Baseline

Baseline report on the KPI Driving under the Influence of Alcohol

January 2023

Belgium | Austria | Bulgaria | Cyprus | Czech Republic | Finland | Germany | Greece | Ireland | Latvia | Lithuania | Luxembourg | Malta | Netherlands | Poland | Portugal | Spain | Sweden

baseline.vias.be

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Any comments or feedback regarding this report should be sent to Baseline@vias.be.

Version history

Version	Date	Changes
1.0	April 30, 2022	First draft version using data collected in 2021.
2.0	September 16, 2022	Draft version of report, including data for 11 countries.
2.1	October 4, 2022	Draft version of report, including data for 11 countries, KEG's comments addressed.
2.2	October 17, 2022	Updated draft version of report, including data for 11 countries, Member States' comments addressed.
2.3	December 1, 2022	Updated draft version of report.
2.4	December 21, 2022	Final Draft version of report
2.5	January 25, 2023	Final version of the report

Contents

Executive summary

The aim of the BASELINE project is to assist participating Member States' authorities in the collection and harmonized reporting of Key Performance Indicators (KPIs) and to contribute to building the capacity of Member States which have not yet collected and calculated the relevant data for the KPIs. The outcomes of this project will be used to set future European targets and goals based on the KPIs. This document is the report providing information on the KPI Driving under the influence (DUI) of alcohol, which is defined as the percentage of drivers driving within the legal limit for blood alcohol concentration (BAC).

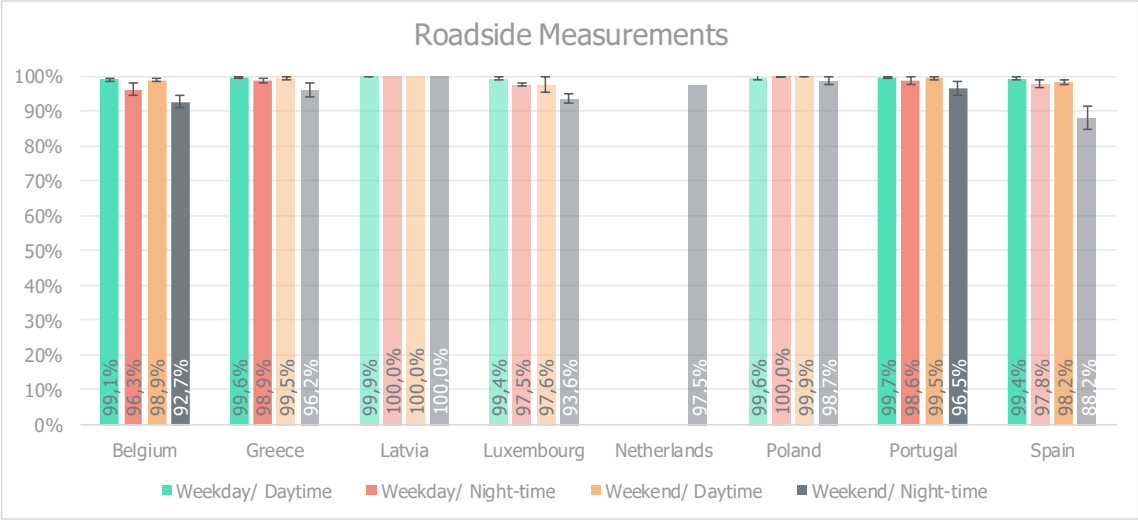
Driving under the influence of alcohol poses serious risks to public safety, with a high proportion of fatal crashes involving drink driving in most countries. It is estimated that 1,5%-2% of kilometres travelled in the EU are driven with an illegal BAC, but around 25% of all road deaths in the EU are alcohol related.

Out of the 18 countries participating in the Baseline project, eight countries collected data through roadside measurements by the Police (random breath testing) and another six countries collected data on self-reported behaviour via anonymous surveys. Out of these six countries, four Member States collected data based on the "period-based prevalence" method and two countries based on the 'trip-based prevalence' method. Only one country used alcohol testing results from enforcement actions (not random) following a crash.

The different data collection methodologies that were used for the KPI DUI of alcohol, do not allow direct comparisons among all countries. Thus, in this report, results and the respective metadata were presented and discussed separately by data collection method. However, even when comparing results of the countries using the same methodology, KPIs are not fully comparable, due to various deviations from the minimum methodological requirements, small samples for specific strata, weighting of data, different questions used for the definition of the KPIs in the case of self-reported surveys, etc.

Based on the roadside measurements, in all countries, the national aggregate mean percentage of car drivers driving within the legal limit for blood alcohol concentration on all road types and time periods is more than 97%. For most countries, there is no notable difference of drivers' behaviour concerning DUI of alcohol among the different types of roads, neither a common pattern among the Member States. In contrast with the results by road type, the KPIs by time period differ a lot for almost all Member States who provided such data. The KPI values are lower during night-time for all countries, with the lowest KPIs being observed at weekends compared to weekdays. Additionally, during daytime, fewer drivers are driving within the legal BAC limits at weekends compared to weekdays in some countries.

Figure 1. KPIs on DUI of Alcohol per time period (Roadside Measurements)



**Note: Countries with deviations in the minimum methodological requirements are shown with light colours*

KPIs by gender and age group are recommended to be gathered and further explored by more countries, including those that used the roadside breath tests, which would also allow to identify the target groups that are of higher risk. Complementary indicators to the KPIs could also be considered, such as indicators on intoxication levels (0-0.2g/l, 0.2-0.5 g/l, 0.5-0.8 g/l, etc.), which would allow to better assess the problem and compare the performance of the countries that dispose different maximum BAC limits. Also, the KPI could be extended to other vehicle types (motorcycles, goods vehicles, etc.) or different driver types (e.g. novice drivers, professional drivers) for which different BAC limits are in force.

1 Introduction

1.1 Context

The Communication of the European Commission "Europe on the Move – Sustainable Mobility for Europe: safe, connected and clean" of the 13th of May 2018 confirmed the EU's long-term goal of moving close to zero fatalities in road transport by 2050 and added that the same goal should be achieved for serious injuries. It also proposed new interim targets of reducing the number of road deaths by 50% between 2020 and 2030 as well as reducing the number of serious injuries by 50% in the same period. To measure progress, the most basic – and important – indicators are of course the result indicators on deaths and serious injuries.

In order to gain a better understanding of the different issues that influence overall safety performance, the Commission has elaborated, in cooperation with Member State experts, a first set of key performance indicators (KPIs). The list of the KPIs is given in ***Table 1***. The minimum requirements for these KPIs are described in the *Commission Staff Working Document SWD (2019) 283*, further referred to as 'SWD'.

Table 1. List of European KPIs for road safety

KPI area	KPI 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 PTWs 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 passenger cars with a Euro NCAP safety rating equal or above a threshold
Infrastructure	Percentage of distance driven over roads with a rating above an agreed threshold
Post-crash care	Time elapsed between the emergency call following a collision resulting in personal injury and the arrival at the scene of the collision of the emergency services

Funding has been made available by the European Commission to support Member States in the data collection and analysis for these KPIs. Eighteen Member States participate in a common project, called "Baseline". The aim of the Baseline project, funded partially by the European Commission, is to assist participating Member States' authorities in the collection and harmonized reporting of these KPIs and to contribute to building the capacity of Member States which have not yet collected and calculated the relevant data for the KPIs. The outcomes of this project will be used to set future European targets and goals based on the KPIs.

1.2 Participation in Baseline

The following EU Member States participated in the Baseline project: Austria; Belgium; Bulgaria; Cyprus; Czech Republic; Finland; Germany; Greece; Ireland; Latvia; Lithuania; Luxembourg; Malta; The Netherlands; Poland; Portugal; Spain; Sweden. Some data regarding KPIs of EU Member States that were not participating in Baseline are also included in the deliverables.

1.3 Final deliverables of the Baseline project

The final public outcomes and deliverables of the Baseline project are:

- Eight specific reports, each on one KPI
- A website on which all public information is accessible
- A final report including the key results of the project and recommendations for next steps.

This document is the report providing information on the ***KPI Driving under the Influence of Alcohol***. This KPI has been defined as:

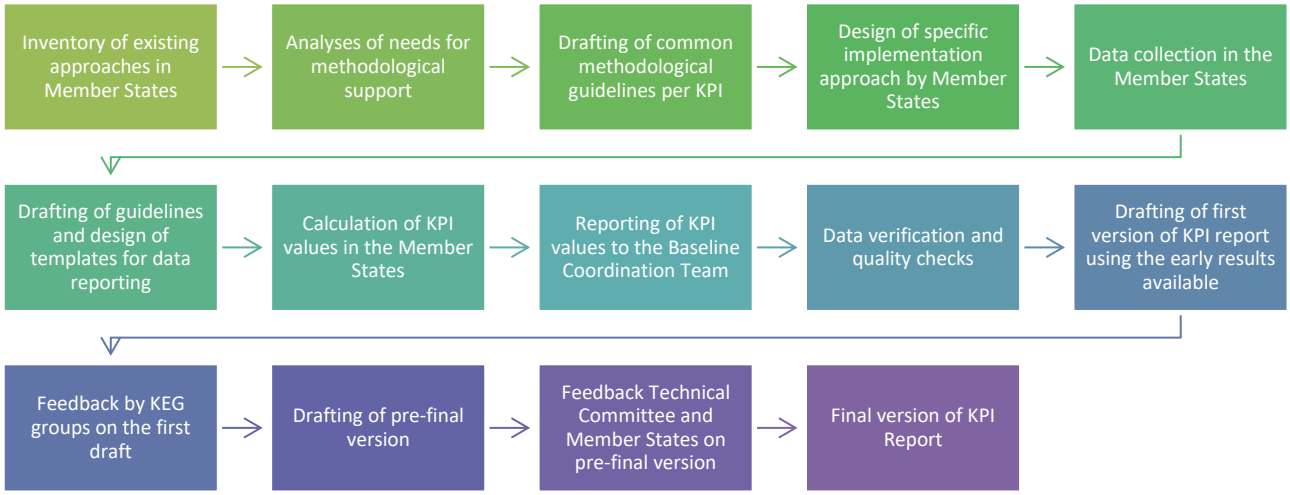
"Percentage of drivers driving within the legal limit for blood alcohol concentration (BAC)"

2 Methodology

2.1 Overall process

The process followed for arriving at this report is summarized in the following scheme:

Figure 2. Process leading to this report



For each KPI, a "KPI Expert Group" (KEG) was established, which was responsible for the design of the methodological guidelines and for the review of a draft version of this report. The KEG for the indicator of Driving under the Influence of Alcohol consisted of the following persons:

- Sofie Boets, Vias institute (Belgium)
- Peter Silverans, Vias institute (Belgium)
- Sjoerd Houwing, CBR (the Netherlands)
- Åsa Forsman, VTI (Sweden)
- Simone Klipp, BASt (Germany)
- Katerina Folla, NTUA (Greece)

The overall process was overseen by the Technical Committee, which focused in particular on issues that were important for several KPIs (e.g. structure and content of methodological guidelines, minimum samples, number of observations and locations, weighting of data, data reporting, etc.). The Technical Committee consisted of:

- Peter Silverans, Vias institute (Belgium) - Coordinator
- Wouter Van den Berghe, Vias institute (Belgium)
- Frits Bijleveld, SWOV (Netherlands)
- Sheila Ferrer López, DGT (Spain)
- Peter Larsson, Trafikverket (Sweden)
- Markus Schumacher, BASt (Germany)
- Veronika Valentova, CDV (Czech Republic)
- George Yannis, NTUA (Greece)

2.2 Support tools developed

For every KPI, methodological guidelines were developed, covering topics such as:

- definition of the KPI concerned, and possibly complementary or alternative KPIs;
- methods to be used for data collection;
- breakdowns requested of the KPI values (road category, vehicle type, day of week, etc.);
- minimum sample of observations/ cases and observation locations;
- methods for weighting and analysing the data;
- nature and format of data to be reported.

