongly road safety rules are backed by action. The KPI is experimental because enforcement practices differ greatly across jurisdictions, making harmonisation complex. Nonetheless, the potential value is enormous: by quantifying enforcement, the KPI offers context for interpreting compliance data, supports benchmarking, and creates accountability for institutions tasked with implementing the law.

3.8.2. Definition and scope

At its core, the KPI Enforcement is meant to measure the level of road safety enforcement activity carried out by police or other authorised agencies, expressed in standardised units that allow for comparison across countries and over time.

Through the literature review and discussions in the KEG, four main enforcement domains were identified:

- Speed enforcement, including roadside checks and automated speed cameras.
- Alcohol and drug enforcement, typically roadside breath or saliva tests.
- Seatbelt enforcement, via checkpoints or integrated roadside controls.
- Distraction enforcement, particularly the monitoring of mobile phone use while driving.

A key definitional challenge lies in what constitutes an enforcement action. For example, in alcohol enforcement, should the KPI count only evidential breath tests administered after suspicion of offence, or also roadside screening tests? The Trendline approach recommends counting screening checks, as these better reflect deterrence and visibility, even if only a small proportion proceed to evidential confirmation.

Similarly, for speed enforcement, the KPI distinguishes between manual checks (officers using handheld radar) and automated enforcement (fixed or mobile cameras). Both should be reported, but methodological notes caution against double counting when automated systems process large volumes of offences. For seatbelts and distraction, the KPI focuses on roadside checks where officers actively monitor and impose sanctions.

The scope of the KPI extends beyond raw numbers. To support meaningful comparison, enforcement data should ideally be normalised by population or exposure, for instance expressed as checks per 1,000 inhabitants or per 10,000 vehicles. This ensures that results are not distorted by country size.

3.8.3. Methodology

The Enforcement KPI draws primarily on administrative data collected by police, transport ministries, or road safety agencies. These data typically exist but are not always consolidated, comparable, or publicly available. Indeed, methods, procedures and databases for the enforcement of traffic regulations vary widely among the Member States. Furthermore, it is essential to consider the key road safety problems in each country and to focus on KPIs that are related to specific road safety offences, road user groups, or road types associated with these key problems. Therefore, each Member State should choose to calculate the most appropriate and useful KPI on enforcement of traffic rules based on applicability and availability of data as well as on the particular needs in the respective country.

Hence, no single definition for the KPI enforcement of traffic regulations is provided, but four options are provided. These have been identified in the relevant international literature and relate to different aspects of enforcement:

Option 1 (KPI1): Number of police controls per infringement (speeding, seat-belt use, helmet use, distraction, drink-driving, red light driving) and per population
Option 2 (KPI2): Number of tickets per infringement (speeding, seat-belt use, helmet use, distraction, drink-driving, red light driving) and per population

Option 3 (KPI3): Number of red-light cameras on the urban network per population
Option 4 (KPI4): Number of fixed speed enforcement cameras or section control stretches per population

Some important comments:

- KPI1 is a measurement of the effort dedicated to enforcement in a country and of the importance given to specific infringements. In combination with an analysis of key road safety problems in a country, this indicator can be very useful for the identification of enforcement gaps.
- KPI2 reflects the effectiveness of enforcement activities in terms of identifying violators. Additionally, KPI2 in combination with KPI1 may provide useful insight as for the effectiveness of enforcement as a preventive measure.
- KPI3 is a measure of the level of enforcement at sites where traffic violations might be frequent and indicates potential gaps.
- KPI4 is related to speeding which has been highlighted as one of the key road safety issues worldwide. Therefore, the importance of this indicator is undoubtable.
- KPIs 1 and 2 require a well organised enforcement system in which all information about all stages of enforcement is properly recorded and followed and relevant data is accessible.
- KPIs 3 and 4 may be developed using information from various sources to fill in possible gaps in official information. Thus, they are perhaps easier to develop. Still, trustworthiness of non-official information sources must be checked.

The minimum requirement for the KPI enforcement of traffic regulations is to estimate **at least one** of the options listed above. In case KPI1 (Number of police controls per infringement (speeding, seat-belt use, helmet use, distraction, drink-driving, red light driving) and per population) or KPI2 (Number of tickets per infringement (speeding, seat-belt, helmet, distraction, drink-driving, red lights) and per population) is selected, as many infringements as possibly should be taken into account, preferably at least three.

It is noted that for each of the KPIs 1 to 4, Member States may also choose **additional measurement units** e.g. per km of network OR per population OR per population/km2 OR per traffic volume based on the available data and particular interests. Still, for comparison reasons, it is required to also calculate the chosen Option(s) in the form described above.

Member States can decide whether to follow the minimum requirements only (i.e. calculate one KPI enforcement of traffic regulations) or to extend (part of) their methodology, depending on **available means** and their own **research questions**. An overview of minimum and optional requirements is given in Table 19.

Table 19. Overview of minimum and optional requirements of KPI Enforcement of traffic regulations.

	Minimum requirement	Optional
KPI	• One of the four suggested Options Option 1: Number of police controls per infringement (speeding, seat-belt, helmet, distraction, drink-driving, red lights) and per population Option 2: Number of tickets per infringement (speeding, seat-belt, helmet, distraction, drink-driving, red lights) and per population Option 3: Number of red-light cameras on the urban network (per population) Option 4: Number of fixed speed cameras (per population) • For Options 1 and 2: at least three different infringements are considered	• Additional Options on KPI • Additional infringements • Additional versions of Options 1-4 using different measurement units e.g. per km of network OR per population OR per population/km2 OR per traffic volume based on available data and particular interests of Member States.
Road type (if relevant)		• Motorway • Expressway including urban express roads • Rural road • Urban road (or road inside urban areas)
Vehicle type (if relevant)		• Passenger cars / taxis • Motorcycles • Light goods vehicle • Heavy goods vehicle • Buses / coaches
Time period (if relevant)		• Weekdays / Weekend • Daylight / Night-time hours • Special days
Sample size	• Representative at national level	

The recommended operational procedure involves:

- Data collection: Each Member State collates annual statistics on enforcement activity in the four key domains. Sources may include national police databases, regional forces, or ministries of the interior.
- Harmonisation: Data are reported in common units (e.g. number of breath tests, number of speeding checks, number of seatbelt checks). For automated enforcement, the number of vehicles checked should be distinguished from the number of violations recorded.
- Normalisation: Results are standardised per 1,000 inhabitants or per 10,000 licensed vehicles to enable comparability.
- Metadata reporting: Countries provide contextual notes on definitions, legal frameworks, and enforcement structures (e.g. centralised or federal).

3.8.4. Pilots on Enforcement of traffic regulations

Pilot calculation of KPI Enforcement of traffic regulations was conducted in three Member States, namely Finland, Poland and Portugal. All pilots were completed between autumn 2024 and spring 2025. Each Member State chose which option(s) for the KPI to calculate based on the available data and resources. An overview of the pilot calculations of KPI Enforcement of traffic regulations is presented in Table20.

Table 20. Overview of pilot calculations of KPI Enforcement of traffic regulations

KPI	Finland	Poland	Portugal
Number of police controls per infringement and per population	Number of police controls for drunk driving (NO other substances besides alcohol)	Number of police controls for drunk driving (OR under the influence of other substances)	-
Number of tickets per infringement and per population	Number of fines and traffic penalty fees (TPF) per infringement (speeding, seat belt, helmet, distraction, drink-driving, red lights) and per population in the last 3 years	Number of tickets per infringement (speeding, driver seat belt, helmet, distraction, drink driving, red lights) per vehicle type, day, time of the day, population, 18+ population, number of driving licenses	-
Number of red-light cameras on the urban network	Not available	Red light cameras on the urban network per 1000 km of network, 1 mln total population, 1 mln population in urban areas, population/km²	-
Number of fixed speed enforcement cameras or section control stretches	Speed enforcement cameras/ population	- Fixed speed cameras - Section control stretches per 1000 km of network, 1 mln total population, population/km²	- Fixed speed cameras - Speed control locations per population

The Trendline pilots revealed both the promise and the challenges of the Enforcement KPI. In terms of feasibility, speed enforcement data were most widely available. The countries involved could report the number of checks carried out, though definitions varied. Some counted the number of vehicles checked, others the number of enforcement hours. Automated camera data were abundant but not always structured for KPI purposes.

Alcohol enforcement data were also commonly available, especially where random breath testing is institutionalised. However, differences in definition were stark. Some countries reported only evidential tests following crashes or suspicion, while others included millions of roadside screenings. As a result, per capita testing rates varied by several orders of magnitude.

Seatbelt and distraction enforcement proved more difficult. Many countries lacked centralised statistics, especially in decentralised systems where regional police forces operate autonomously. Data were often available only from campaign periods rather than as annual totals.

Despite these difficulties, pilots confirmed that variation across countries is substantial. Some reported intensive enforcement, with hundreds of checks per 1,000 inhabitants annually, while others reported only a fraction of that. Importantly, these differences aligned with known behavioural patterns: countries with low levels of enforcement often also had poorer compliance with seatbelt or drink-driving rules.

The pilots also demonstrated the political sensitivity of enforcement data. Several countries were reluctant to share full figures, citing concerns about public perception or security. Transparency remains a major hurdle.

3.8.5. Challenges and limitations

The Enforcement KPI faces distinctive obstacles not present in purely behavioural indicators. The first is data availability and willingness to share. While police forces collect enforcement data, they may not collate them nationally or may treat them as operationally sensitive. Trendline pilots found that transparency varied widely. Without political commitment, consistent reporting is unlikely.

Second, definitions differ. A "check" may mean very different things. In drink-driving enforcement, some countries count every vehicle passing through a checkpoint, others only drivers asked to blow into a device. For speed, some count the hours of enforcement, others the number of vehicles checked. Without harmonisation, comparisons are misleading.

Third, enforcement data are fragmented across agencies. In federal countries, regional police may operate independently, complicating aggregation. Even within a single country, speed enforcement may be managed by traffic police, alcohol enforcement by general patrols, and distraction enforcement by specialised units.

Fourth, comparability is undermined by exposure. A large country with many vehicles will naturally have more checks, so per capita or per vehicle normalisation is essential. Yet not all countries collect the exposure data needed for such adjustments.

Finally, the KPI faces communication challenges. While the concept is simple — more checks mean more intense enforcement — numbers alone may not convince the public. If millions of breath tests are reported, citizens may question their relevance unless presented alongside outcomes. Linking enforcement data to observed behaviours or crash reductions is therefore vital.

3.8.6. Policy relevance and complementarity

Despite these limitations, the Enforcement KPI has high policy value. It provides a direct measure of institutional effort in road safety, complementing behavioural KPIs that capture user compliance.

The relevance is grounded in deterrence theory. If enforcement is weak, compliance is unlikely to improve. By measuring enforcement levels, policymakers can identify gaps and allocate resources. For example, if drink-driving remains common in a country but breath testing rates are low, the KPI makes the case for scaling up enforcement.

The KPI also has symbolic value. Publishing enforcement figures demonstrates transparency and signals commitment to Vision Zero. It allows governments to benchmark themselves and creates peer pressure for improvement.

Complementarity with other KPIs is strong. For speeding, observed compliance can be interpreted only in light of enforcement intensity. If compliance is low despite high enforcement, cultural or infrastructural factors must be addressed. If compliance is high with low enforcement, social norms may be stronger. For seatbelts and distraction, enforcement data explain whether low compliance stems from weak deterrence.