The methodological guidelines of the KPI on driving under the influence of alcohol can be accessed from the Baseline website via this link: https://www.baseline.vias.be/storage/minisites/methodological-guidelines-kpi-alcohol.pdf. Many elements of the Methodological Guidelines have been integrated in this report, either within the main body of the text, or as part of the Annex.

In order to streamline and harmonize the data flow, data reporting guidelines and data reporting templates were developed. The data reporting templates (in Excel) were used by the Member States for reporting their KPI values to the Baseline Coordination Team.

Figure 3. Data reporting template

Road Type	Time period	Vehicle Type	Gender	Age Group	Nr of Locations	Traffic Counts	Weight proportion	N-tot	N-within legal limit-tot
motorways	weekday/daytime	**passenger car-Total**	*(both genders)*	*(all ages)*	*31*	*5594*	*3,29%*	*458*	*454*
motorways	weekday/night-time	**passenger car-Total**	*(both genders)*	*(all ages)*	*12*	*251*	*0,21%*	*98*	*96*
motorways	weekend/daytime	**passenger car-Total**	*(both genders)*	*(all ages)*	*30*	*5186*	*0,95%*	*597*	*594*
motorways	weekend/night-time	**passenger car-Total**	*(both genders)*	*(all ages)*	*16*	*640*	*0,25%*	*157*	*152*
motorways	(all periods)	**passenger car-Total**	*(both genders)*	*(all ages)*	*86*	*11671*	*4,69%*	*1310*	*1296*
rural roads	weekday/daytime	**passenger car-Total**	*(both genders)*	*(all ages)*	*71*	*17978*	*13,31%*	*1386*	*1376*
rural roads	weekday/night-time	**passenger car-Total**	*(both genders)*	*(all ages)*	*28*	*1793*	*1,80%*	*330*	*319*
rural roads	weekend/daytime	**passenger car-Total**	*(both genders)*	*(all ages)*	*61*	*14003*	*2,85%*	*982*	*972*
rural roads	weekend/night-time	**passenger car-Total**	*(both genders)*	*(all ages)*	*34*	*2022*	*1,61%*	*484*	*449*
rural roads	(all periods)	**passenger car-Total**	*(both genders)*	*(all ages)*	*191*	*35796*	*19,57%*	*3182*	*3116*
urban roads	weekday/daytime	**passenger car-Total**	*(both genders)*	*(all ages)*	*90*	*19259*	*51,89%*	*1884*	*1872*
urban roads	weekday/night-time	**passenger car-Total**	*(both genders)*	*(all ages)*	*27*	*474*	*2,50%*	*186*	*168*
urban roads	weekend/daytime	**passenger car-Total**	*(both genders)*	*(all ages)*	*72*	*10123*	*14,62%*	*1223*	*1201*
urban roads	weekend/night-time	**passenger car-Total**	*(both genders)*	*(all ages)*	*46*	*2975*	*6,73%*	*627*	*577*
urban roads	*(all periods)*	**passenger car-Total**	*(both genders)*	*(all ages)*	*234*	*32831*	*75,74%*	*3920*	*3818*
(all roads)	*(all periods)*	**passenger car-Total**	Male	18-24	511		4,27%	414	405
(all roads)	*(all periods)*	**passenger car-Total**	Male	25-65	511		44,99%	3915	3801
(all roads)	*(all periods)*	**passenger car-Total**	Male	65+	511		10,80%	797	781
(all roads)	*(all periods)*	**passenger car-Total**	Female	18-24	511		2,63%	242	239
(all roads)	*(all periods)*	**passenger car-Total**	Female	25-65	511		32,07%	2605	2572
(all roads)	*(all periods)*	**passenger car-Total**	Female	65+	511		5,25%	336	332
(all roads)	weekday/daytime	**passenger car-Total**	*(both genders)*	*(all ages)*	*192*	*42831*	*68,49%*	*3728*	*3702*
(all roads)	weekday/night-time	**passenger car-Total**	*(both genders)*	*(all ages)*	*67*	*2518*	*4,51%*	*614*	*583*
(all roads)	weekend/daytime	**passenger car-Total**	*(both genders)*	*(all ages)*	*163*	*29312*	*18,42%*	*2802*	*2767*
(all roads)	weekend/night-time	**passenger car-Total**	*(both genders)*	*(all ages)*	*96*	*5637*	*8,59%*	*1268*	*1178*

2.3 Definition of driving under the influence of alcohol

Drinking and driving, called driving under the influence (DUI), involves operating a vehicle with a blood alcohol content (BAC) level higher than the legally allowed limit. Driving under the influence of alcohol poses serious risks to public safety, with a high proportion of fatal crashes involving drink driving in most countries. It is estimated that 1,5%-2% of kilometres travelled in the EU are driven with an illegal BAC, but around 25% of all road deaths in the EU are alcohol related (Calinescu & Adminaite, 2018). For that reason, most countries either ban the use of alcohol among drivers, or set low legal limits for blood alcohol concentrations (Hakkert & Gitelman, 2007).

As stated earlier the minimum requirements for the KPI for alcohol are described in the Commission Staff Working Document (SWD). The SWD proposes three methods to collect data to determine the percentage of drivers driving within the legal limit for blood alcohol concentration (BAC). The SWD allows three measurement methods, based on:

- Random breath testing, i.e. roadside breath testing of randomly selected drivers
- Breath testing results from enforcement actions (even if not random)
- Self-reported behaviour through anonymous surveys

The EC has expressed a clear preference for a KPI based on random breath testing, as this is generally considered to deliver an accurate picture of the situation. However, as random testing is costly and not allowed in some Member States, breath testing results from enforcement actions is considered the second best option. If neither of these two options is feasible for objective reasons, data from self-reported behaviour based on anonymous surveys may also be accepted. Self-reported data can either refer to prevalence of DUI of alcohol over a specific time period (e.g. last 30 days, last 12 months) or to prevalence of use during a specific recent trip (trip-based prevalence). These methods will be referred to as 'period-based prevalence' and 'trip-based prevalence' respectively.

2.4 Minimum and optional requirements for the KPI DUI of Alcohol within Baseline

The minimum requirements for the KPI on Driving under the influence of Alcohol are given in ***Table 2***. The minimum requirements concern the random breath testing methodology. The table also includes optional supplementary approaches. Baseline partner countries had the option of either just meet the minimum requirements or to extend (part of) their methodology and include other elements.

The main indicator is the percentage of drivers below the legal BAC limit across all time periods and road types (locations). This KPI is based on the legal limit applied in a country and can thus vary. At a minimum, the percentage of personal car drivers that adhere to the legal limit should be provided. The equivalent percentage for other vehicle types is supplementary. An estimate is expected for each level of the following stratification variables:

- Time period (4 levels)
- Road type (3 levels)

Specific estimates for combinations of time period and road type (e.g. motorways on weekend-nights) are recommended but not required since some countries will not have sufficient sample sizes for each combination.

Interesting additional (optional) indicators are the mean BAC level, the mean BAC level of drivers with a BAC above the legal limit and the percentage of drivers per BAC level group: 0, 0-0.2, 0.2-0.5, 0.5-0.8, 0.8-1.2, 1.2 or more.

Table 2. Minimum requirements and optional additions for the KPI DUI of Alcohol

	Minimum requirement	Optional additions
KPI definition	• % ≤ legal BAC limit + CI aggregated • % ≤ legal BAC limit + CI per road type • % ≤ legal BAC limit + CI per time period	• The mean BAC level • The mean BAC level of drivers with a BAC above the legal limit • The % of drivers per BAC level group: 0, 0-0.2, 0.2-0.5, 0.5-0.8, 0.8-1.2, 1.2 or more.
Conditions	• Free month choice but not during holidays or heavy winter period	
Sample size	• Min. sample size: 2,000 tested car drivers • Min 500 drivers/road type (3) AND /time period (4) • 1 location = min. 1 control session of min. 30 minutes • Min. 10 different locations/road type (3) AND /time period (4) • Min. 2 different locations/road type x time period (12 crossed strata)	

Locations	• Random selection • Representative of entire national road network • A minimum traffic flow of at least 10 vehicles passing per hour is required	• Stratification by Regions
Vehicle types	• Passenger cars	• Motorcycles • Goods vehicles • Buses
Road types	• Motorways • Rural roads (defined as roads outside built-up areas, but no motorways) • Urban roads (defined as roads inside built-up areas)	
Time periods	• 4 time periods: night/day x week/weekend	

3 Results

In this section, the national KPIs on DUI of alcohol and the respective indicators by road type, time period, age group and gender are presented. The Member States that delivered the respective data are Austria, Belgium, Bulgaria, Czech Republic, Finland, Germany, Greece, Ireland, Latvia, Luxembourg, Poland, Portugal, Spain and Sweden. Also KPI data from the Netherlands are included, which were collected in 2022 and partly met the Baseline requirements (Rijkswaterstaat, 2021). Almost all countries collected data only for passenger car drivers, which is the minimum requirement within the Baseline project. The number of countries providing data for other vehicle types and/or types of drivers (e.g. novice or professional drivers) was limited. More precisely, Czech Republic and Spain provided data for other vehicle types, while Portugal and Finland provided separate indicators for novice and/or professional drivers. For this reason, only the indicators related to passenger car drivers are shown in the Tables and Figures of the report.

3.1 Metadata

3.1.1 Data collection methodology and characteristics

As already mentioned, the Member States could choose the most suitable data collection methodology for the estimation of the KPI DUI of Alcohol. As shown in Table 3, eight countries collected data through roadside measurements by the Police (random breath testing) and one country used alcohol testing results from enforcement actions following a crash. Six countries collected data on self-reported behaviour via anonymous surveys ("Questionnaire Survey" hereinafter). The anonymous surveys on self-reported behaviour were either online, telephone, paper surveys or a combination of these methods was selected.

Out of these six countries, four Member States collected data based on the "period-based prevalence" method and two countries based on the 'trip-based prevalence' method. Regarding the KPIs based on the period-based prevalence survey, the definition of this indicator is the percentage of drivers who never drove while being over the legal BAC limit over a specific period (i.e. the last 30 days or the last 12 months). On the other hand, in the trip-based prevalence survey, the respondents are asked about DUI of alcohol during a specific trip or all their trips made in the last 24 hours. Due to these differences, data are not directly comparable, thus, in the next sections, results and metadata are presented separately by data collection method.

In Table 3, the data collection period for each Member State, the sampling unit and the stratification levels are shown. Most Member States collected data in 2021 and 2022, while for most countries, the main stratification levels of the roadside surveys were road type and time period and the main stratification levels for the questionnaire surveys were age, gender and region/state/town. The most recent data collection in the Netherlands was carried out in 2022, a random breath testing by the police of more than 10.000 drivers on weekend nights.

Table 3. Metadata on KPI DUI of Alcohol

Country	Data collection method	Sampling of locations	Survey Period	Sampling Unit	Actual Question	Stratification Levels
Austria	Questionnaire Survey / Period-based prevalence survey	-	23/02/2022 - 08/03/2022	Driver	N-over the legal limit-never (30days)	age, gender, time period
Belgium	Roadside measurements by the police	Stratified random	21/09/2021 - 03/11/2021	Driver	-	road type, time period, region, gender and age group
Bulgaria	Questionnaire Survey / Trip based prevalence survey	-	01/04/2022 - 15/06/2022	Driver	N-over legal limit (trip)-negative	road type, time period
Czech Republic	Alcohol testing results from enforcement actions (not random)	-	01/01/2021 - 31/12/2021	Driver	-	road type, time period, vehicle type
Finland	Questionnaire Survey / Period-based prevalence survey	-	31/03/2022 - 06/04/2022	Driver	N-over the legal limit-never (30days)	age, gender, region
Germany	Questionnaire Survey / Trip based prevalence survey	-	10/11/2021 - 26/11/2021	Driver	N-over legal limit (trip)-negative	road type, time period
Greece	Roadside measurements by the police	Stratified random	14/06/2022- 30/07/2022	Driver	-	road type, time period

Country	Data collection method	Sampling of locations	Survey Period	Sampling Unit	Actual Question	Stratification Levels
Ireland	Questionnaire Survey / Period-based prevalence survey	-	Nov.-Dec. 2021	Driver	N-over the legal limit-never (30days)	-
Latvia	Roadside measurements by the police	Stratified random	19/09/2021 - 18/12/2021	Driver	-	road type, time period
Luxembourg	Roadside measurements by the police	Simple random	20/01/2022 - 08/05/2022	Driver	-	road type, time period
The Netherlands[a]	Roadside measurements by the police	-	Feb. - Sep. 2022	Driver	-	weekend nights
Poland	Roadside measurements by the police	Simple random	20/05/2022 - 05/06/2022	Driver	-	road type, time period
Portugal	Roadside measurements by the police	Stratified random	08/10/2021 - 12/12/2021	Driver	-	road type, time period, age group, gender
Spain	Roadside measurements by the police	Simple random	01/11/2021 - 31/11/2021	Driver	-	road type, vehicle type (passenger car, motorcycle), time period
Sweden	Questionnaire Survey / Period-based prevalence survey	-	17/05/2020 - 13/07/2020	Driver	N-over legal limit-never (12 months)	age, gender, region

3.1.2 Sampling design

In Table 4 the sampling framework of the roadside measurements is presented, including the number of measurement locations per road type (motorway; rural roads; urban roads), the number of measurement locations per time period (weekday/daytime; weekday/night-time; weekend/daytime; weekend/night-time) and the average duration of the sessions. At minimum, 10 different locations per stratum (road type or time period) are required for the alcohol measurements. In Latvia and Luxembourg, this minimum requirement is not achieved. Also, it is noted that in Latvia there are no motorways, while in Poland, motorways were not included in the measurements. For Spain, the different time spans were not considered in the sampling, since the stratification levels used were road type and vehicle type. In almost all countries, the average duration of the measurement sessions was about 1 hour, with the exception of Greece and Spain.

Table 4. Sampling per stratum (Roadside Measurements)

	Number of locations			Number of locations				
Country	**Motorway**	**Rural**	**Urban**	**Weekday/ daytime**	**Weekday/ night-time**	**Weekend/ daytime**	**Weekend/ night-time**	**Average Session Duration**
Belgium	86	191	234	192	67	163	96	1 h
Greece	19	17	47	26	37	11	9	4:26 h
Latvia	-	4	5	6	1	1	1	1:07 h
Luxembourg	1	7	40	7	26	4	12	1 h
Poland	-	32	32	32	32	32	32	0,5 - 1 h
Portugal	48	100	201	254	53	104	58	0:49 h
Spain	63	147	230	144	90	114	91	2 h

[a] Rijkswaterstaat (2022). Rijden onder invloed in Nederland in 2006-2022: ontwikkeling van het alcoholgebruik van automobilisten in weekendnachten. Ministerie van Infrastructuur & Waterstaat, Rijkswaterstaat Water, Verkeer en Leefomgeving https://open.overheid.nl/repository/ronl-86b32cec00c85f3f33b3d93c7d1513c4db37f919/1/pdf/bijlage-2-aanbieding-rijden-onder-invloed-in-nederland-in-2006-2022.pdf

In Table 5, the total sample size and sample size per minimum required stratification level (road type and time period) are presented for the countries that collected data through random breath tests by the Police on the roadside. Also, the respective collected samples for Czech Republic, which used Police enforcement data following crashes, are shown. The minimum required total sample should be 2.000 tested drivers, which is reached by almost all countries. The samples that are lower than the minimum required size per stratum (500 drivers) are shown in a different colour (orange).

Table 5. Sample data per stratum (Roadside Measurements)

		Road Type			Time Period			
Country	Total Sample	Motorway	Rural	Urban	Weekday/ daytime	Weekday/ night-time	Weekend/ daytime	Weekend/ night-time
Belgium	8.412	1.310	3.182	3.920	3.728	614	2.802	1.268
Greece	2.894	674	500	1.720	873	1.267	425	329
Latvia	1.988	-	665	1.323	1.095	480	315	98
Luxembourg	11.833	441	1.051	4.325	1.541	3.223	169	1.083
Netherlands	4.815	-	-	-	-	-	-	-
Poland	3.579	-	1.680	1.899	942	862	964	811
Portugal	5.654	906	1.628	3.120	3.389	542	1.127	596
Spain	2.411	607	535	1.269	1.044	277	834	256
Czech Republic[1]	83.403	4.041	28.542	50.820	49.343	15.545	13.068	5.447

[1] based on alcohol testing results from enforcement actions (not random) / [2] samples lower than the min. required shown in different colour

Similarly, the collected samples for the combination of these two strata (road type x time period) are shown in Table 6 for Belgium, Greece, Poland, Portugal and Czech Republic, who provided such data. The samples that are lower than the minimum required size per stratum (500 drivers) are shown in a different colour.

Table 6. Sample data for combined strata (Roadside Measurements)

Road Type	Time Period	Belgium	Greece	Czech Republic[1]	Poland	Portugal
Motorway	Weekday/daytime	458	177	2.017	-	500
	Weekday/night-time	98	211	924	-	96
	Weekend/daytime	597	190	737	-	190
	Weekend/night-time	157	96	363	-	120
Rural roads	Weekday/daytime	1.386	206	13.348	483	979
	Weekday/night-time	330	160	7.878	408	146
	Weekend/daytime	982	79	4.746	422	347
	Weekend/night-time	484	55	2.570	367	156
Urban	Weekday/daytime	1.884	490	33.978	459	1.910

	Weekday/night-time	186	896	6.743	454	300
	Weekend/daytime	1.223	156	7.585	542	590
	Weekend/night-time	627	178	2.514	444	320

[1] Based on alcohol testing results from enforcement actions (not random)

The respective sample sizes in total and per stratum (age group and gender) are shown in Table 7 for the Member States that used the Period-based prevalence survey methodology. It is noted that the minimum required sample for self-reported surveys is 1.000 respondents, which is reached by all countries. The lowest number of respondents was collected for the 18-24 age group for all countries. The number of respondents in the surveys for the combination of these strata (gender x age group) are presented in Table 8. The samples that are lower than the minimum required size per stratum (500 drivers) are shown in a different colour.

Table 7. Sample data per stratum (Questionnaire Survey / Period-based prevalence survey)

	Total Sample	Gender		Age Group		
Country		**Male**	**Female**	**18-24**	**25-64**	**65+**
Austria[1]	2.005	1.046	959	121	1.547	337
Finland[1]	1.322	695	627	55	895	372
Ireland[1]	1.013	-	-	-	-	-
Sweden[2]	2.198	1.149	1.049	392	810	996

[1] N-over legal limit-never (30 days)/ [2]N-over legal limit-never (12 months)

Table 8. Sample data for combined strata (Questionnaire Survey / Period-based prevalence survey)

Gender	Age Group	Austria
Male	**18-24**	57
	25-64	776
	65+	213
Female	**18-24**	64
	25-64	771
	65+	124

Finally, in Table 9, the number of respondents in the trip-based prevalence surveys for Bulgaria and Germany are shown. For the trip-based prevalence surveys, the minimum recommended sample of drivers is 2.500, which is achieved by both countries. The strata used by the two countries differ; in Bulgaria the strata are road type and time period, while in Germany, the sample is stratified for gender, age, federal state and highest level of education. Both countries have achieved the minimum samples for their main strata (besides night-time at weekends for Bulgaria) and have provided their results by road type and time period.

The number of respondents per road type and time period is provided below. It is noted that the samples of drivers for the strata of weekday/night-time and weekend/night-time are lower compared to the remaining time periods.