The KPI also links to self-report surveys. If citizens report perceiving enforcement as rare, and data confirm low enforcement levels, the problem is systemic. If perception diverges from reality, communication strategies may need adjustment.

In the Safe System, enforcement is a cross-cutting instrument. It ensures that safe speeds, sober driving, and protective behaviours are not optional. Monitoring enforcement thus reinforces all pillars: safe road users, safe speeds, and safe vehicles.

3.8.7. Conclusions and recommendations

The Enforcement KPI is perhaps the most politically sensitive of the experimental indicators, but it is also one of the most important. It measures the extent to which governments back up road safety laws with real action. Without such a measure, interpretation of compliance and crash data is incomplete. Trendline pilots show that data collection and analysis for the KPI is feasible, though harmonisation is challenging. Speed and alcohol enforcement data are most available, seatbelt and distraction less so. Definitions must be clarified and reporting made transparent.

The proposed options for the KPI on the Enforcement of traffic regulations concern procedures (i.e. controls) and respective results (i.e. tickets) as well as the use of technical equipment (red light or speed cameras). For all four proposed options, data collection does not require on-site measurements. Instead of that, a solid, unhindered cooperation with competent road authorities is necessary. Close cooperation with the Traffic Police and other Authorities is needed to obtain data on enforcement procedures and results that are not freely available. This may be considered a drawback in some cases.

Specific traffic infringements seem of more interest i.e. speeding and drink-driving. Still other infringements should not be overlooked when enforcement methods and results are explored. Methods and procedures for the enforcement of traffic regulations and available data on procedures and results are substantially different among countries. In addition, key road safety problems in each country and associated road safety offences, road user groups, or road types must be considered for the selection of useful KPIs. Therefore, each Member State should choose the most appropriate and useful KPI Enforcement based on applicability and availability of data as well as on the particular needs in the respective country.

Based on the above, no single definition for the KPI enforcement of traffic regulations is provided in the respective methodological guidelines (Laiou et al, 2025). However, minimum methodological requirements for alternative KPI Enforcement options that relate to different aspects of enforcement are provided.

Based on the evidence, the following recommendations can be made:

- Adopt harmonised definitions for what constitutes a check in each enforcement domain.
- Conduct further research on enforcement practices to improve data availability on enforcement effort and effectiveness
- Examine the question of whether it is preferable that drivers are (fully) aware of enforcement systems (e.g. location of speed cameras)
- Assess the possible added value of a centralised system that will include all information on enforcement of traffic regulations procedures, equipment, activities and results
- Publish metadata on legal frameworks and enforcement structures.
- Link enforcement KPI results with behavioural and crash KPIs to demonstrate relevance.

With these steps, the Enforcement KPI can move from experimental to operational status. Its value is clear: by making enforcement measurable, it strengthens accountability, supports cultural change, and provides the missing piece of the road safety monitoring puzzle.

3.9. Alternative speeding KPIs

3.9.1. Context and rationale

Speed remains universally recognised as the single most important determinant of road safety. It is the factor that both triggers the occurrence of crashes and determines their severity. The relationship between speed and injury risk is well established: even small reductions in mean speed can produce disproportionately large decreases in fatalities and serious injuries. Nilsson's power model (2004) and subsequent empirical reviews (Aarts & Van Schagen, 2006) have shown repeatedly that a reduction of only one or two kilometres per hour in average speed can save many lives.

Given this centrality, speed management has been prioritised in almost all European and international road safety frameworks. The European Commission's Road Safety Policy Framework 2021–2030 explicitly identifies speeding as one of the "main killers" on EU roads, alongside alcohol, seatbelt non-use, and distraction. The Vision Zero philosophy, increasingly adopted by Member States, adds a further emphasis: wherever motor vehicles mix with vulnerable road users, urban streets should be designed for speeds no higher than 30 km/h.

To monitor progress, the Baseline project developed the core European KPI on speeding, which calculates the percentage of vehicles travelling within the posted speed limit across selected road types. This core indicator has proven to be valuable, but it also has limitations. By focusing only on legal compliance, it overlooks important aspects of actual risk. Posted speed limits themselves vary across and within countries, complicating comparability. The core indicator does not capture whether drivers are travelling at speeds that are safe for the conditions, even if these remain below the limit. Nor does it highlight the prevalence of extreme speeding—those cases well beyond the limit that contribute disproportionately to crashes. Finally, it tends to produce averages that conceal particularly dangerous sub-groups or locations.

Recognising these limitations, the Trendline consortium explored the concept of some complementary or Alternative Speeding Indicators (ASIs), in particular in relation to speed variation. The ASIs are not intended to replace the core speed KPI but to complement it. Their purpose is to capture risk-relevant aspects of speed behaviour that go beyond simple legal compliance. By broadening the monitoring framework, the ASIs align the measurement of speeding more closely with safety outcomes rather than purely with statutory limits.

Speed variation and its effect on road safety has been investigated in several studies and the results are clear concerning crash risk. On freeways, crash rates increase as the within lane speed variations raise, especially at higher traffic volumes. Higher speeds coupled with greater volume and high between-lanes speed variation also increase crash likelihood (Choudhary et al, 2018). On urban arterials, it has been found that an increase of 1% in mean speed is associated with a 0,7% increase in total crashes, and larger speed variation is also associated with increased crash frequency (Wang et al, 2018).

3.9.2. Definition and scope

The ASI is not a single fixed metric but a family of possible measures. The central idea is to move beyond “percentage of vehicles within the posted limit” and focus instead on speeds that are dangerous in real terms, whether because they are far above the limit or because they are inappropriate for the prevailing conditions.

The minimum requirement for KPI Speed (within Trendline) is to estimate the percentage of vehicles travelling within the speed limit. Besides this indicator, it is needed to also measure the speed below which 85% of drivers are driving (V85), and the average speed (including standard error and standard deviation).

Complementary to these KPIs for speed, Alternative Speeding Indicators were selected to be calculated within Trendline, initially at a small scale. Specifically, the primary Alternative Speeding Indicator was defined as the:

Percentage of vehicles travelling 10km/h or 20km/h or 30km/h faster than the speed limit

in other words, the percentage of vehicles overspeeding by less than or equal to 10km/h, 20km/h or 30km/h.

The proposed intervals of 10, 20 and 30 km/h above the speed limit may or may not match the relevant legislation in the Member States. For comparison reasons, it is a minimum requirement to calculate the KPI using the proposed intervals (i.e. by less than or equal to 10km/h, 20km/h or 30km/h). However, each Member State can additionally calculate the KPI using the intervals that are more meaningful to them taking into account national law provisions.

Given the relevance of the two KPIs, data needed for the development of KPI Speed and Alternative Speeding Indicators are the same but analysed in different ways. Therefore, the minimum requirements set for this Alternative Speed Indicator are those set by the EC for KPI Speed as described in the Commission Staff Working Document SWD (2019) 283. The requirements are quantified and specified for each of the parameters in the respective Methodological Guidelines for ASI (Laiou et al, 2024) which are based on a review of the methodological guidelines on KPI Speed (Laiou et al, 2023) that were developed within the Trendline project.

An additional ASI is also proposed:

Speed variation expressed by the difference between the lowest and highest 10% of speeds
per road type, or
area type, or
speed limit, or
vehicle type

This indicator is calculated as the difference between the 90th percentile speed and the 10th percentile speed for each road type or area type or speed limit or vehicle type. The 10th percentile speed represents the speed below which 10% of the speeds fall, and the 90th percentile speed represents the speed below which 90% of the speeds fall.

3.9.3. Methodology

The methodological foundation of the ASI is broadly similar to that of the core KPI Speed. Both rely on the same data sources: speed measurement equipment such as radar devices, inductive loop detectors, or roadside sensors, placed at representative sample sites across different road types. The sampling strategy again prioritises free-flow speeds, with observations made during uncongested periods to reflect genuine driver choices rather than enforced slowdowns. The minimum requirements for the calculation of ASI are summarized in Table 21.

Table 21. Overview of minimum requirements for KPI Alternative Speeding Indicators

	Minimum requirement	Optional
KPI	• Percentage of vehicles travelling 10km/h or 20km/h or 30km/h faster than the speed limit • Speed variation expressed by the difference between the lowest and highest 10% of speeds per road type or area type or speed limit or vehicle type	• Calculation of the percentage of vehicles overspeeding using the speed intervals over the speed limit that are more meaningful to each Member State taking into account national law provisions.
Scope	• Free flow traffic	• Non-free flow
Location	• Random selection • Representative of entire national road network • Covering the whole geographical area of the country • Measurements should not take place near speed cameras, either fixed or mobile • A minimum traffic flow of at least 10 vehicles passing per hour is required • Locations where the speed limit was changed up to 6 months before the measurements or in between measurements and data analysis should be excluded	• Stratification by Regions
Road type	• Motorway • Expressway including urban express roads • Rural road • Urban road (or road inside urban areas) • Public road inside urban boundary signs	• Differentiate between single and dual lane roads for rural and urban roads • Differentiate between speed limits within rural and urban roads
Vehicle type	• Passenger cars	• Motorcycles • Vans and light trucks • Heavy trucks • Buses
Time period	• Weekdays • Daylight hours • Spring/autumn	• Weekend • Night-time hours

3.9.4. Pilot testing and results

Pilot testing within Trendline was not about enforcing strict harmonisation but about showing the feasibility and usefulness of other variants using the same data sets as used for the core KPI Speed. The emphasis was on feasibility and insight, with the recognition that eventual harmonisation would require a more structured EU-level process.

Following the development of the draft methodological guidelines on KPI ASIs, Finland, Italy, Poland and Portugal expressed their interest to run a pilot implementation and calculate ASI. Data collection and KPI calculations took place between autumn 2024 and spring 2025 in all pilot countries. ASI were calculated according to the respective methodological guidelines and adjusted to the particular needs and interests in each pilot country, to the extent that this was allowed (e.g. overspeeding using other speed intervals).

The pilots carried out under Trendline demonstrated that calculating an ASI is feasible but that results vary considerably depending on the variant chosen. This in itself is an important lesson: methodological choices shape the picture of speeding that emerges.

The implemented pilots did not reveal any methodological issues concerning the calculation of the proposed ASI. Generally, the percentage of vehicles overspeeding decreases at higher overspeeding levels (i.e. 10, 20, 30 km/h over the speed limit) showing a restrained inclination to speeding. In most cases the higher the speed limit is, the higher the speed variation (difference between the lowest and highest 10% of speeds) gets, showing different behaviours towards speeding in different contexts.

In the case of excessive speeding, results consistently showed that while average speeding rates across all drivers were moderate, typically between 20 and 40 per cent, the proportion engaging in excessive speeding, defined as more than 20 km/h above the limit, was small but significant, usually between three and eight per cent. Importantly, this small minority of offenders posed a disproportionate risk, especially on rural roads where speeds are high and protection limited. In general, significant overspeeding was highest on urban roads.

Meaningful overspeeding intervals differ among Member States implying different levels of tolerance against speeding reflected in the respective enforcement practices and sanctions. Overall, the suggested ASI provide a good further insight into overspeeding taking into account national facts on speed limits, distribution of vehicle types and road types.