Table 9. Sample data per stratum (Questionnaire Survey / Trip-based prevalence survey)

		Road Type			Time Period			
Country	Total Sample	Motorway	Rural	Urban	Weekday/ daytime	Weekday/ night-time	Weekend/ daytime	Weekend/ night-time
Bulgaria	2.883	934	1.029	920	1.568	558	989	231
Germany	4.730	415	1.552	2.490	3.149	87	1.100	67

3.1.3 Data weighting

In this section, the methodologies used by the Member States for the data weighting and the calculation of the national KPI are presented. In most cases that the stratification levels were road type and time period, the Baseline weight formula, including strata sampling weight (road type x time period), session sampling weight (traffic counts) and traffic volume weight (if available), was used. In the case of surveys on self-reported behaviour, data were weighted according to age, gender and region/state/town, so that the total sample corresponds to the total (driving) population. However, it should be noted that 3 out of 14 countries have not applied any weighting of data. The results of those countries, for which deviations in minimum requirements or data weighting are observed, are shown in figures with light colours in the next sections.

Table 10. Data weighting methodology

Country	Weighting Method
Austria	In order to compensate for different response rates in different groups (worse response rates among young males, among low educational strata, etc.), a "post-stratification strategy" was used in the field control. When a certain number of complete interviews is reached, these (social) strata are "closed". Then only people from open strata can be interviewed by means of screening. Corresponding specifications were made for the following socio-demographic characteristics: age x federal state (interlocked), gender, education and size of town. The raw data were then weighted using post-stratification weighting to compensate for different response rates in individual groups. The following weighting axes were used: Gender, Age x Federal State, Education, Town size
Belgium	Baseline formula including week period strata sampling weight (correction of the number of sessions by the actual duration of the week periods in a week; but not for share of road type length), session sampling weight (traffic counts + correction for control duration) and traffic volume weight (national data in million car km driven by road type x region)
Bulgaria	No weighting
Czech Republic	Baseline weight formula. Weight proportion is based on ratio combination of national road network (km of motorways, rural roads and urban roads) and time period (weekdays/daytime, weekdays/night-time, weekend/daytime and weekend/night-time).
Finland	No weighting
Germany	Data weighted for the calculation of the KPI according to Driver population data (only holders of drivers licences) so that the sample corresponds the German driving population. Weighting was done according to age, gender and federal states
Greece	Data weighted based on the Baseline weight formula, including strata sampling weight (road type x time period) and session sampling weight (traffic counts)
Ireland	Sample selection is controlled by the external supplier's panel management team to ensure that there are no over-active panellists, and that all panellists have an equal opportunity to respond. When extracting the sample, individuals were randomly selected within the survey target groupings. To ensure a representative sample of motorists, the supplier applied quota controls in terms of age within gender, overall socio-economic class, region and area. The sample was randomised prior to deployment. At the analysis stage, statistical t-tests

Country	Weighting Method
	determined if significant differences in attitudes and behaviours existed between segments of the sample. These tests were applied to establish significant differences at the 95% confidence level.
Latvia	The weighting factors for rural roads and urban roads have been calculated from the total mileage of the whole vehicle fleet obtained from odometer readings at regular technical inspections. The obtained values are 75% traffic on rural roads and 25% on urban roads. The weighting factors for days of the week and daytime/night-time have been calculated from the traffic counts on Latvian rural roads. The obtained values are 71% traffic on weekdays and 29% on weekends, where 68% is weekday/daytime, 2% is weekday/night-time, 27% is weekend/daytime, 3% is weekend/night-time.
Luxembourg	No weighting
Poland	Weights were constructed in two steps: Country level weights were constructed on the basis of information about distribution of traffic volume in Poland. Information were available by rural and urban region, where information on traffic volume by day (weekday/weekend) and day/night were also available. Separate weight was calculated for urban/rural region and weekday/(day/night) and weekend/(day/night). Overall country level weight was a product of those two weights. Session weights were used earlier in the calculations and that weight was calculated as traffic volume at each location divided into the duration of each session by number of vehicles controlled. These weights refer to each session duration that took place during the alcohol measurements.
Portugal	Post stratification weighting was carried out following the suggestions by the Baseline experts included in the document "Considerations for sampling weights in Baseline".
Spain	The methodology of the Druid/EDAP project is described in detail in the different studies that have been carried out for more than ten years. In https://www.dgt.es/conoce-la-dgt/que-hacemos/conocimiento-e-investigacion/revision-sistematica-sobre-drogas-y-conduccion/ Annex D, 3.4. Adjustment for weighting according to traffic intensity of the EDAP 2018 report, it is specified how the weighting has been carried out and the weighting factors are presented.
Sweden	The weights applied to each sample unit was set in order to make the estimate representative for the national age, gender and region population distribution (the stratification variables). The weights in a stratum "h" were set to the: (number of residents in stratum "h") divided by (the total number of residents in all strata times the number of respondents in stratum "h"). Here, only car drivers were selected and thus, the estimated KPIs are representative for all car drivers in Sweden. In practice, a ratio estimate was used with the weighted number of car drivers who had not driven after drinking alcohol in the numerator, and the weighted number of car drivers in the denominator.

3.1.4 Country characteristics

In Table 11, the national maximum legal BAC limits per country are presented. These limits differ not only among the various EU Member States, but also for different types of drivers (e.g. novice and professional drivers).

Table 11. National BAC limits per country

Country	Country Characteristics / Legislation
Austria	Legal BAC limits: 0,5 g/l - Standard drivers; 0,1 g/l - Professional drivers
Belgium	Legal BAC limits: 0,5g/l - Standard drivers; 0,2g/l - Professional drivers
Bulgaria	Legal BAC limit: less than 0,5 g/l for all drivers
Czech Republic	The tolerance is 0,00 ‰ of alcohol
Finland	Legal BAC limit: 0,5 g/l for all drivers
Germany	Legal BAC limit: less than 0,5 g/l for all drivers; 0,0 g/l - Novice drivers(during the probationary period (2 years) and before reaching the age of 21)
Greece	Legal BAC limits: 0,5 g/l - Standard drivers; 0,2 g/l - Novice drivers; 0,2 g/l - Professional drivers

Ireland	Legal BAC limits: 0,5 g/l - Standard drivers; 0,2 g/l - Novice drivers; 0,5 g/l - Professional drivers
Latvia	Legal BAC limits: 0,5 g/l - Standard drivers; 0,2 g/l - Novice drivers; 0,5 g/l - Professional drivers
Luxembourg	Legal BAC limits: 0,5 g/l - Standard drivers; 0,2 g/l - Novice drivers; 0,2 g/l - Professional drivers
The Netherlands	Legal BAC limits: 0,5 g/l - Standard drivers; 0,2 g/l - Novice drivers; 0,5 g/l - Professional drivers
Poland	Legal BAC limit: 0,2 g/l for all drivers.
Portugal	Legal BAC limits: 0,5 g/l - Standard drivers; 0,2 g/l - Novice drivers; 0,2 g/l - Professional drivers
Spain	Legal BAC limit: 0,5 g/l - Standard drivers; 0,3 g/l - Novice drivers (Drivers who have held a driving license for less than two years); 0,3 g/l - Professional drivers (Professional drivers, emergency service drivers, drivers transporting dangerous goods or special transport drivers)
Sweden	Legal BAC limit: 0,2 g/l for all drivers

3.2 Overall Results

In this section, the national KPIs on DUI of alcohol are presented. Concerning the KPIs based on roadside measurements (Table 12), in all countries, more than 97% of drivers drive within the legal limit for blood alcohol concentration (BAC), with the highest percentages being recorded for Poland (99,7%) and Portugal (99,2%). The respective proportion for Czech Republic is 96,2%, which is based on non-random breath tests coming from enforcement actions following road crashes.

Table 12. National KPI (95% CI) on DUI of Alcohol (Roadside Measurements)

Country	KPI (95% CI)
Belgium	98,4% (97,9% - 98,8%)
Greece[1]	98,8% (98,4% - 99,2%)
Latvia[2, 4]	99,9% (99,8% - 100,0%)
Luxembourg[2, 3]	97,3% (97,0% - 97,6%)
Poland[4]	99,7% (99,4% - 100,0%)
Portugal	99,2% (98,6% - 99,6%)
Spain[b]	97,6% (96,9% - 98,2%)

[1] min sample not achieved for all strata / [2]min. nr of locations per stratum not achieved / [3] no weighting / [4] motorways not included

Table 13. National KPI (95% CI) on DUI of Alcohol (Alcohol testing results from enforcement actions - not random)

Country	KPI (95% CI)
Czech Republic	96,2% (96,1% - 96,4%)

Regarding the KPIs based on the period-based prevalence survey, the definition of this indicator is the percentage of drivers who never drove while being over the legal BAC limits over the last 30 days in case of Austria and Finland or over the last 12 months in case of Sweden. The highest KPI value was found in Finland (96,1%), followed by Sweden (94,3%) and Austria (91,9%).

[b] In Spain, the KPI for motorcyclists is 99,63%.

Table 14. National KPI (95% CI) on DUI of Alcohol (Questionnaire Survey / Period-based prevalence survey)

Country	KPI (95% CI)
Austria[1]	91,9% (90,7% - 93,1%)
Finland[1,2]	96,1% (95,1% - 97,2%)
Ireland[1]	96,0% (93,0% - 99,0%)
Sweden[3]	94,3% (92,7% - 96,0%)

[1] N-over legal limit-never (30 days) / [2] no weighting / [3] N-over legal limit-never (12 months)

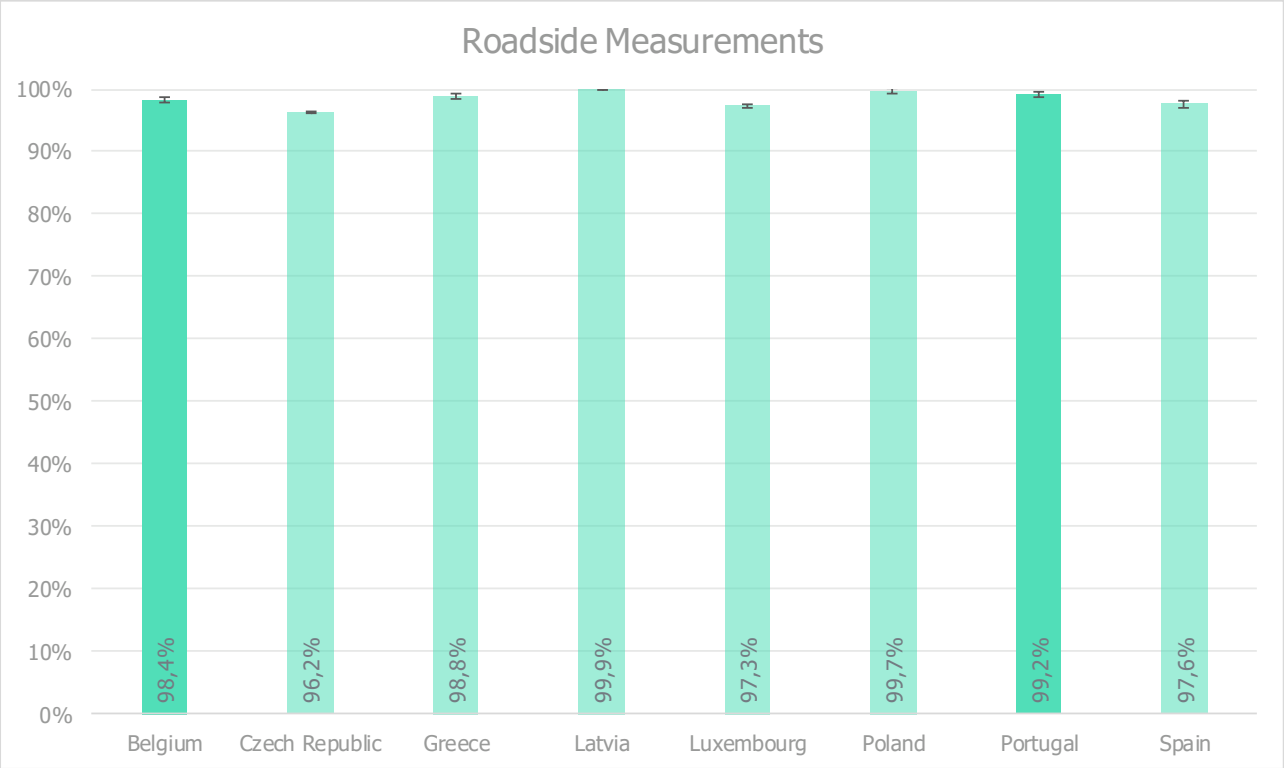
Additionally, the KPI on DUI of alcohol for Bulgaria and Germany, based on the trip-based prevalence survey, are shown in Table 15, with the KPI value for Germany being equal to 99,7%. All results are also displayed in Figures 3-5.

Table 15. National KPI (95% CI) on DUI of Alcohol (Questionnaire Survey / Trip-based prevalence survey)

Country	KPI (95% CI)
Bulgaria[1]	99,4% (99,1% - 99,7%)
Germany	99,7% (99,4% - 99,8%)

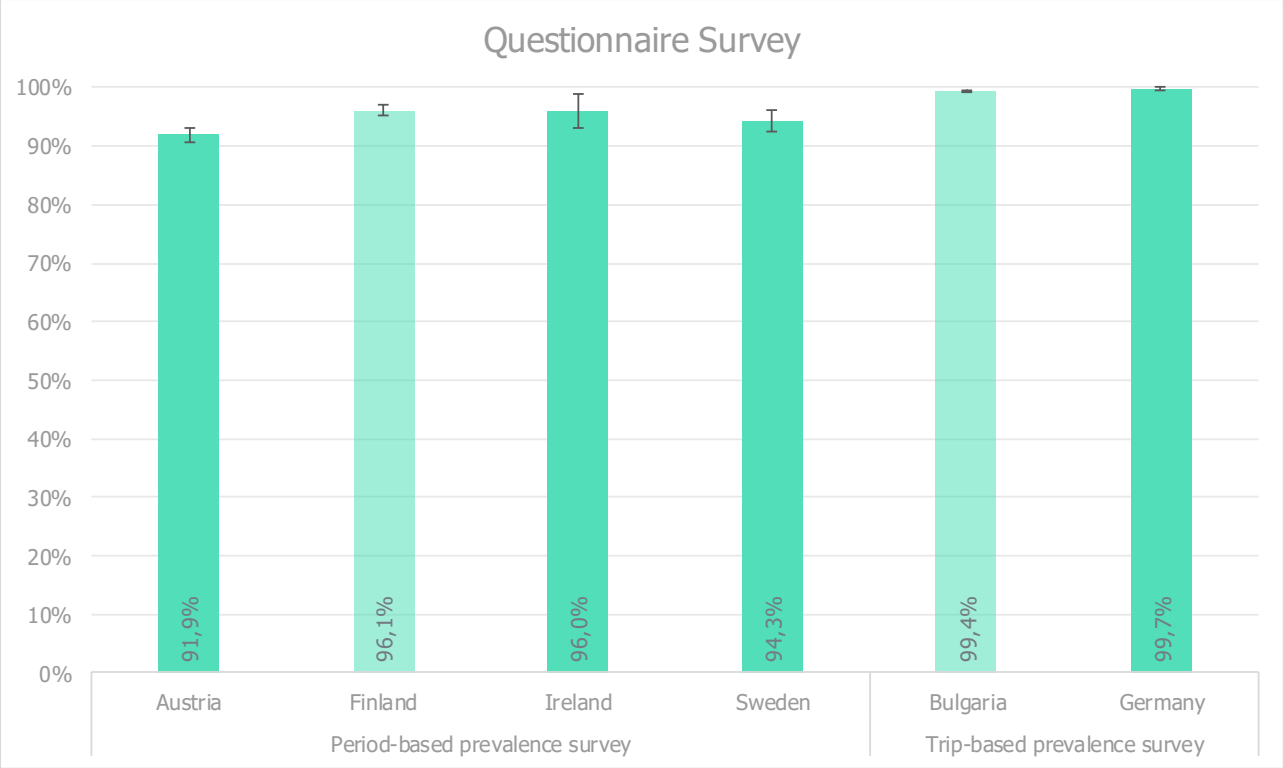
[1] no weighting

Figure 4. National KPI on DUI of Alcohol (Roadside Measurements)



**Note: Countries with deviations in the methodology are shown with light colours (LU, LV: min requirements not achieved; LU: no weighting; EL, ES: min sample achieved for all time periods except at night; LV, PL: motorways not included; CZ: results from enforcement actions)*

Figure 5. National KPI on DUI of Alcohol (Questionnaire Surveys)



**Note: Countries with deviations in the methodology are shown with light colours*

3.3 Breakdown by road type

In this section, KPIs on DUI of Alcohol by road type are provided. Data are available for the Member States that collected data either via roadside measurements or a trip-based prevalence survey. Data for motorways are not available for Poland and Latvia, as referred above.

For most countries, there is no significant difference of drivers' behaviour concerning DUI of alcohol among the different types of roads, neither a common pattern among the Member States. For instance, in Portugal, the value of the KPI is higher on motorways, while in Spain, more drivers driving within the legal BAC limits are observed on urban roads.

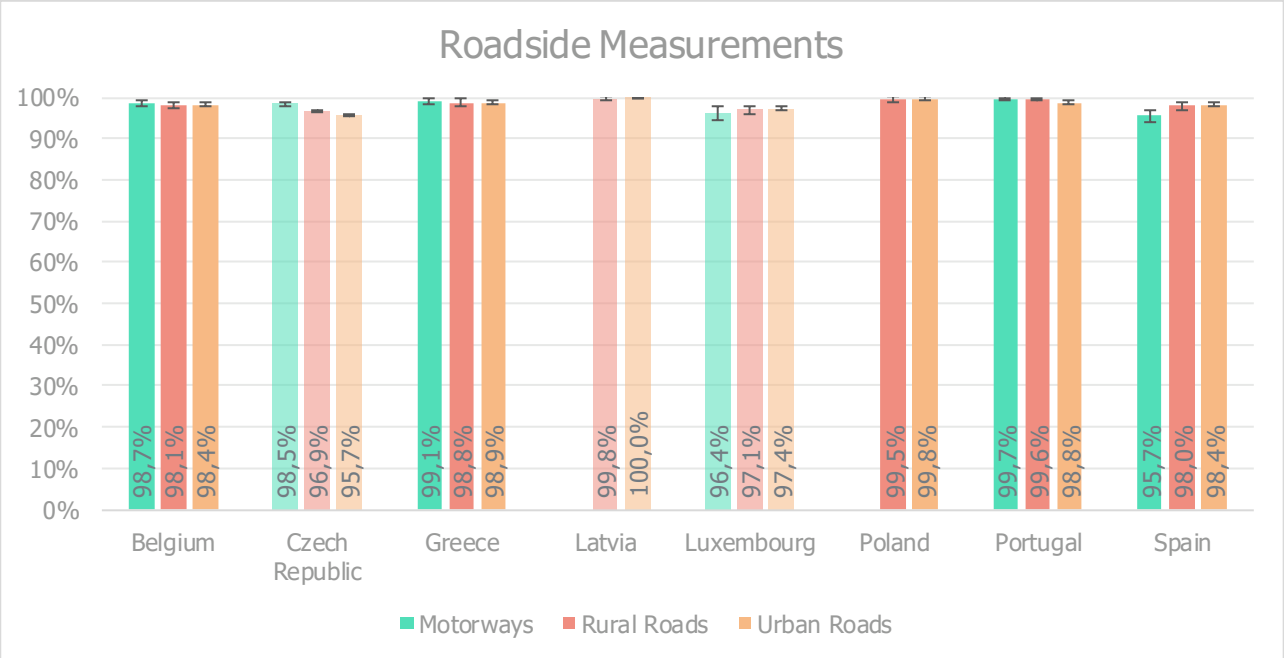
Table 16. KPIs (95% CI) on DUI of Alcohol per road type, all periods combined

Country	Motorway	Rural Road	Urban Road
Roadside Measurements			
Belgium	98,7% (97,5% - 99,4%)	98,1% (97,2% - 98,8%)	98,4% (97,7% - 98,8%)
Greece	99,1% (98,4%-99,8%)	98,8% (97,8%-99,8%)	98,9% (98,4% - 99,4%)
Latvia[1,3]	-	99,8% (99,6% - 100,0%)	100,0%
Luxembourg[1, 2]	96,4% (94,6% - 98,1%)	97,1% (96,0% - 98,1%)	97,4% (96,9% - 97,9%)
Poland[3]	-	99,5% (99,0% - 100,0%)	99,8% (99,5% - 100,0%)
Portugal	99,7% (98,6% - 100,0%)	99,6% (98,4% - 99,9%)	98,8% (97,8% - 99,4%)
Spain	95,7% (93,9% - 97,1%)	98,0% (96,7% - 99,0%)	98,4% (97,5% - 98,9%)
Czech Republic[4]	98,5% (98,1% - 98,8%)	96,9% (96,7% - 97,1%)	95,7% (95,5% - 95,9%)
Questionnaire Survey - Trip-based prevalence Survey			
Bulgaria[2]	98,7% (98,0% - 99,4%)	99,4% (99,0% - 99,9%)	100,0%
Germany	99,5% (98,3% - 99,9%)	99,9% (99,5% - 100,0%)	99,6% (99,2% - 99,8%)

[1] min. nr of locations per stratum not achieved / [2] no weighting / [3] motorways not included / [4] based on alcohol testing results from enforcement actions (not random)

Comparing the countries by road type, it is shown that on motorways, the highest KPI is observed in Portugal (99,7%), on rural roads in Portugal and Poland (99,6% and 99,5% respectively) and on urban roads in Poland (99,8%).