3.9.5. Challenges and limitations

The pilots also revealed some challenges. One conceptual difficulty is that some of the ASIs are less intuitive and more difficult to communicate than the core KPI Speed.

International comparability also remains a challenge. The strength of the core KPI Speed is that it is legally anchored: the posted speed limit provides a common reference. By contrast, the ASI risks divergence if countries define risk thresholds differently.

3.9.6. Policy relevance and complementarity

Despite these challenges, the Alternative Speeding Indicators have clear policy relevance. They highlight aspects of speed behaviour that the core KPI Speed does not reveal. By focusing on excessive speeding, it identifies the small minority of drivers whose behaviour is particularly dangerous.

Concrete examples illustrate this value. A country may report that 70 per cent of drivers comply with posted limits, suggesting reasonable compliance. Yet the ASI may reveal that five per cent are driving more than 30 km/h above the limit, a group likely responsible for many severe crashes. Another country may report high compliance with 50 km/h urban limits, but the ASI shows that average speeds in 30 km/h zones around schools remain 40–45 km/h. Such findings highlight the need for more context-sensitive speed management.

3.9.7. Conclusions and recommendations

The guidelines for KPI ASI are based on a review of the methodological guidelines on KPI Speed. Therefore, the minimum requirements set for ASI are those set by the EC for KPI Speed as described in the Commission Staff Working Document SWD (2019) 283. The developed guidelines include the minimum requirements to deliver the ASI and recommendations for optional additional speeding measurements. Member States can decide to extend or not their methodology, depending on available means and their own research questions. Data needed for the development of KPI ASI are the same data as for KPI Speed but analysed in a different way. Based on the relevance of ASI with KPI Speed it is suggested that ASI are incorporated into the KPI Speed methodology.

The examined ASI are not the most common or expected KPI regarding speed. However, they allow for a more profound understanding of the actual situation on the road in terms of speed. Thus, it may help better understand existing problems and select the most appropriate measures.

The introduction of Alternative Speeding Indicators represents an important step forward in European road safety monitoring. While the core KPI Speed captures legal compliance, the ASI adds risk sensitivity and highlights extreme behaviours. Together they create a richer and more policy-relevant picture of speeding.

Based on the Trendline experience, it is recommended that excessive speeding, e.g. driving at least 20 km/h faster than the speed limit should be adopted as the baseline ASI, given its feasibility and communicability. ASI results should be integrated with enforcement data, so that extreme speeding behaviours can be linked to the intensity of speed checks. The ASI should be used proactively in communication campaigns to underline the dangers of extreme speeding and to support Safe System thinking, which shifts focus from mere legality to real safety outcomes.

Based on the pilot calculation of ASI it is suggested that in cases where different speed limits exist for the same road type (e.g. rural roads with 70km/h, 80km/h or 90km/h speed limit), the prevailing speed limit is considered. Given the transition phase of urban speed limits from 50 to 30km/h, it is suggested that two different categories are considered for urban roads based on speed limit and are compared to each other.

3.10. Synthesis and discussion

3.10.1. Overview of methodological challenges

Table 22 summarizes the main methodological challenges that were encountered during the development of the methodologies for the experimental KPIs.

Table 22. Main methodological challenges for the experimental indicators

KPI	Challenges
Driving under the influence of drugs	The development of a KPI on drug driving faced legal, ethical, and practical obstacles. Random roadside saliva testing by the police is the most accurate method, but its legality and feasibility differ widely across Europe. In some countries, police resources are insufficient to support large-scale random testing. To address this, three methodological tiers were proposed: (1) gold standard roadside saliva testing with police support; (2) researcher-led saliva testing at service stations; and (3) self-reported surveys as a minimum standard. Each method was defined as a stand-alone KPI, ensuring comparability within but not across methods.
30 km/h on urban roads	Measuring the prevalence of safe speed environments is critical for pedestrians and cyclists. The basic KPI definition, share of 30 km/h road length, was chosen for its simplicity and policy relevance. Yet this ignores other safe options for pedestrians and cyclists, namely physical separation from motorized traffic on urban roads with higher speed limits. More advanced indicators taking these options into account, were piloted but proved difficult to operationalise consistently across Member States.
Compliance with traffic regulations at signalised and non-signalised pedestrian crossings and intersections	Compliance of car drivers and pedestrians with traffic rules at crossings and intersections is a long-recognised road safety issue (Evans, 2004; ETSC, 2001). Developing KPIs for this topic involved challenges of defining low prevalence of violations, differences in traffic control systems and variations in design of crossings, as well as different national traffic rules. Variability of behaviour across peak/off-peak hours, weekdays/weekdays and regions/countries present challenges, and complicates the definition of sample size requirements. Nevertheless the "sanity check" of relationship between the casualty rates and the violation rates showed a statistic relationship, which indicates the representativeness of the KPI.
Helmet wearing by PMD riders	The growing use of e-bikes, e-scooters and other PMDs created a demand for a KPI on protective equipment. The methodological challenge was the lack of standardised PMD categories and very low helmet wearing rates in pilot studies. Moreover, in most countries, there is no legislation for compulsory helmet wearing by PMD riders. The approach taken was to develop a clear taxonomy of PMDs and standardised observation protocols, supplemented with optional automated camera-based methods (Kšicová et al., 2025). Minimum sample sizes were set to ensure statistical reliability.
Self-report behaviour and attitudes	Self-report surveys are cost-effective but could be prone to bias. In developing these KPIs, Trendline drew heavily on experience from the ESRA and SARTRE surveys. Period-based self-reports (e.g. "in the last 30 days") were used to improve recall. Harmonised survey items and weighting procedures were applied to reduce cross-cultural response biases (Silverans & Meesmann, 2025). Attitudinal items were included alongside behavioural self-reports, enabling triangulation.
Light use by cyclists in the dark	Defining "darkness", identifying measurement locations and reliably observing lights were central obstacles. Darkness was operationalised as <26 lux natural light, while observations distinguished between visible, partially visible, and non-visible lights. Roadside surveys were complemented by camera footage, which allowed validation of observer coding (Moreau et al., 2025).
Enforcement of traffic regulations	Enforcement is a cornerstone of road safety policy (ETSC, 2022). Yet enforcement practices and available data vary enormously across Member States. A single definition was not feasible. Instead, Trendline developed a set of options: number of police controls, number of tickets, or number of automated cameras per population. Each country was invited to select the most relevant option, provided minimum methodological standards were respected (Laiou et al., 2025a).
Alternative speeding KPIs	The Baseline speed KPI measures the proportion of vehicles within the speed limit, but this masks gradations of risk. To capture severity, Trendline introduced complementary speeding indicators such as the percentage of vehicles exceeding the limit by more than 10, 20, or 30 km/h (Laiou et al., 2025b). Using the same speed data already collected for the main KPI ensured efficiency. This approach harmonises minimum requirements while allowing national adaptations to reflect specific legislation.

3.10.2. Common methodological challenges

Although the KPIs were very diverse, ranging from direct observation at crossings to national surveys of attitudes and police enforcement statistics, there were similarities in the challenges encountered.

Data availability

The first and perhaps the most fundamental challenge was data availability. For some indicators, such as red-light compliance or pedestrian priority at zebra crossings, the challenge was essentially logistical: observers could be deployed, protocols could be followed, and the data could be generated with relative ease. For others, such as enforcement activity, the data already existed in administrative systems but were not always accessible. Police forces in some countries were reluctant to share operational information, either because they considered it sensitive or because data were fragmented across regions.

Sampling

Sampling and representativeness pose challenges for both observational and survey-based KPIs. Observational data are highly context dependent: driver behaviour at a zebra crossing in a well-designed urban setting may not reflect behaviour in rural areas or at informal crossings. This raises questions about how to construct representative sampling frames. This is a particular challenge for observations on cyclists and other vulnerable road users, since there is less information available about the distribution of their "traffic" than the traffic distribution of cars. Surveys, meanwhile, needed to ensure that online panels adequately reflected national populations. Weighting could correct imbalances, but only if reliable demographic data were available.

Cost, feasibility and sustainability

The pilots provided valuable insights into feasibility. Observational methods proved straightforward to implement for crossings, cyclist lights, and helmet use. They require trained observers but relatively modest resources. If integrated into national monitoring systems, these indicators could be sustained at low cost. Other indicators, such as those for driving under the influence of drugs, require substantial resources. Sustainability will depend on whether data collection can be embedded into existing national or European monitoring systems, or whether dedicated funding is required. Enforcement indicators and data for safe speeds on urban roads rely on administrative data. Their sustainability will depend less on resources than on institutional arrangements. If police forces agree to provide data regularly and in a standardised format, the indicator could be sustained at low cost. But if data remain fragmented or confidential, collection will be inconsistent. Looking forward, automation offers opportunities. Speed and red-light violations can increasingly be recorded automatically. Helmet and light use might be monitored with artificial intelligence applied to video streams. While Trendline tested manual feasibility, sustainability may be best ensured by gradually shifting to automated data collection where appropriate.

Exposure data

Another cross-cutting lesson is the importance of exposure data. Whether measuring speed, infrastructure, or compliance, the question of exposure (road length, lane length, distance travelled, or number of interactions, etc.) is central to have meaningful KPIs. Exposure measures influence not only the value of the KPI but also its interpretation. For example, a country may show a high share of 30 km/h roads but if these are lightly used residential streets, the safety relevance is limited. Similar concerns apply to intersection compliance: counting the proportion of compliant interactions is sensitive to how interactions are defined and sampled. Trendline's methodological guidelines stressed the need for careful definition of exposure units, but further research and expertise development is needed to standardise this aspect across the new KPIs.

Validity

Questions of validity and reliability were raised for several KPIs. Self-reports may be biased by social desirability, though anonymity mitigates this to some extent. Observational methods can be influenced by the presence of observers or by atypical site selection. Enforcement data may reflect not actual activity but the willingness of agencies to report. Despite these concerns, the pilots demonstrated that with clear protocols, transparency, and training, the indicators can produce reliable and valid results.

3.10.3. Methodological dilemmas encountered

Across the approaches adopted, three overarching methodological dilemmas can be distinguished: the trade-off between simplicity and accuracy, the balance between objectivity and feasibility, and the challenge of achieving cross-national comparability under diverse legal and cultural frameworks.

Simplicity versus accuracy was a recurring theme. Indicators such as the share of 30 km/h roads provide an easily understandable measure, directly linked to urban safety policies (Yannis & Michelaraki, 2024). Policymakers can readily interpret the percentage of urban roads with a safe speed limit, and progress over time can be monitored. However, such simplicity risks masking critical nuances. The basic indicator for example does not take other safe options for pedestrians and cyclists into account. Moreover, road safety is affected by actual speeds instead of speed limits, so ideally, actual speeds should be considered instead of speed limits. A similar tension emerged for alternative speeding indicators, where the decision to adopt 10/20/30 km/h thresholds was pragmatic and policy-relevant. But this inevitably overlooks finer-grained patterns of risk that might be captured by continuous measures of speed variance (Choudhary et al., 2018), or the actual speeding values that distinguish between fine levels in different countries. The lesson is that methodological development must strike a balance: an indicator that is too complex may never be implemented (or maybe in one country only), while one that is too simple risks limited validity.