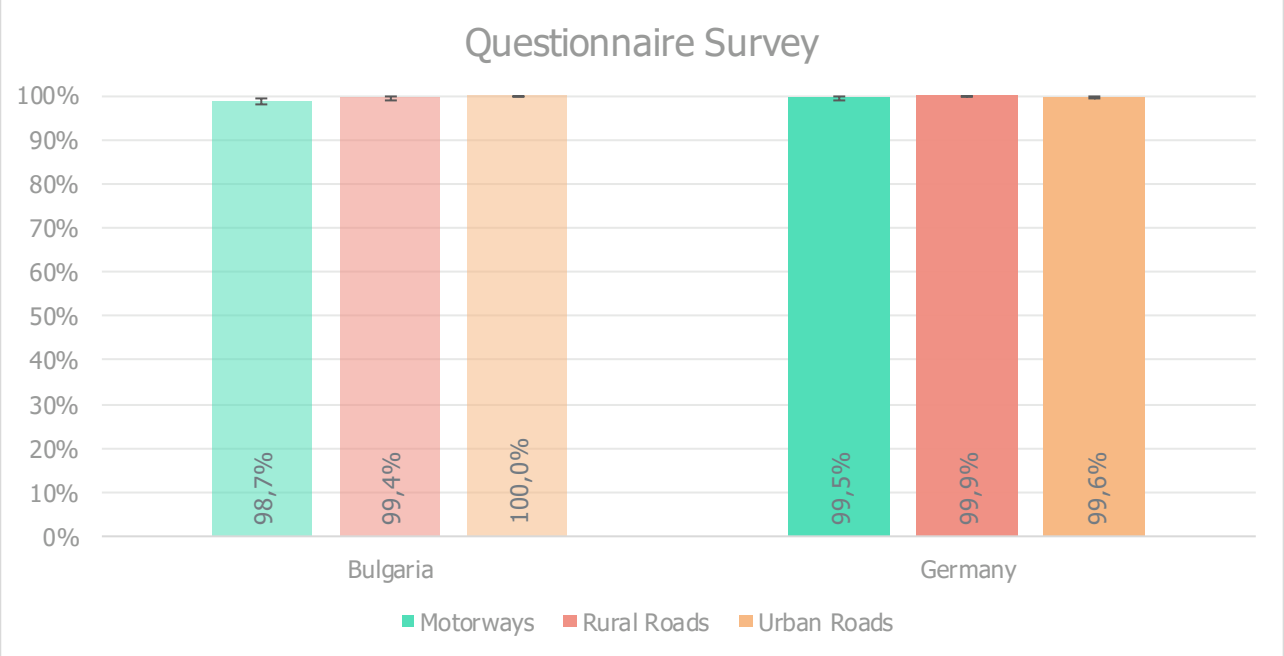
Figure 6. KPIs on DUI of Alcohol per road type, all periods combined (Roadside Measurements)



**Note: Countries with deviations in the methodology are shown with light colours*

From the survey on self-reported behaviour in Germany and Bulgaria, it is shown that the KPIs on all road types are very high (99,5%-99,9%), without difference by road type.

Figure 7. KPIs on DUI of Alcohol per road type, all periods combined (Questionnaire Survey - Trip-based prevalence survey)



**Note: Countries with deviations in the methodology are shown with light colours*

3.4 Breakdown by time period

KPIs on DUI of Alcohol are also provided by time period (weekday/weekend and daytime/night-time). Data are available for the Member States that collected data either via roadside measurements or trip-based prevalence survey. Data are also available for Austria, who used the methodology of a period-based prevalence survey.

Table 17. KPIs (95% CI) on DUI of Alcohol by time period, all roads combined

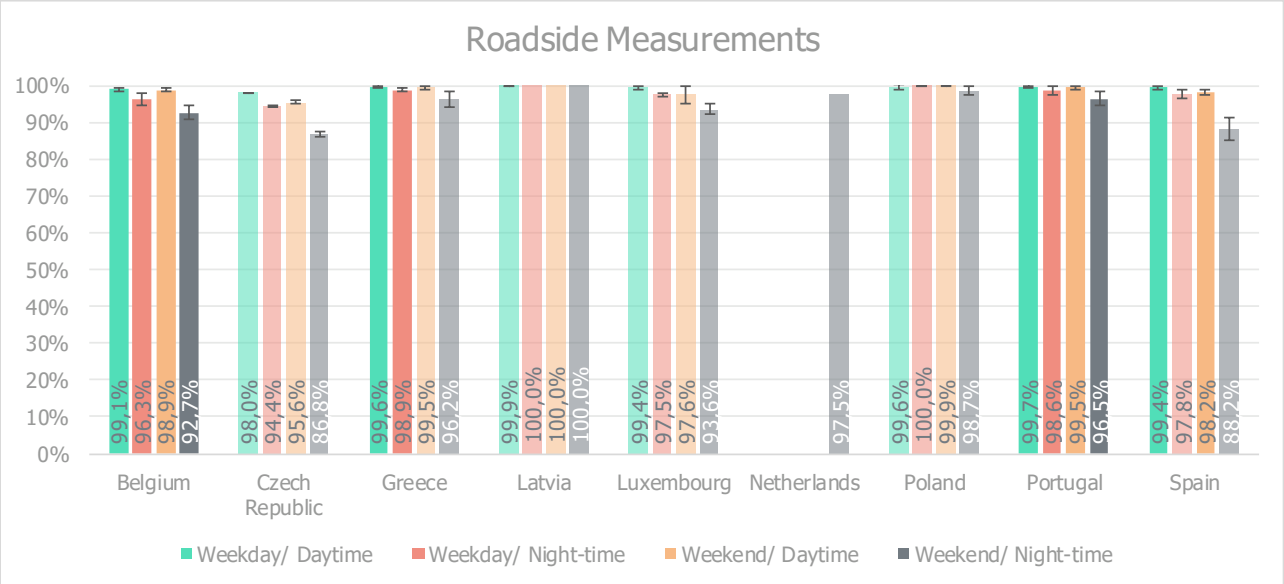
Country	Weekday/ Daytime	Weekday/ Night-time	Weekend/ Daytime	Weekend/ Night-time
Roadside Measurements				
Belgium	99,1% (98,3% - 99,5%)	96,3% (93,1% - 98,0%)	98,9% (98,1% - 99,3%)	92,7% (90,2% - 94,6%)
Greece[1]	99,6% (99,2% - 100,0%)	98,9% (98,3% - 99,4%)	99,5% (98,9% - 100,0%)	96,2% (94,2% - 98,3%)
Latvia[2,4]	99,9%(99,7% - 100,0%)	100,0%	100,0%	100,0%
Luxembourg[2,3]	99,4% (99,0% - 99,8%)	97,5% (97,0% - 98,1%)	97,6% (95,3% - 99,9%)	93,6% (92,2% - 95,1%)
Poland[4]	99,6% (98,9% - 100,0%)	100,0%	99,9% (99,7% - 100,0%)	98,7% (97,5% - 99,8%)
Portugal	99,7% (99,2% - 99,9%)	98,6% (95,4% - 99,7%)	99,5% (98,0% - 99,9%)	96,5% (92,8% - 98,5%)
Spain	99,4% (98,8% - 99,8%)	97,8% (95,6% - 99,1%)	98,2% (97,1% - 98,9%)	88,2% (83,5% - 91,5%)
Czech Republic[5]	98,0% (97,9% - 98,1%)	94,4% (94,0% - 94,7%)	95,6% (95,2% - 95,9%)	86,8% (85,9% - 87,7%)
Questionnaire Survey - Trip-based prevalence Survey				
Bulgaria[3]	99,2% (98,8% - 99,7%)	99,5% (98,9% - 100,0%)	99,4% (98,9% - 99,9%)	99,6% (98,7% - 100,0%)
Germany[6]	99,7% (99,4% - 99,8%)	95,4% (88,8% - 98,2%)	99,8% (99,3% - 100,0%)	100,0% (94,6% - 100,0%)
Questionnaire Survey - Period-based prevalence Survey				
Austria	93,6% (92,5% - 94,6%)	94,9% (93,9% - 95,8%)	94,1% (93,0% - 95,1%)	94,6% (93,6% - 95,6%)

[1] min. sample not achieved / [2]min. nr of locations per stratum not achieved / [3] no weighting / [4] motorways not included / [5] based on alcohol testing results from enforcement actions (not random) / [6] low samples during night-time (weekday and weekends)

In contrast with the results by road type, the KPIs by time period differ a lot for almost all Member States who provided such data. Concerning results of the roadside measurements, the KPI values are lower during night-time for all countries, with the lowest KPIs being observed at weekends compared to weekdays for all countries. Additionally, during daytime, fewer drivers are driving within the legal BAC limits at weekends compared to weekdays in all countries. This pattern is also observed in the Czech Republic, who analysed police enforcement data related to crashes.

Also, among the Member States, the KPIs on weekdays during daytime have no significant differences (more than 99,2% for all countries and 98% for Czech Republic), while during daytime at weekends, KPIs vary between 98,2% (Spain) to 99,5% (Portugal). The respective value for the Czech Republic is 95,6%. The lowest value on weekdays during night-time is observed in Belgium (96,3%) and the highest in Poland (100%). During night-time at weekends, least drivers driving within BAC limits were observed in Spain (88,2%), while most drivers driving within BAC limits were found in Poland (98,7%). It should be noted, however, that the sample of drivers observed during night-time in weekends in Spain was lower than the minimum required.