The second dilemma concerned **objectivity versus feasibility**. Observation-based indicators, such as helmet use among PMD riders or light use by cyclists, provide objective behavioural data that can be directly compared across countries. Yet these observations require substantial fieldwork resources and may be limited in scope. By contrast, self-reported behaviour and attitudinal surveys can be implemented quickly and at relatively low cost, and they allow insights into underlying motivations. However, they are inherently subject to biases such as social desirability, recall error, and cultural response tendencies (Silverans & Meesmann, 2025). In Trendline, this tension was addressed by setting clear minimum requirements for observational methods while also validating the use of self-report surveys for specific constructs. The two approaches should be seen as complementary rather than competing: where possible, observational and self-report data can be triangulated to provide a more holistic picture.

The third dilemma involved **cross-national comparability** under diverse legal and cultural frameworks. Nowhere was this more evident than in the KPI on driving under the influence of drugs. In a few Member States, random roadside saliva testing by police is routine and legally supported; in others, it is prohibited or not operationally feasible (Kint et al., 2025). Similarly, enforcement practices vary widely:

some countries rely heavily on automated speed enforcement, while others emphasise manual controls. A rigid, one-size-fits-all KPI definition would have been unworkable. The solution adopted in Trendline was – like it is already the case for the exiting KPI on driving under the influence of alcohol – to define a minimum core methodology, accompanied by options that Member States could choose depending on national feasibility, as long as transparency and documentation were ensured. This flexibility reduces comparability but increases participation, which is critical if KPIs are to be widely adopted.

These three dilemmas are summarised in Table 23, which shows how specific KPIs exemplify the three main challenges and the approach adopted.

Table 23. Overarching methodological dilemmas in KPI development

Dilemma	Examples of KPIs concerned	Approach adopted in Trendline
Simplicity versus accuracy	Share of 30 km/h roads Alternative speeding indicators	Establishment of a simple "minimum" definition (road length and speed limit of 30 km/h or lower; overspeeding thresholds of 10/20/30 km/h) while providing optional refined variants (traffic volume and share of roads with a safe speed limit; alternative thresholds).
Objectivity versus feasibility	Helmet use among PMD riders; Self-reported risky behaviour and attitudes	Minimum reliance on observational protocols, complemented by harmonised self-report surveys to increase scalability; emphasis on triangulation where possible.
Cross-national comparability	Drug driving; Enforcement of traffic regulations	Flexible "menu of methods" adapted to national context, with mandatory transparency on chosen method to safeguard minimum comparability.

Overall, the Trendline experience shows that methodological development of KPIs is as much a process of negotiation and consensus-building as of scientific design. The involvement of KPI Expert Groups proved crucial: experts from multiple Member States brought in diverse perspectives, ensuring that proposed methodologies were not only scientifically robust but also politically and practically feasible. By iterating between theory, piloting, and revision, the project succeeded in defining workable indicators in areas where measurement was previously considered infeasible.

The broader implication for road safety policy is that KPI development should be seen as an ongoing process rather than a one-off task. As new mobility modes emerge, as technology evolves, and as data availability changes, indicators must be periodically reassessed and updated. The Trendline project has shown how such continuous methodological innovation can be achieved at the European level

3.11. Conclusions and recommendations

3.11.1. Main findings and strategic implications

The Trendline project has demonstrated that the development and testing of methodologies for experimental Key Performance Indicators (KPIs) was both feasible and valuable. These indicators address dimensions of road safety that were not previously covered by the European monitoring framework, including behaviours, enforcement, and cultural norms. The pilot exercises confirmed that such indicators can be measured in diverse contexts, even though challenges remain regarding comparability, sampling strategies, and long-term sustainability.

The pilot tests conducted showed that a wide variation in the KPI values of the experimental indicators across Member States. These variations are not only technical but also cultural and institutional in nature. They highlight how norms, practices, and governance structures influence road user behaviour and, ultimately, safety outcomes. The inclusion of such indicators in European monitoring frameworks therefore adds essential information that complements crash statistics and core KPIs.

From a strategic perspective, the implications are significant. Monitoring crashes alone provides information on outcomes but sheds little light on the underlying causes. By systematically tracking behaviours and attitudes, policymakers can identify the levers of change, whether these are related to enforcement practices, infrastructure design, or broader cultural norms. The experimental KPIs complement the existing standard KPIs in operationalising the Safe System principle that responsibility for road safety is shared between users, institutions, and society as a whole.

The indicators also enhance international benchmarking. Cross-country comparisons expose differences in culture, enforcement, and compliance, thereby creating peer pressure for improvement and enabling the exchange of good practices. Benchmarking can help in explaining why some countries achieve stronger safety outcomes than others, despite similarities in infrastructure or vehicle fleets. In this way, the experimental KPIs strengthen the analytical capacity of European road safety policy, offering explanatory insights rather than merely descriptive outcomes.

3.11.2. Lessons from the methodological developments

The Trendline experience underlines that developing KPIs in new or complex domains is not simply a scientific task but also a process of negotiation and consensus-building. The involvement of KPI Expert Groups (KEGs) proved crucial in this respect. By bringing together experts from multiple Member States, the KEGs ensured that proposed methodologies were both scientifically robust and politically feasible. The iterative process of theory development, piloting, and revision resulted in workable methodologies even in areas previously considered too difficult to measure systematically.

This methodological experience suggests that KPI development should not be regarded as a one-off task but as an ongoing process. As new mobility modes emerge, technologies evolve, and data availability changes, indicators must be reassessed and adapted. Trendline has shown how such continuous methodological innovation can be organised at the European level, combining expert consultation with practical field experience.

Some indicators, such as those related to speeding behaviour or self-reported risky behaviour, already appear ready for large-scale implementation. Others, including drug driving and helmet use for personal mobility devices (PMDs), require further refinement. The broader lesson is that developing European-level KPIs requires a careful balance between setting minimum methodological requirements, which is needed for international comparability, and allowing enough flexibility for national adaptation. By managing this balance, Trendline has expanded the monitoring toolkit available to policymakers, while recognising that complete harmonisation is neither feasible nor desirable in every case.

3.11.3. Recommendations

The principal recommendation for **EU Member States** is to adopt harmonised protocols for KPI measurement and integrate some of the experimental indicators into their national road safety strategies. Doing so provides a more comprehensive picture of safety performance and ensures that policy measures are based on evidence covering both outcomes and behaviours. Regular publication of KPI results will enhance transparency and public accountability.

Member States are also encouraged to invest in capacity building for data collection, particularly in areas requiring specialised observation or survey techniques. Collaboration between countries can reduce costs and promote methodological consistency. Finally, Member States should view KPI monitoring not as an isolated exercise but as an integral part of their broader policy cycle, linking data directly to enforcement, infrastructure planning, and communication strategies.

At the **EU level**, the key recommendation is to institutionalise KPI monitoring within the Road Safety Policy Framework 2030 and beyond. This entails supporting Member States with funding, methodological guidance, and training. The Commission should support the further development of minimal requirements and metadata standards to ensure consistency and comparability. Integrating Trendline KPIs into the European Road Safety Observatory will strengthen the Observatory's role as a central hub for monitoring and benchmarking.

Synergies should also be pursued with existing international surveys, such as ESRA, for self-report and attitudinal indicators. This would reduce duplication of effort and promote convergence towards common standards.

4. Use of KPIs in national policies

More details about this topic can be found in the document "The use of KPIs in the policy process. Results of the Trendline Policy Integration Questionnaires" which is available on the Trendline website (https://trendlineproject.eu/trendline-results).

4.1. The importance of integrating KPIs in road safety policies

Within the Trendline programme, the collection of harmonised Key Performance Indicators (KPIs) provides a robust evidence base on safety conditions and risk factors across Europe. Yet the true value of this evidence depends on whether, and how, it is integrated into the processes of policymaking, target-setting, evaluation, and public accountability. Without such integration, data collection and analysis of KPIs risk remaining a technical exercise with limited practical effect.

The importance of policy integration has long been emphasised in road safety literature. The Safe System approach, endorsed at both EU and national levels, underlines that performance indicators must not only measure outcomes but must also guide the design and monitoring of interventions and their behavioural effects. Evidence-based policymaking requires a chain linking measurement to evaluation (see Figure 4.1). If any link is missing, the effectiveness of the system is compromised.

Figure 4.1 From measurement of KPIs to evaluation of effectiveness of measures

Policy integration is also essential for legitimacy and accountability. Citizens, stakeholders, and political leaders need clear signals of progress, expressed in terms they can understand. The eight standard KPIs, and the ten experimental ones for which methodologies have been developed, are not only scientific tools but also communicative devices. When embedded in dashboards, strategies, or campaigns, they become tangible markers of whether policies are delivering.

Policy integration is also vital for sustainability. KPI collection is resource-intensive, and Member States will only continue it beyond Trendline if they see that the indicators have direct value in national strategies, EU frameworks, and wider governance. Thus, this chapter focuses on how Trendline contributes to embedding KPIs in the policy fabric of Europe.

Within Trendline, a Policy Integration Advisory Committee (PAC) was established to explore this critical dimension. Its mandate was to investigate how Member States (MS) actually use KPIs in their road safety policies, how they communicate them to different audiences, and whether they are moving towards target setting and long-term institutionalisation. The PAC also collected and discussed examples of good practice, as well as barriers and enabling factors.

4.2. Methodology

A Policy Integration Advisory Committee (PAC) brought together experts from Member States, research institutes, and advisory bodies, ensuring a mix of policy and scientific perspectives. Membership is given in Appendix 1. The PAC was chaired by SWOV (Letty Aarts). The PAC met four times during 2023–2024. The first meeting (February 2023) defined the scope and designed the initial questionnaire. The second (April 2023, Athens) reviewed the draft questionnaire and refined its questions. The third (September 2023, online) discussed first results and communication strategies. The fourth (October 2024, online) evaluated lessons learned and prepared the second, more structured questionnaire. Between meetings, members contributed to drafts, provided national insights, and reviewed analyses.

Two successive questionnaires were central to the PAC's work.

- **Q1 (spring 2023).** This questionnaire was exploratory, largely consisting of open-ended questions. It asked countries how they used KPIs, at which levels, with which aims, whether they set targets, how they disseminated results, and whether they planned continuation beyond Trendline. This open design allowed diversity of practices to surface.

- **Q2 (winter 2024/25).** This questionnaire was more structured and included mostly multiple-choice questions. This design shift was a direct response to PAC discussions, which highlighted that open answers provided valuable insights but were difficult to compare and quantify. Q2 therefore included closed questions on purposes of use, dissemination channels, and target-setting, alongside limited free-text options.

Responses were collected from 26 of 29 countries for Q1, and from 24 of 29 for Q2. The SWOV team coded open responses into thematic categories (monitoring, evaluation, prioritisation, benchmarking, etc.). Quantitative analysis produced frequency tables and cross-country comparisons. Draft analyses were shared with PAC members for feedback, and revisions were made iteratively. The Q1 results were presented in meetings of the Trendline General Assembly and those of Q2 at the final Trendline conference in The Hague in June 2025.

4.3. Key results of the PAC Questionnaires

4.3.1. Use of KPIs in road safety policies (Figure 4.2)

Almost all participating countries reported that KPIs are used for **monitoring progress in road safety**. In Q1, 24 of 26 respondents listed monitoring as a purpose, and in Q2 this remained the dominant function. Monitoring is typically understood as tracking whether behaviour or conditions (e.g. speed, seatbelt use) are improving or deteriorating over time.