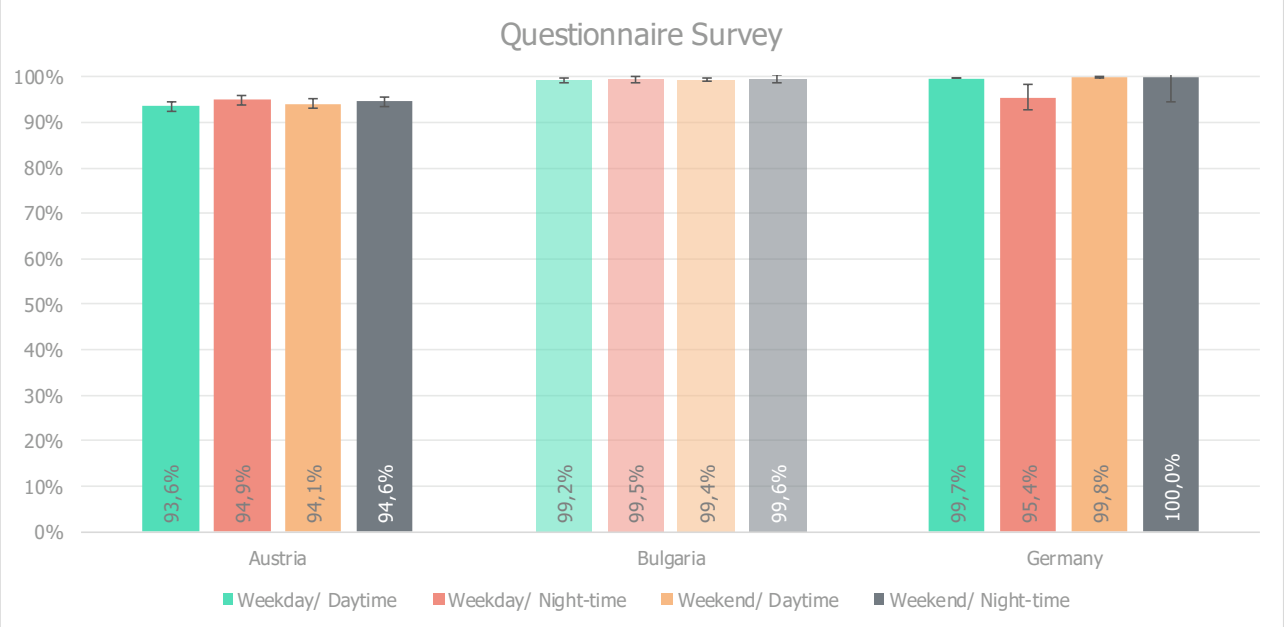
Figure 8. KPIs on DUI of Alcohol per time period, all roads combined (Roadside Measurements)



**Note: Countries with deviations in the methodology are shown with light colours (LU, LV: min requirements not achieved; LU: no weighting; EL, ES: min sample not achieved for all time periods; LV, PL: motorways not included; NL: 2019 data; CZ: results from enforcement actions)*

Concerning the results of the surveys on the self-reported behaviour of drivers, there is no significant difference of the KPIs among the different time periods examined in Austria and Bulgaria, while in Germany, the KPI is lower during night-time on weekdays (95,4%) compared to the other time periods (99,7% and above).

Figure 9. KPIs on DUI of Alcohol per time period, all roads combined (Questionnaire Survey)



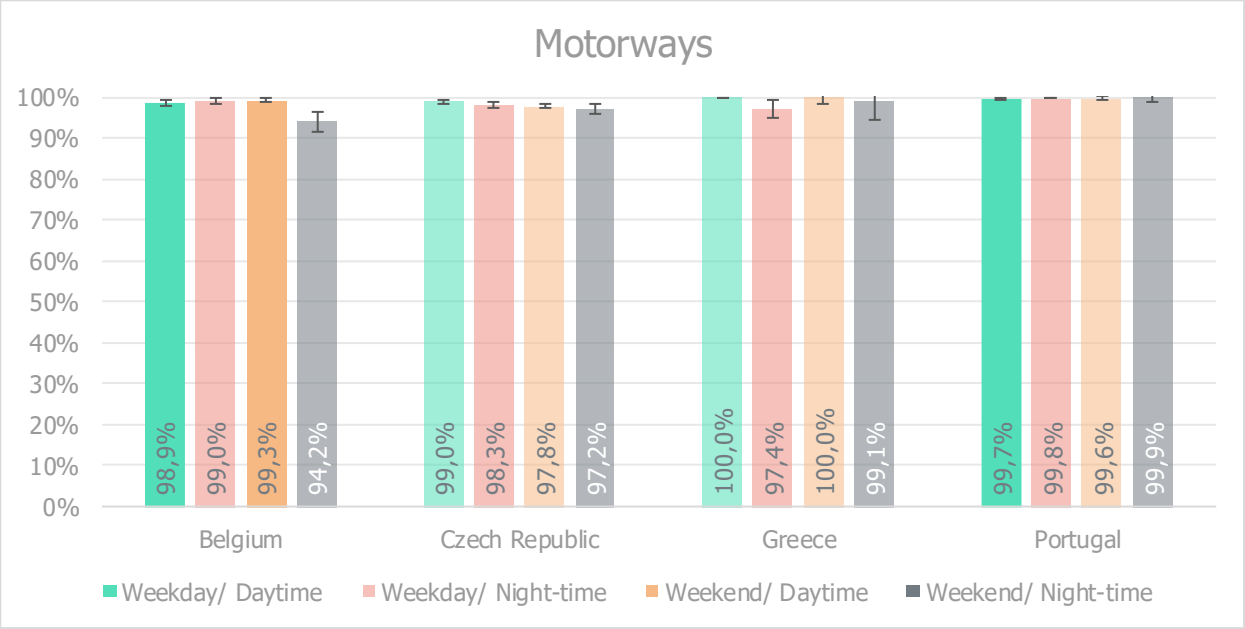
**Note: Countries with deviations in the methodology are shown with light colours (BG: no weighting of data); low samples during night-time for Germany*

3.5 Breakdown by road type and time period

Data by road type and time period are also available for several countries: Belgium, Portugal, Poland and Czech Republic. It should be noted, however, that the minimum samples of drivers are not achieved for all combinations of strata (road type x time period) for all countries, thus, caution is needed when interpreting the results.

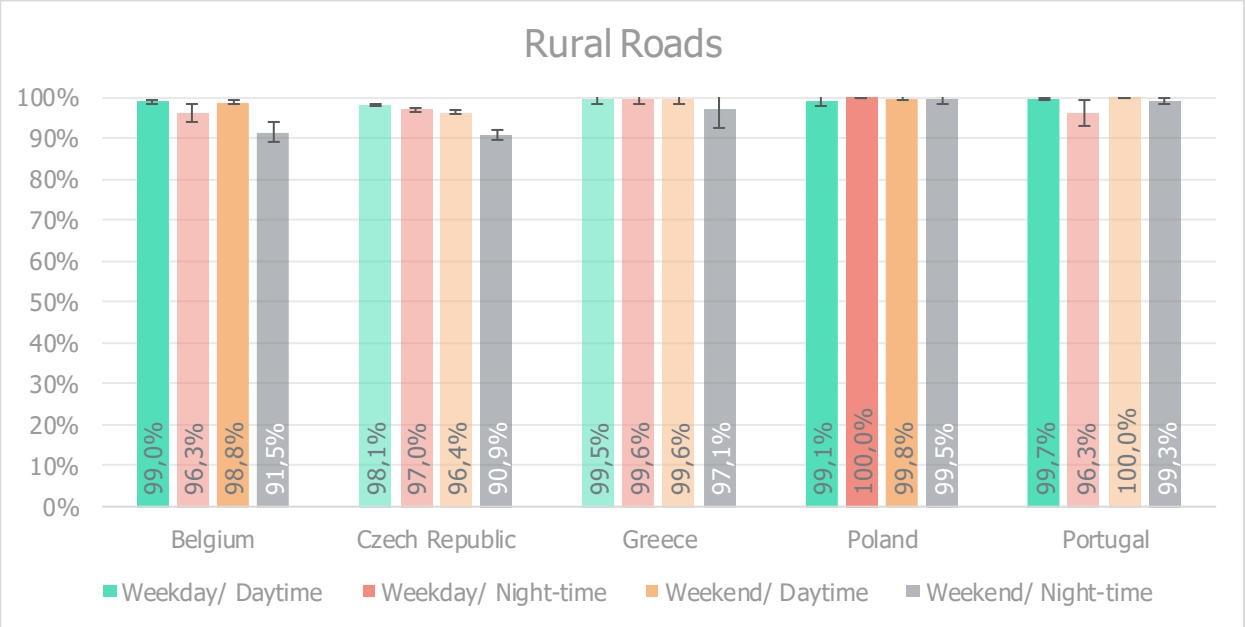
For all countries, the percentages of drivers driving within the legal BAC limit are higher on motorways during all time periods compared to the other road types, as shown in Figures 9-11.

Figure 10. Percentage of drivers driving within BAC limits on motorways per time period



**Note: Countries with deviations in the methodology are shown with light colours (not achieving min. samples per stratum; CZ: results from enforcement actions)*

Figure 11. Percentage of drivers driving within BAC limits on rural roads per time period

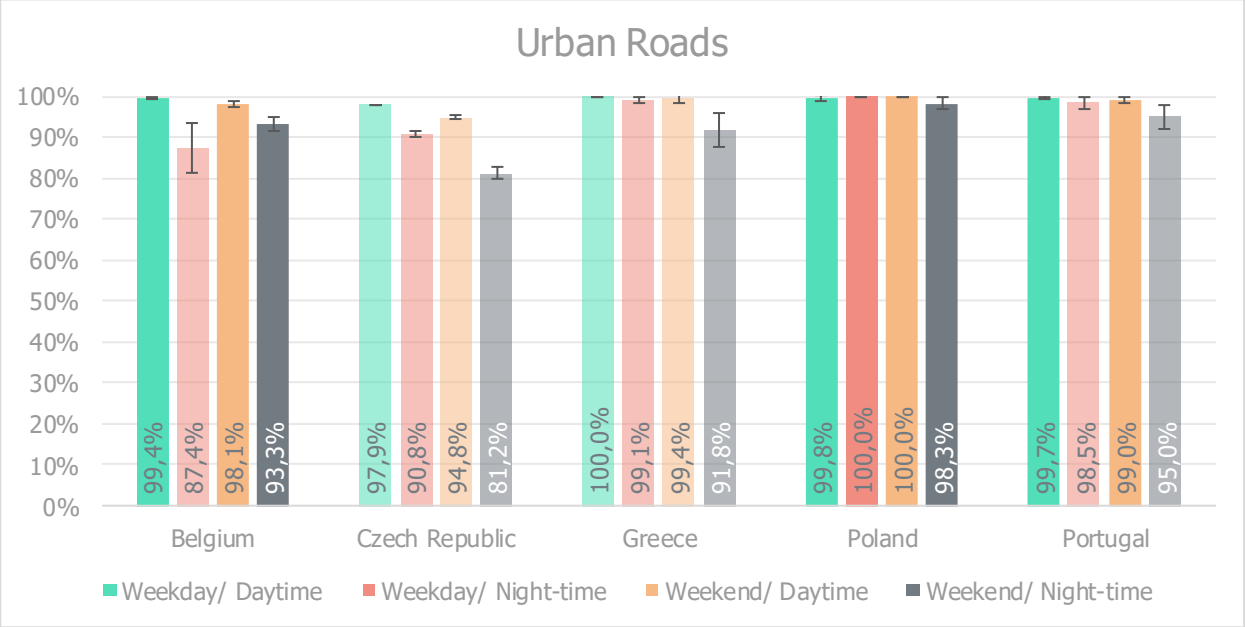


**Note: Countries with deviations in the methodology are shown with light colours (not achieving min. samples per stratum; CZ: results from enforcement actions)*

In Portugal, the lowest number of drivers driving within the legal BAC limits was observed on urban roads at weekends during night-time (95%) and on rural roads during night-time on weekdays (96,3%). In Belgium, the lowest percentage is found on urban roads on weekdays during night-time (87,4%) and on rural roads at weekend night-time (91,5%). In Poland, the respective values among the different time periods and road types do not vary a lot, with the lowest value being observed on urban roads during night-time of weekends (98,3%). Also, in Greece, the lowest value of the KPI is found on urban roads, at weekends during night-time (91,8%).