Beyond monitoring, many countries use KPIs for **evaluation of policies**. In Q2, 14 countries mentioned evaluation explicitly—for example, using changes in drink-driving prevalence to assess the effectiveness of enforcement campaigns. Twelve countries reported using KPIs for **prioritisation**: identifying where the greatest risks lie and where interventions should be targeted.

Benchmarking performance with other countries is far less common at present. Most countries primarily focus inward when using KPIs. This may be related to the fact that until recently KPIs of different countries were hardly comparable with each other.

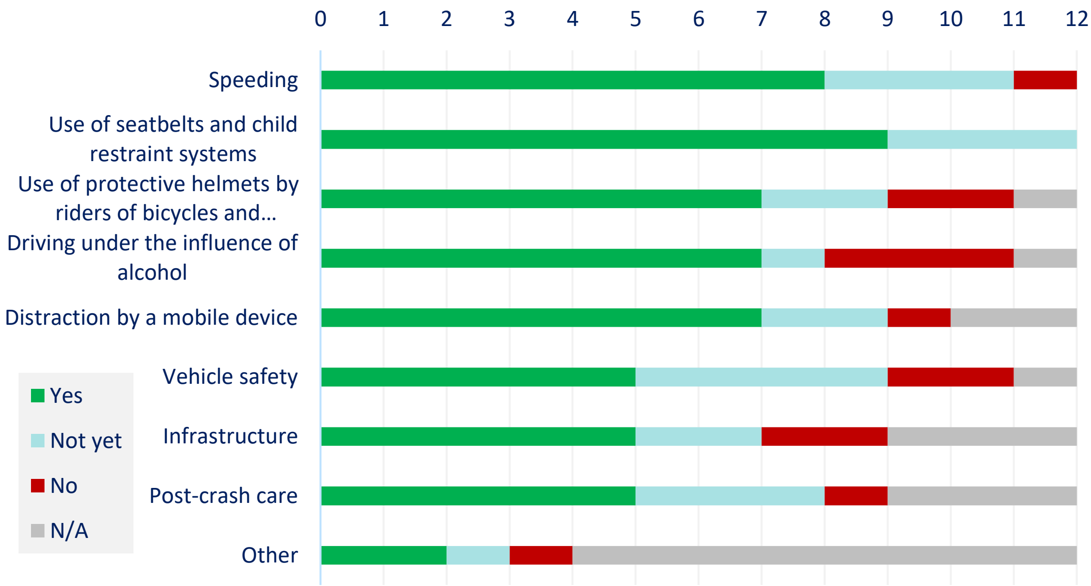
Figure 4.2 Ways in which countries use KPIs in road safety policies on a national level (n = 24) – answers from the second questionnaire.

4.3.2. Levels of use

KPI use currently appears to be concentrated at the **national level**, but regional and local uptake is increasing. In Q1, nine countries reported examples at sub-national levels. Sweden is particularly advanced, with municipalities incorporating KPIs into their Vision Zero programmes. Portugal reported use of speed compliance indicators by local authorities in Lisbon, guiding enforcement strategies. Estonia highlighted local dashboards used by municipalities.

The PAC recognised that regional and local integration is vital for Safe System implementation, since many interventions (implementation of safe road design, urban speed limits, pedestrian crossings, micromobility rules) are decided locally. However, methodological guidance is less developed for these levels, raising questions about sampling and comparability.

4.3.3. KPI target setting (



4.3.4. Figure 4.3)

Target setting is less developed than monitoring. In Q1, only 7 of 26 countries reported KPI targets; in Q2 it was 12 out of 24. Targets were most common for **speeding** and **protective equipment**, less so for infrastructure or post-crash care. It looks that there is still a lot of political hesitancy in setting targets; some governments avoid targets fearing public backlash if they are not achieved. There is also uncertainty in setting the level of targets for KPIs, in particular when the use of KPIs is recent. The key question is how to translate behavioural prevalence into meaningful target values. This cautious movement towards target setting suggests a transitional stage: from measurement to strategic management.

No country intends KPI targets to replace casualty targets. Rather, they are seen as intermediate milestones that complement fatality/serious injury goals.

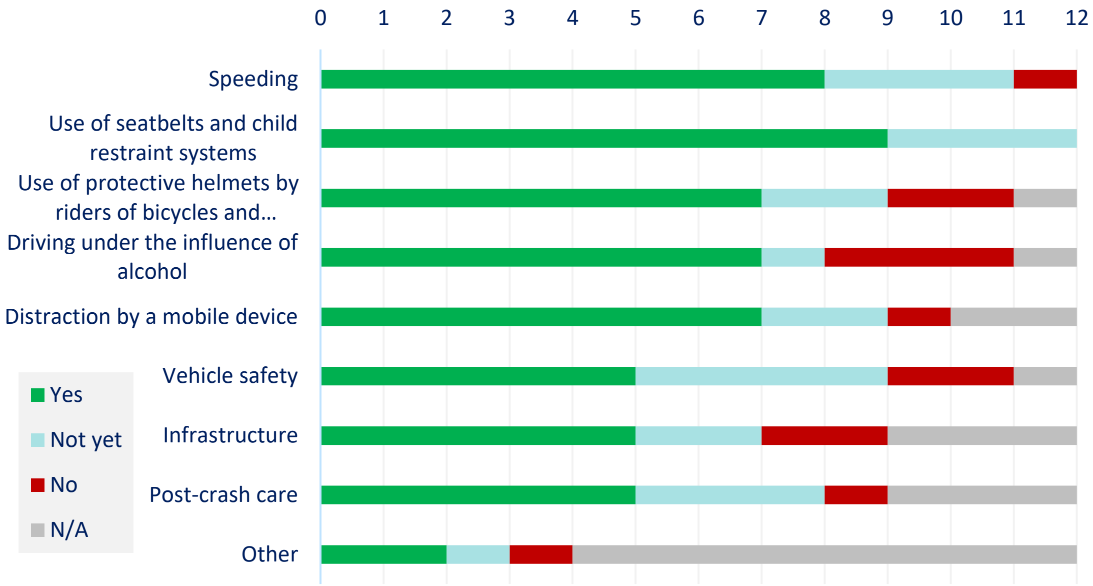


Figure 4.3 KPIs for which targets have been or will be set (n = 12) - answers from Q2.

4.3.5. Dissemination and communication

Dissemination practices appear to vary widely. In Q1, 20 of 25 countries made KPI data public in some form; in Q2, 18 of 24 confirmed general dissemination. The primary audiences are governments, professionals, and stakeholders, but the general public is increasingly targeted. Formats include annual reports, press releases, conferences, and online dashboards – see also Figure 4.4**Fout! Verwijzingsbron niet gevonden.**. Some countries publish detailed methodological notes; others provide only headline numbers. Communication strategies differ: some frame results positively ("90% compliance") to emphasise progress; others negatively ("10% non-compliance") to stress urgency. Such framing choices can influence public and political perception.

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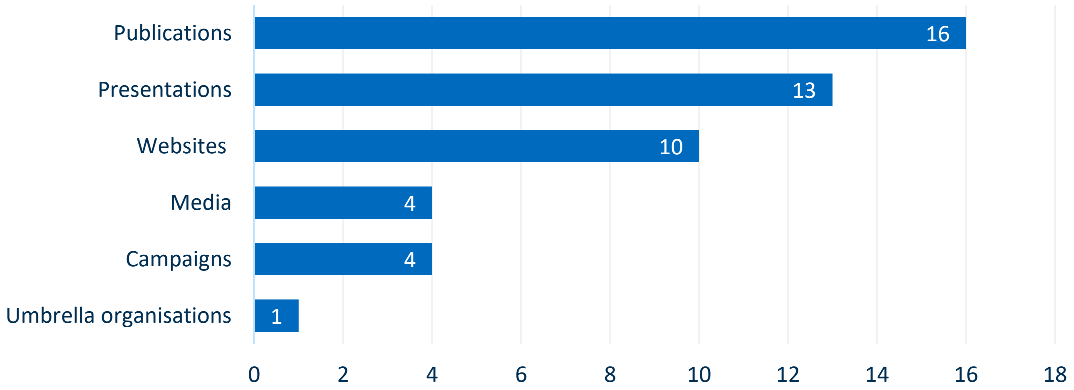

Figure 4.4 Number of countries that mentioned a way of communication - answers from Q1.

A recurring theme was the need for **dashboards** tailored to decision-makers, enabling them to see trends at a glance. Dissemination is not only about transparency but also about creating political momentum.

4.3.6. Role and added value of Baseline/Trendline

For most countries, Trendline was a **catalyst**. It provided methodological guidance, co-financing, and legitimacy. For some, it enabled KPI measurement for the first time (e.g. Bulgaria). For others with mature systems (e.g. Sweden), it added comparability and networking. Overall, Trendline has reinforced the sense of being part of a **European community** working towards common goals. Even countries with strong national practices found value in harmonisation.

4.4. Country case studies and good practices

4.4.1. Sweden

Sweden has been the pioneer of the Vision Zero approach, and the integration of KPIs into its policy cycle is one of the most mature examples in Europe. The Swedish Transport Administration (Trafikverket) has, since the late 1990s, maintained a systematic framework of Safety Performance Indicators (SPIs), which are conceptually identical to KPIs. These indicators are embedded in annual monitoring reports that feed directly into parliamentary discussions on road safety.

At the national level, Sweden monitors seatbelt wearing rates, helmet use among cyclists and motorcyclists, speed compliance, and infrastructure safety ratings. These are not treated as peripheral statistics but as central metrics of whether the Safe System is functioning. Each year, Trafikverket publishes a Vision Zero progress report in which KPI results are presented alongside casualty figures. For example, the proportion of traffic volume on roads with a 2+1 lane layout and median barriers is used as a direct indicator of infrastructure safety improvement.

The system is also target-driven. Sweden sets explicit quantitative targets for several KPIs: reducing the proportion of vehicles exceeding the speed limit by more than 10 km/h, raising seatbelt compliance to above 98%, and expanding the share of safe road infrastructure. These targets are linked to national casualty targets, creating a logical chain of accountability.

Integration also occurs at the municipal level. Large cities such as Stockholm and Gothenburg collect and report their own KPI data, aligning them with national indicators but tailoring them to urban priorities (e.g. pedestrian safety, cycling helmet use, speed compliance in school zones). This creates a cascade effect: KPIs are embedded at multiple governance levels, ensuring coherence between national strategies and local actions.

Links provided by the country:
https://trafikverket.diva-portal.org/smash/get/diva2:1779579/FULLTEXT01.pdf
https://trafikverket.diva-portal.org/smash/get/diva2:1363391/FULLTEXT01.pdf
https://trafikverket.diva-portal.org/smash/get/diva2:1363478/FULLTEXT01.pdf

4.4.2. Slovenia

Slovenia has made remarkable progress in road safety, achieving one of its lowest fatality rates ever, placing Slovenia among the EU's best performers. This success stems from the National Road Safety Programme 2023–2030, based on the Vision Zero approach. The programme emphasizes the protection of vulnerable road users, including pedestrians, cyclists, motorcyclists, children, and older people, and systematically addresses key risk factors such as speeding, alcohol and drug impairment, and driver distraction. To guide successes in this programme, indicators provide essential evidence for adapting measures and aligning with EU best practices.

By combining data-driven monitoring with education, prevention campaigns, and infrastructure improvements, Slovenia is building a strong evidence base for future action. Trendline's continuous measurement ensures accountability and helps policymakers refine strategies to achieve the long-term Vision Zero goal of eliminating road deaths.

4.4.3. Portugal

Portugal has made significant progress in road safety over the past two decades, and Trendline has provided an opportunity to strengthen the country's use of KPIs. What distinguishes Portugal is its regional and municipal-level engagement. During the PAC meeting in Prague (2024), Portugal presented how Lisbon has incorporated KPIs into its local road safety strategies. Speed compliance data, collected through observational studies and automated cameras, is regularly analysed and used to guide enforcement campaigns. For instance, stretches of road with persistently low compliance rates are prioritised for police presence or engineering interventions.

Helmet use on motorcycles and mopeds is another KPI actively monitored and publicised in Portugal. Local campaigns in Lisbon and Porto have used KPI data to design communication messages targeting younger riders, linking compliance to broader narratives of responsibility and modern urban mobility. Dissemination is also advanced. Portugal has developed dashboards accessible to both policymakers and the public, displaying KPI trends alongside casualty data. These dashboards are intended to foster transparency and trust, while also providing researchers and journalists with reliable information. The framing of results is consciously positive, highlighting progress while acknowledging remaining challenges.

Integration extends to national policy as well. The Portuguese National Road Safety Strategy makes explicit reference to KPIs as part of its monitoring framework. Though targets are not yet formalised for all indicators, discussions are ongoing about including them in the next revision of the strategy. Portugal's example demonstrates that KPI integration does not need to remain at the national level: it can be cascaded down to municipalities, enabling targeted local action. The Portuguese approach also highlights the importance of accessible communication tools, which ensure that KPI data becomes part of the public conversation about safety.

4.4.4. Estonia

Estonia, while smaller in size, has shown innovation in the communication of KPIs. Its national authorities have invested in designing user-friendly dashboards that present KPI results in ways that are easy for both policymakers and the general public to interpret. The Estonian dashboard provides interactive graphs showing trends in speed compliance, alcohol-related crashes, and protective equipment use. Importantly, it allows breakdowns by region, road type, and demographic group. This functionality helps local authorities identify their specific challenges and tailor interventions accordingly.

PAC members noted Estonia's strength in framing results. Rather than only presenting "negative" statistics (e.g. % non-compliance), the Estonian dashboard often emphasises positive achievements, such as improvements in seatbelt wearing over time. This approach was seen as effective in maintaining political support and public confidence.

Estonia also integrates KPIs into broader mobility policies. For example, indicators on helmet use and cycling safety are cross-referenced with data from sustainable mobility planning, ensuring alignment between safety and environmental goals. This cross-sectoral integration strengthens the political relevance of KPIs.

At the PAC meeting in Prague, Estonia presented its communication strategy, including partnerships with local media to disseminate KPI results and explain their significance. By linking indicators to stories about everyday behaviour, Estonia ensures that KPIs are not abstract numbers but relatable messages. Estonia's example illustrates how even a small country can use KPIs as powerful communication and governance tools, bridging the gap between technical monitoring and public understanding.

4.4.5. Bulgaria

Bulgaria offers an instructive example of how programmes like Baseline and Trendline can act as a catalyst for countries with limited prior experience in KPI collection. Before Bulgaria participated in Baseline, the country had not conducted systematic measurements of many indicators. With the project's support, Bulgaria implemented observational studies of seatbelt and helmet use, as well as surveys on driver behaviour. These first data collections provided a baseline that could be used in national debates. The very existence of KPI data created political momentum: it was harder for policymakers to ignore problems once they were documented quantitatively.

When the current road safety strategy was drafted in 2020, no KPI targets were defined, as no reference data were available at that time. Now, however, as the KPI evaluation process has advanced, these indicators are regarded as a core element of the national road safety monitoring framework. At the time of finalising this report, a revision of the National Road Safety Strategy 2021–2030 was underway. The proposed monitoring model will include several KPIs: speed, distraction, helmet use, seat belt use, and the use of child restraint systems. The baseline and current values for these indicators have been derived directly from the project results.

Bulgaria's experience also highlights challenges. Funding and institutional capacity remain fragile, and there is a risk that KPI collection could lapse once EU funding ends. Hence the importance of embedding these new practices in permanent institutions and aligning them with other monitoring frameworks (e.g. ETSC PIN). Nonetheless, Bulgaria's case shows that European projects can initiate transformative change. What was previously absent - the systematic measurement of safety performance - has now become part of the national conversation.

4.5. Conclusions

The key findings on policy integration are:

(1) **Variation in the level of maturity.** Across the EU there is a wide spectrum of maturity in the use of KPIs. Some countries, such as Sweden and Estonia have advanced evaluation systems and explicit targets, while others, including Bulgaria and Romania, are still at an early stage. Most Member States are gradually progressing from basic monitoring to more systematic evaluation and target setting.

(2) **Dissemination tuned to target and audience**. How results are communicated has a decisive impact on engagement. Transparency and clarity help policymakers, practitioners, and the public to understand and use the information. Dashboards are emerging as important tools, while framing also plays a role: in some countries positively formulated messages are more likely to foster involvement than those framed negatively.

(3) **Target setting is developing.** The establishment of measurable targets remains politically delicate. Governments often hesitate, fearing accountability if goals are not met. Nonetheless, there is increasing evidence that clear targets are associated with sustained reductions in fatalities and injuries. The challenge is to balance political caution with the benefits of explicit commitments.

(4) **Catalytic role of Baseline and Trendline.** Both Baseline and Trendline have served as catalysts by providing methodological guidance, financial support, and opportunities for peer learning. This has enabled less experienced countries to build capacity and allowed more advanced systems to benefit from harmonisation. Even Member States with established monitoring infrastructures gained from the shared frameworks.

(5) **Sustainability and institutional embedding**. Lasting progress requires institutionalisation and secure budgets. Without such embedding, achievements risk remaining temporary. Sustainability is strengthened when KPI use is aligned with other frameworks such as the Sustainable Development Goals, and Sustainable Urban Mobility Plans, ensuring that KPI monitoring becomes a durable element of policy cycles.

5. Conclusions and recommendations

5.1. Introduction

The Trendline project (2022–2025), co-funded by the European Union, represents the most comprehensive European effort to date in the development, collection, analysis, and policy integration of road safety performance indicators (KPIs). Building on the experience of the Baseline project (2020–2022), Trendline sought not only to refine the methodologies for the eight standard KPIs established by the European Commission in 2019, but also to expand the framework by piloting ten new experimental indicators addressing emerging risk domains. Together, these efforts aimed to provide a more complete and policy-relevant understanding of the behavioural, infrastructural, and systemic conditions that shape road safety outcomes.

The conclusions presented in this chapter synthesise the evidence generated by Trendline across its technical and policy dimensions. They take into account the results of the standard KPIs, the lessons from developing and piloting experimental indicators, the methodological obstacles encountered, and the perspectives gathered from Member States on the use of KPIs in policy frameworks. They also draw on comparative insights from the Baseline project and align with the long-term strategic ambitions of the European Union: halving road deaths and serious injuries between 2020 and 2030, and approaching Vision Zero by 2050.

The chapter is structured as follows. Section 5.2 presents a summary of findings from Trendline across key dimensions: results on standard and experimental KPIs, methodological progress, policy integration, capacity building and cross-cutting lessons. Section 5.3 formulates recommendations, addressed respectively to the European Commission, Member States, and the research community. Section 5.4 looks ahead towards the 2030 and 2050 horizons, highlighting priorities for sustaining and expanding KPI-based monitoring in support of the Safe System approach.

5.2. Summary of findings

5.2.1. The standard KPIs

Trendline consolidated and extended the collection and analyses of the data for the KPIs first introduced in the EU Road Safety Policy Framework 2021–2030. Across 25 participating Member States and several observers, data were collected for seven of the eight indicators (all except infrastructure). Compared to Baseline, participation widened, methodological adherence improved, and cross-country comparability increased.

For **speeding**, compliance remains a big challenge. While modest improvements were observed relative to Baseline, compliance remains low in many countries, especially on urban roads where it often falls below 50%. Speeding seems to be deeply ingrained in many traffic cultures. Urban settings are particularly concerning as vulnerable road users face the greatest danger there.

For the use of **safety belts and child restraint systems**, driver seat-belt use is generally high, with motorway values often above 95%. However, rear-seat use continues to lag significantly, with some countries reporting levels below 50%. Child restraint systems show widespread misuse, even where nominal use is high.

As regards wearing **helmets**, powered two-wheeler use is almost universal with exception of two countries, making it a success story of road safety policy, legislation and enforcement. Correct fastening is, however, less consistent. Cyclist helmet use shows wide variation, from below 10% in some Member States to above 70% in others. This reflects differences in cultural acceptance, infrastructure, and policy context.

For driving under the influence of **alcohol**, results differ by country but also by method. Random roadside breath testing and trip-based surveys show high overall compliance, typically above 98%. However, even a small percentage of 2% non-compliance implies approximately five million drivers under the influence[10]. Furthermore, period-based surveys indicate lower compliance, up to 93%. Comparability across countries is limited by the coexistence of three methods, but the findings underline both progress and persisting challenges, such as risk concentrations at weekend nights and among male drivers.

The Trendline results for **distraction** by mobile phone show that most countries report over 90% compliance (no handheld phone use while driving). It is important to note however the KPI does not take into account drivers distracted by operating a fixed mobile phone or onboard screen. Furthermore, the spread between lowest and highest performing countries remains wide, and younger drivers continue to exhibit significantly higher risk. Professional fleets (light goods vehicles and heavy goods vehicles) also show lower compliance in several Member States.

When it comes to **vehicle safety**, the KPI confirmed that the proportion of new cars with a Euro NCAP rating above the defined threshold is high (generally 80% or higher) reflecting both market trends and regulatory requirements. The additional 0-5-year indicator broadens fleet coverage. Expanding the KPI to cover the whole fleet would be desirable but remains a considerable methodological challenge.

For **post-crash care**, Trendline confirmed the feasibility of measuring response times in some Member States, but coverage remains uneven. Significant differences persist in response times for some periods, often weekday nights facing delays well above the 95th percentile thresholds. The eCall technology seems promising in reducing delays.

The **infrastructure KPI** was not measured and compared at European level due to the lack of funding for this indicator – although a few Member States undertook data collection with their own resources.

Overall, the standard KPIs confirm their feasibility, relevance, and diagnostic power. They reveal both improvements and persistent gaps across Member States, offering a valuable basis for evidence-based policy and benchmarking. At the same time further harmonisation, and broader participation for some KPIs are essential to increase the comparability and impact of results.

[10] On basis of 259 million registered passenger cars in EU countries in 2024 (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Passenger_cars_in_the_EU)

5.2.2. Experimental KPIs

An important innovation of Trendline was the selection, development and piloting of ten new experimental KPIs. These addressed domains insufficiently covered by the standard set: drug driving, compliance at crossings and intersections, 30 km/h urban limits, enforcement, micromobility (helmet use by PMD riders), alternative speeding indicators, cyclist lights, and self-reported behaviours and attitudes.

The development process was rigorous, involving expert groups, literature reviews, pilots, and iterative refinement. Despite challenges, all ten indicators were successfully defined, and pilot results were produced in multiple Member States.

The pilots demonstrated both feasibility and policy relevance. For example, the KPI on **driving under the influence of drugs** revealed measurable though low prevalence in several Member States but highlighted strong legal and methodological barriers to comparability. The **30 km/h indicator** confirmed its simplicity and policy relevance but also its limitations in capturing exposure. **Compliance at crossings** proved highly relevant to vulnerable road users, though requiring careful contextualisation due to variability in infrastructure design. The **PMD helmet indicator** revealed very low helmet wearing rates, underscoring an urgent policy gap in a growing transport mode. **Self-reported attitudes and behaviours** proved complementary to observational data, opening a window into safety culture and enabling triangulation. Although the feasibility of implementing the **enforcement** indicators may vary between countries (mainly linked to the availability of national databases) the policy relevance is obvious as well as their communication potential.

Taken together, the experimental KPIs show that the scope of road safety monitoring can and should be expanded beyond the original eight indicators. However, they also reveal the methodological and institutional work required to embed new measures sustainably across Europe.

5.2.3. Methodological progress and comparability

Trendline significantly advanced methodological harmonisation. Clearer minimum requirements, improved sampling guidelines, and validation procedures raised the comparability of results relative to Baseline. The involvement of KPI Expert Groups (KEGs) ensured both scientific rigour and practical feasibility. Nevertheless, comparability remains uneven across indicators and countries. Survey-based methods, in particular, continue to face challenges of harmonisation, representativeness, and cultural bias.

The project also surfaced cross-cutting dilemmas: the trade-off between simplicity and richness, the difficulty of defining exposure measures, and the balance between harmonised rules and national flexibility. Addressing these dilemmas will be essential for future KPI development.

5.2.4. Integration into national policies

Trendline placed stronger emphasis than Baseline on policy integration, through the Policy Integration Advisory Committee and national policy questionnaires. Results show that Member States increasingly recognise the value of KPIs for monitoring, target-setting, and communication. More than half of the participating countries already embed KPIs in one way or another in their monitoring frameworks. Others are at earlier stages, with Trendline acting as a catalyst for institutional uptake. In many countries, setting adequate targets for the KPIs remains a challenge.

A key lesson is that KPI integration requires more than methodological guidance: it depends on political commitment, institutional capacity, and sustained funding. Dissemination strategies and capacity-building efforts proved vital in countries with limited prior experience.

5.2.5. Contribution to capacity-building and knowledge transfer

Like Baseline, Trendline played a crucial role in capacity-building. For several Member States, participation in Baseline or Trendline represented their first systematic involvement in KPI data collection. The project provided methodological support, tools, and training, thereby strengthening national capabilities. It also fostered a European community of practice, linking researchers, practitioners, and policymakers. The spill-over of Trendline experience to neighbouring regions, such as the Western Balkans, illustrates its broader influence.

5.2.6. Cross-cutting lessons

Several cross-cutting lessons emerge from Trendline:

- **Governance and institutionalisation**: Successful KPI integration depends on clear institutional ownership, political commitment, and adequate resources. Projects can catalyse uptake, but sustainability requires embedding in permanent structures.
- **Methodological harmonisation vs. flexibility**: Harmonised definitions and minimum requirements are essential for comparability, yet flexibility is needed to accommodate national contexts. The balance between these principles must be carefully managed.
- **Data infrastructure and digitalisation**: Investment in digital tools, databases, and automated observation methods can improve feasibility, accuracy, and comparability. Linking KPI data with other transport and health datasets can increase policy relevance.
- **Policy relevance**: KPIs gain traction when they are visibly linked to national targets, enforcement strategies, and communication campaigns. Dissemination is key: indicators must be presented not only to experts but also to decision-makers and the public.
- **Capacity building and peer learning**: Countries with limited prior experience benefited strongly from methodological support and peer exchange. Continued training and mentoring will remain essential for achieving convergence across Europe.

5.2.7. Trendline in the wider European safety landscape

Trendline's significance extends beyond its immediate outputs. By consolidating a pan-European KPI practice, the programme contributes to a durable evidence base for policy at EU and national levels. It also helps align measurement practices among Member States, supports target-setting informed by intermediate indicators, and cultivates an interdisciplinary community around KPI use.

From a governance perspective, Trendline illustrates how distributed innovation can be organised: common minimums for comparability, transparent documentation of national variations, and iterative guideline development rooted in pilots and peer review within the KEGs. In areas where measurement was previously considered impractical, such as drug driving or pedestrian/cyclist compliance at crossings, the programme has opened pathways for feasible, policy-relevant indicators while making explicit the limitations and trade-offs.

Finally, the programme demonstrates that KPI development is not a one-off task but a continuous process. As mobility technologies and behaviours evolve (e.g., e-scooters, connected vehicles), as legal frameworks change, and as data sources improve (e.g., richer infrastructure or vehicle datasets), indicators must be re-assessed, updated, and sometimes re-designed. Trendline offers both the institutional mechanisms (KEGs, TC, PAC) and the shared culture needed to sustain this ongoing work.

5.3. Recommendations

Based on the experience gained in Baseline and Trendline, the Trendline consortium has formulated several recommendations. These recommendations are targeted at the European Commission, the public authorities in the Member States, and the research community.

5.3.1. Recommendations to the European Commission

1. **Sustain and expand KPI monitoring** by establishing a permanent European KPI framework, embedded in ERSO and supported by stable funding for national data collection.
2. **Ensure coverage of all eight standard KPIs**, with particular investment in infrastructure data collection.
3. **Consolidate experimental KPIs** and moving the most promising towards mainstream adoption and full integration in a European framework for road safety performance monitoring.
4. **Support methodological harmonisation** by providing updated EU guidelines, common survey instruments, and shared databases.
5. **Underpin capacity-building and facilitate knowledge exchange** through regular workshops, training, and benchmarking exercises, building on the Trendline community of practice.

5.3.2. Recommendations to Member States

1. **Institutionalise KPI collection** as a regular national activity, supported by clear mandates and adequate budgets.
2. **Embed KPIs in national strategies**, using them for target-setting, monitoring, and evaluation.
3. **Prioritise high-risk gaps**, such as, for example, rear-seat belt use, CRS misuse, cyclist helmets, weekend night alcohol use, and young driver distraction.
4. **Leverage KPIs for enforcement planning**, targeting times, locations, and groups with higher non-compliance.
5. **Invest in data infrastructure**, including digital platforms, to facilitate KPI collection, storage, and dissemination (e.g., for KPIs on post-crash care, enforcement, vehicle safety and 30 km/h)
6. **Engage stakeholders and the public**, using KPIs as communication tools to raise awareness and accountability.

5.3.3. Recommendations to the research community

1. **Advance methodological innovation**, particularly in exposure measures, self-report validation, and automated observation methods (e.g., camera and AI technologies).
2. **Triangulate data sources**, combining observational, self-report, and administrative data for richer insights.
3. **Provide insights into target setting approaches** for KPIs, for use at local, national and European level.
4. **Contribute to harmonisation** by developing shared instruments and protocols, and by participating actively in European working groups on KPIs.

5. **Expand evaluation research**, linking KPI trends to crash outcomes to strengthen causal understanding.
6. **Support policy translation**, working with authorities to ensure KPI findings inform practical interventions.

5.4. Looking ahead

The Trendline project represents a milestone in European road safety monitoring. It confirms that systematic KPI collection is feasible, valuable, and policy-relevant. Yet achieving the EU's 2030 and 2050 targets will require continued investment, methodological refinement, and stronger policy integration.

Looking forward, three priorities stand out:

1. **Consolidating and institutionalising KPI monitoring**: embedding regular KPI collection in national and EU systems, with secure funding and governance arrangements.
2. **Expanding the KPI framework**: integrating selected experimental KPIs into the standard set, while continuing to develop new indicators for emerging risks (e.g., automation, connected mobility).
3. **Strengthening the policy value chain**: ensuring that KPI results directly inform strategy, target-setting, enforcement, and communication, thereby making the indicators an active driver of progress.

To ensure continuity towards 2030 and 2050 targets, KPI monitoring must move beyond project-based cycles. This requires:

- A **permanent European observatory function** coordinating KPI data.
- **National legal mandates** for regular KPI reporting.
- **Stable co-funding mechanisms** to support resource-intensive indicators.
- Integration of KPI monitoring into **wider transport and health data systems**.
- Regular **independent evaluations** of methodology and policy impact.

The long-term vision of zero deaths and serious injuries on Europe's roads remains ambitious but attainable. KPIs are the operational bridge between that vision and day-to-day practice. Trendline has provided the evidence, methodologies, and institutional momentum to carry this agenda forward. The task now is to sustain and expand these efforts, ensuring that KPI monitoring becomes a permanent and powerful tool in Europe's road safety governance.

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Appendix. People and organisations involved in the Trendline programme

Trendline partners

No	Short Name	Legal Name	Country
1	SWOV	Institute for Road Safety Research (Trendline coordinator)	The Netherlands
2	BMIMI	(Federal Ministry of Innovation, Mobility and Infrastructure)	Austria
3	VIAS	Vias institute	Belgium
4	BGSARS	State Agency Road Safety	Bulgaria
5	FPZ	University of Zagreb Faculty of Transport and Traffic Sciences	Croatia
6	MTCW	Ministry of Transport, Communications and Works	Cyprus
7	CDV	Centrum dopravního výzkumu, v.v.i.	Czechia
8	DRD	Danish Road Directorate	Denmark
9	VTT	Teknologian tutkimuskeskus VTT	Finland
10	DSR	Délégation à la Sécurité Routière	France
11	BAST	Federal Highway Research Institute	Germany
12	MIT	Ministry of Infrastructure and Transport	Greece
13	KTI	KTI Magyar Közlekedéstudományi és Logisztikai Intézet Nonprofit Kft.	Hungary
14	RSA	Road Safety Authority	Ireland
15	CTL	Sapienza Università di Roma - Centro di ricerca per il Trasporto e la Logistica	Italy
16	CSDD	Road Traffic Safety Directorate	Latvia
17	TKA	Transport Competence Agency	Lithuania
18	MMTP	Ministère de la Mobilité et des Travaux publics	Luxembourg
19	ITS	Instytut Transportu Samochodowego	Poland
20	ANSR	Autoridade Nacional de Segurança Rodoviária	Portugal
21	MTI	Ministry of Transport and Infrastructure	Romania
22	RAR	Romanian Automotive Register	Romania
23	UNIZA	University of Zilinia	Slovakia
24	AVP	Slovenian Traffic Safety Agency	Slovenia
25	DGT	Directorate-General for Traffic	Spain
26	STA	Swedish Transport Administration	Sweden

National coordinators for Trendline

Austria: Alexander Nowotny, BMK (Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology), now BMIMI (Federal Ministry of Innovation, Mobility Infrastructure).
Belgium: Peter Silverans, Sofie Boets (Vias institute)
Bulgaria: Malina Kroumova (State Agency Road Safety)
Croatia: Marko Ševrović, Marijan Jakovljević (FPZ)
Cyprus: Elpida, Epaminonda, Michalis Karantanos (MTCW-PWD)
Czechia: Tomáš Neřold (Ministry of Transport)
Denmark: Anne Eriksson, Anders Møller Gaardbo (Danish Road Directorate)
Estonia: Maria Pashkevich (Estonian Transport Administration)
Finland: Fanny Malin, Ida Maasalo and Johannes Mesimäki (VTT Technical Research Centre of Finland). Riikka Rajamäki and Anne Silla (Finnish Transport and Communications Agency Traficom; Noora Airaksinen and Maija Rekola (Finnish Transport Infrastructure Agency).
France: Manuelle Salathe, Helga Mondesir (ONISR)
Germany: Markus Schumacher, Tobias Panwinkler (BASt)
Greece: George Yannis, Katerina Folla (NTUA), Efstratios Georgiopoulos & Manos Parissis (Directorate of Road Traffic & Safety in the Ministry of Infrastructure & Transport)
Hungary: Gábor Pauer, Nóra Krizsik (KTI)
Ireland: Sharon Heffernan, Paul Deane (RSA)
Italy: Davideshingo Usami (CTL)
Latvia: Juris Kreicbergs (CSDD)
Lithuania: Evaldas Morkūnas, Mindaugas Katkus (Transport Competence Agency)
Luxemburg: Yanik Scolastici (Ministry of Mobility)
Malta: David Sutton (Transport Malta), Pierre Vella (Malta Road Safety Council)
Netherlands: Esther Veldkamp (Ministry of Infrastructure and Water Management), Letty Aarts (SWOV)
Norway: Garnes Marte Lillehagen (Ministry of Transport), Arild Engebretsen (Norwegian Public Roads Administration)
Poland: Dagmara Jankowska - Karpa (ITS – Motor Transport Institute)
Portugal: Augusto Torbay (ANSR)
Romania: Victor Tache (MTI), Mihai Grigore, Cătălin Cosmulescu, Serban Urjan (RAR)
Slovakia: from 01.02.2025: Pavol Kudela, University of Zilina; from 01.12.2023: Michal Cingel, University of Zilina; until 30.11.2023: Michal Zábovský,University of Zilina; Roman Török, Ministry of Transport of the Slovak Republic
Spain: From National Road Safety Observatory (ONSV) of Directorate-General for Traffic (DGT): Álvaro Gómez Méndez, Ángel Martín Serrano, Jesús Eloy Bedoya Chocán, Sheila Ferrer López, Cristina Heras Cuesta, Francisco González Sánchez, Diego Juárez Rodríguez, Maria del Pilar Sánchez Obama, Carlos Cárceles López-Briones, Enrique Vivar González, Dolores Rodríguez Rodríguez-Grandjean, Elena González De Vega López, José Ramón Calvo Querol, Julio Pérez de la Paz.
Sweden: Peter Larsson (Swedish Transport Administration), Anna Vadeby, Åsa Forsman (VTI)
Switzerland: Thomas Spillman (ASTRA), Steffen Niemann (Swiss Council For Accident Prevention)

Overall coordination

Trendline Coordination Team (TCT)

Agnieszka Stelling (SWOV-chair) & Wouter Van den Berghe (SWOV-chair), The Netherlands
Peter Silverans (VIAS institute), Sofie Boets (VIAS institute), Belgium
George Yannis (NTUA), Katerina Folla (NTUA), Greece
Ketino Popiashvili (CDV), Jiří Ambros (CDV), Czechia

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Agnieszka Stelling (SWOV), Wouter Van den Berghe (SWOV), Frits Bijleveld (SWOV), The Netherlands
Sofie Boets (VIAS), Belgium
Veronika Valentova (CDV), Jan Elgner (CDV), Czechia
George Yannis (NTUA), Katerina Folla (NTUA), Greece

Members of the Key Expert Groups (KEGs) for the eight standard KPIs

Speed:

- Alexandra Laiou, NTUA (Greece) - chair
- Anna Vadeby, VTI (Sweden)
- François Riguelle, AWSR (Belgium)
- Ingrid Van Schagen, SWOV (The Netherlands)
- João Cardoso, LNEC (Portugal)
- Pawel Tutka, WUT (Poland)
- Davide Shingo Usami, CTL (Italy)
- Naomi Wardenier, VIAS (Belgium)

Safety belt:

- Eva Kšicová, CDV (Czech Republic) - chair
- Veronika Valentova, CDV (Czech Republic)
- Philippe Lesire, LAB (France)
- Alexandra Laiou, NTUA (Greece)
- Alain Aréal, PRP (Portugal)
- Åsa Forsman, VTI (Sweden)

Protective equipment (helmet):

- Eva Kšicová, CDV (Czech Republic) - chair
- Nathalie Moreau, VIAS (Belgium)
- Anna Zielinska, ITS (Poland)
- Anna Vadeby, VTI (Sweden)
- Alain Aréal, PRP (Portugal)
- Sheila Ferrer López, DGT (Spain)
- Maria João Da Silva Barros, ANSR (Portugal)

Driving under the influence of alcohol:

- Sofie Boets (Belgium) - chair
- Sjoerd Houwing, CBR (The Netherlands)
- Åsa Forsman, VTI (Sweden)
- Simone Klipp, (Germany)
- Katerina Folla, NTUA (Greece)
- Alain Areal, (Portugal)
- Dagmara Jankowska-Karpa, ITS (Poland)
- Uta Meesmann (Belgium/ESRA)

Distraction:

- Agnieszka Stelling, SWOV (The Netherlands) - chair
- Sofie Boets, VIAS (Belgium)
- Brayan González Hernández, CTL (Italy)
- Dagmara Jankowska, ITS (Poland)
- Peter Larsson, Trafikverket (Sweden)
- Markus Schumacher, BASt (Germany)
- Sandra Vieira, LNEC (Portugal)
- Apostolos Ziakopoulos, NTUA (Greece)

Vehicle Safety:

- Naomi Wardenier, VIAS (Belgium) - chair
- Adrian Hellmann, BASt (Germany)
- Pete Thomas, Loughborough University (UK)
- Matteo Rizzi, STA (Sweden)
- Katerina Folla, NTUA (Greece)
- Diane Cleij, SWOV (Netherlands)
- Richard Schram and Aled Williams, Euro NCAP
- Jean-François Gaillet, Vias (Belgium)

Post-crash care

- Wouter Van den Berghe, SWOV & Wendy Weijermars, SWOV (The Netherlands) - chair
- Åsa Forsman, VTI (Sweden)
- Nina Nuyttens, Vias (Belgium)
- Katerina Folla, NTUA (Greece)
- Maria Segui Gomez (Spain)

Infrastructure:

- Anastasios Dragomanovits, NTUA (Greece) - chair
- Jiri Ambros, CDV (Czech Republic)
- Fanny Malin, VTT (Finland)
- Marco Irzik, BASt (Germany)
- João Cardoso, LNEC (Portugal)
- Simon Sternlund, Trafikverket (Sweden)
- Govert Schermers, SWOV (The Netherlands)

- Wouter Van Den Berghe, SWOV (The Netherlands)
- Milan Tesic, Road Traffic Safety Agency (Serbia)

Members of the Key Expert Groups (KEGs) for the experimental KPIs

Driving under the influence of drugs

- Sander van der Kint – chair, Agnieszka Stelling, Wouter Van den Berghe (SWOV, The Netherlands)
- Helga Mondésir & Manuelle Salathé (ONSR, France)
- Veronika Kurečková, Martina Trepáčová (CDV, Czechia)
- Sofie Boets, Mathias de Roeck, Uta Meesmann (VIAS, Belgium)
- Ana Coroado, Augusto Torbay (ANSR, Portuga), Alain Areal (PRP)
- Julio Perez Paz (DGT, Spain)
- Åsa Forsman (VTI, Sweden)
- Simone Klipp (BASt, Germany)
- Katerina Folla (NTUA, Greece)

30 km/h on urban roads

- Wendy Weijermars - chair, Wouter Van den Berghe, Teun Uijtdewilligen & Jan-Hendrik Van Petegem (SWOV, The Netherlands)
- Anastasios Dragomanovits (NTUA, Greece))
- Helga Mondésir & Manuelle Salathé (ONSR, France)
- Maria Georgieva (SARS, Bulgaria)
- Johannes Mesimäki (VTT, Finland)
- Elisabete Rodrigues & Augusto Torbay (ANSR, Portugal); Ana Vidigal, Ana Amaro & Fernando Rosa (CML, Portugal)
- Simon Sternlund, Lars Ekman & Mats Pettersson (Trafikverket, Sweden)

Compliance with traffic rules on signalized pedestrian crossings and intersections
Compliance with traffic rules on unsignalized pedestrian crossings and intersections

- Jiří Ambros – chair, Martin Šípek (CDV, Czechia)
- Leonid Ljubotina, Marko Ševrović, (University of Zagreb - FPZ, Croatia)
- Nóra Krizsik (KTI, Hungary)
- Paul Deane (RSA, Ireland)
- Juris Kreicbergs (CSDD, Latvia)
- Sandra Vieira (LNEC, Portugal)
- Michalis Karantanos (Ministry of Transport, Communications and Works, Cyprus)
- Helga Mondésir (ONISR, France)
- Katerina Folla (NTUA, Greece)

Helmet wearing by PMD (Personal Mobility Device) riders

- Eva Kšicová – chair, Lukáš Musil (CDV, Czechia)
- Nóra Krizsik (KTI, Hungary)
- Sevket Oguz Kagan Capkin (Sapienza Università di Roma - CTL, Italy)
- Anna Zielińska (ITS, Poland)

- Maria João Barros (ANSR, Portugal)
- Helga Mondésir (ONISR, France)
- Sharon Heffernan (RSA, Ireland)

Self-report behaviour
Attitudes

- Peter Silverans – chair, Uta Meesmann, Naomi Wardenier (VIAS, Belgium)
- Helga Mondésir, Manuelle Salathé (ONISR, France)
- Sharon Heffernan (RSA, Ireland)
- Brayan Gonzalez Hernandez, Francesca Damiani (Sapienza University of Rome, Italy)
- Dimitris Nikolaou, (NTUA, Greece)
- Nikolay Naydenov (State Agency Road Safety, Bulgaria)

Light use by cyclists in the dark

- Nathalie Moreau - chair (VIAS, Belgium)
- Michelle Doumen (SWOV, The Netherlands)
- Anđelo Marunica, Mario Mataija (University of Zagreb, Croatia)
- Helga Mondésir (ONISR, France)

Enforcement of traffic regulations

- Alexandra Laiou – chair (NTUA, Greece)
- Peter Silverans (VIAS, Belgium)
- Helga Mondésir (ONISR, France)
- Fanny Malin, Teemu Itkonen (VTT, Finland)
- Dagmara Jankowska-Karpa (ITS, Poland)
- Rute Calheiros, Augusto Torbay (ANSR, Porugal)
- Charles Goldenbeld (SWOV, The Netherlands)

Alternative speeding KPIs

- Alexandra Laiou – chair (NTUA, Greece)
- Helga Mondésir (ONISR, France)
- Johannes Mesimäki (VTT, Finland)
- Paul Deane (RSA, Ireland)
- Stephen Kome (Sapienza Università di Roma, CTL, Italy)
- João Cardoso (LNEC, Portugal)
- Anna Vadeby (VTI, Sweden)

Members of the Policy Integration Advisory Committee (PAC)

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