In Czech Republic, there is higher variation in the percentages of drivers driving within the legal BAC limits among the different time periods and road types, with the lowest percentage being found on urban roads at weekend nights (81,2%) and the highest on motorways during daytime on weekdays (99%).

Figure 12. Percentage of drivers driving within BAC limits on urban roads per time period



**Note: Countries with deviations in the methodology are shown with light colours*

3.6 Breakdown by gender

In this section, the KPIs on DUI of alcohol by gender are shown. Data were available for Belgium, Portugal, Austria, Finland and Sweden.

The percentages of female drivers driving within the legal BAC limits are generally quite similar to those of male drivers, although in Belgium, Finland and Sweden these are somehow higher.

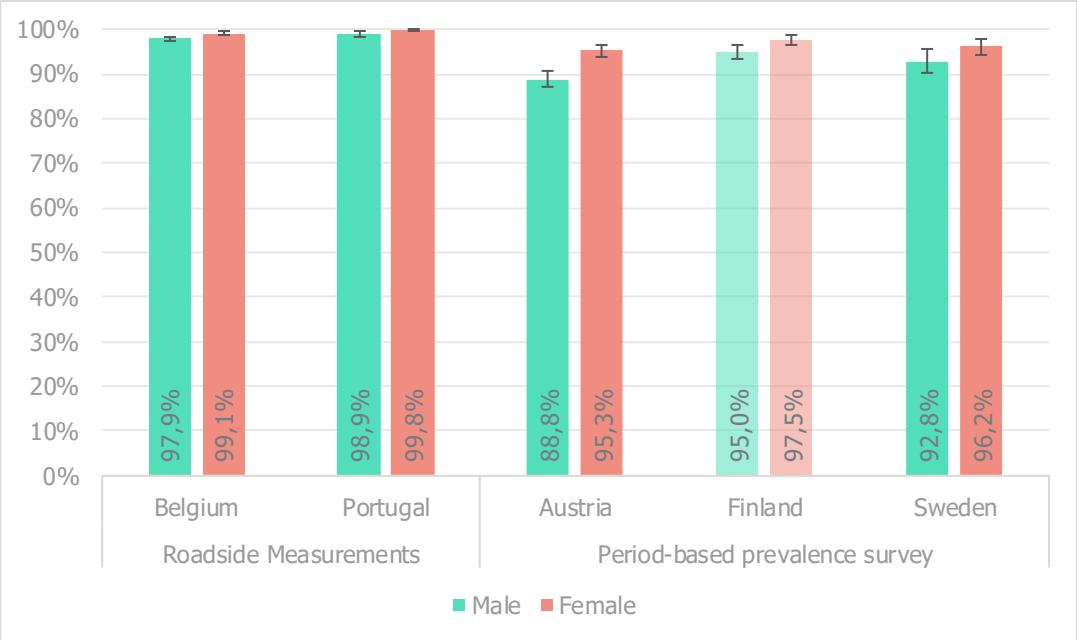
Table 18. KPIs (95% CI) on DUI of Alcohol by gender

Country	Male	Female
Roadside Measurements		
Belgium	97,9% (97,2% - 98,5%)	99,1% (98,3% - 99,5%)
Portugal	98,9% (98,1% - 99,4%)	99,8% (99,1% - 100,0%)
Questionnaire Survey - Period-based prevalence Survey		
Austria[1]	88,8% (86,9% - 90,7%)	95,3% (94,0% - 96,6%)
Finland[1,3]	95,0% (93,3% - 96,6%)	97,5% (96,2% - 98,7%)
Sweden[2]	92,8% (90,2% - 95,4%)	96,2% (94,3% - 98,0%)

[1] N-over legal limit-never (30 days) / [1] N-over legal limit-never (12 months) / [3] no weighting

Comparing KPIs among the countries by data collection methodology, in Belgium KPIs for both male and female drivers are lower than those of Portugal, while based on the self-reported behaviour of drivers (30 days period), the lowest percentages of drivers driving within the legal BAC limit are found in Finland.

Figure 13. KPIs on DUI of Alcohol by gender



**Note: Countries with deviations in the methodology are shown with light colours*

3.7 Breakdown by age group

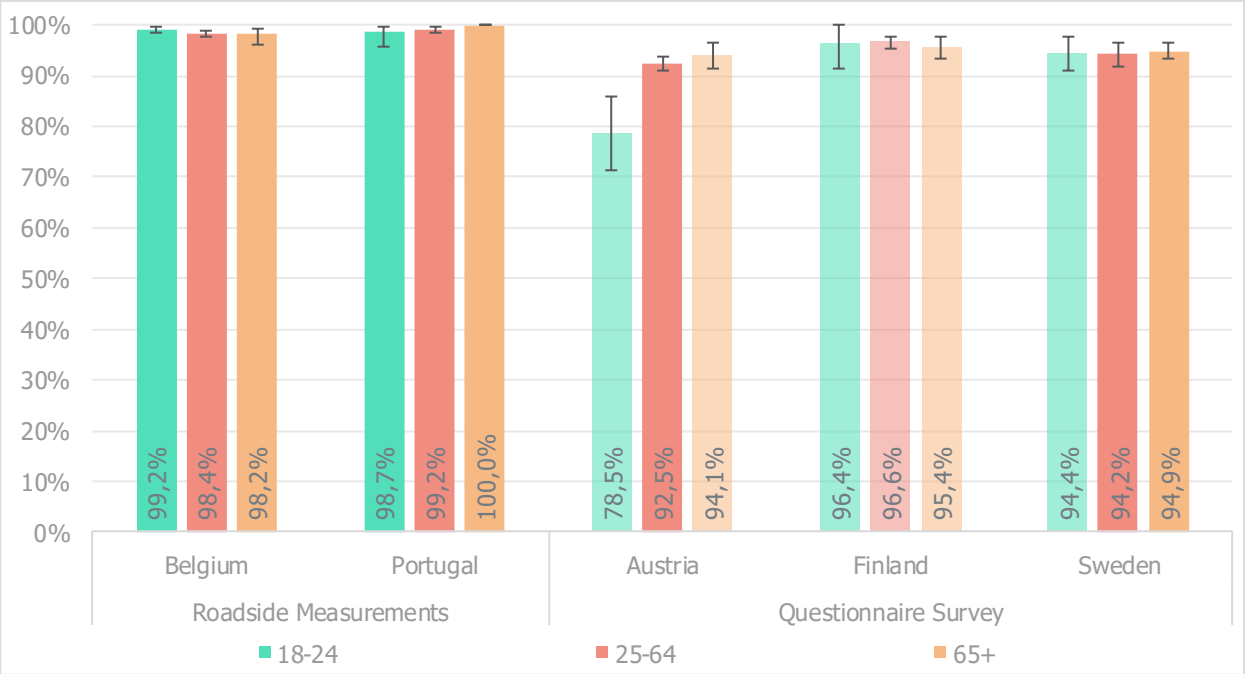
In this section, the KPIs on DUI of alcohol by age group are shown for Belgium, Portugal, Austria, Finland and Sweden. For most countries, the minimum sample of drivers has not been achieved for the 18-24 age group, and in some cases for the 65+ age group. No similar age-related patterns are observed among the countries, while the low samples for specific age groups do not allow reliable comparisons.

Table 19. KPIs (95% CI) on DUI of Alcohol by age group

Country	18-24	25-64	65+
Roadside Measurements			
Belgium	99,2% (98,4% - 99,6%)	98,4% (97,7% - 98,8%)	98,2% (96,1% - 99,1%)
Portugal	98,7% (95,7% - 99,8%)	99,2% (98,5% - 99,6%)	100,0%
Questionnaire Survey - Period-based prevalence Survey			
Austria[1]	78,5% (71,2% - 85,8%)	92,5% (91,2% - 93,8%)	94,1% (91,5% - 96,6%)
Finland[1, 3]	96,4% (91,3% - 100,0%)	96,6% (95,2% - 97,6%)	95,4% (93,3% - 97,6%)
Sweden[2]	94,4% (91,1% - 97,7%)	94,2% (91,9% - 96,4%)	94,9% (93,4% - 96,4%)

[1] N-over legal limit-never (30 days) / [1] N-over legal limit-never (12 months) / [3] no weighting

Figure 14. KPIs on DUI of Alcohol by age group



**Note: Countries with deviations in the methodology are shown with light colours*

3.8 Breakdown by gender and age group

Finally, the available data by gender and age group are presented. Due to the fact that samples for the different combinations of strata (gender x age group) are not achieved for all countries (subsequent samples are available mainly for the 25-64 age group), the KPIs are not further described nor compared.

Table 20. Percentage of drivers driving within legal BAC limits (95% CI) by age group for males

Country	18-24	25-64	65+
Roadside Measurements			
Belgium	99,0% (97,7% - 99,6%)	97,9% (97,0% - 98,6%)	97,5% (94,2% - 98,9%)
Portugal	98,2% (93,5% - 99,7%)	98,9% (98,0% 99,4%)	100,0%
Questionnaire Survey - Period-based prevalence Survey			
Austria	66,7% (54,4% - 78,9%)	89,8% (87,7% - 91,9%)	90,6% (86,7% - 94,5%)
Finland	91,7% (80,0% - 100,0%)	95,6% (93,7% - 97,4%)	94,0% (90,1% - 97,3%)

Table 21. Percentage of drivers driving within legal BAC limits (95% CI) by age group for females

Country	18-24	25-64	65+
Roadside Measurements			
Belgium	99,6% (98,6% - 99,9%)	99,0% (98,0% - 99,5%)	99,6% (98,8% - 99,9%)
Portugal	99,9% (95,9% - 100,0%)	99,8% (99,0% 100,0%)	100,0%
Questionnaire Survey - Period-based prevalence Survey			
Austria	87,7% (79,6% - 95,7%)	95,2% (93,7% - 96,7%)	100,0%
Finland	100,0%	97,4% (95,9% - 98,9%)	97,1% (94,6% - 99,6%)

3.9 Additional indicators

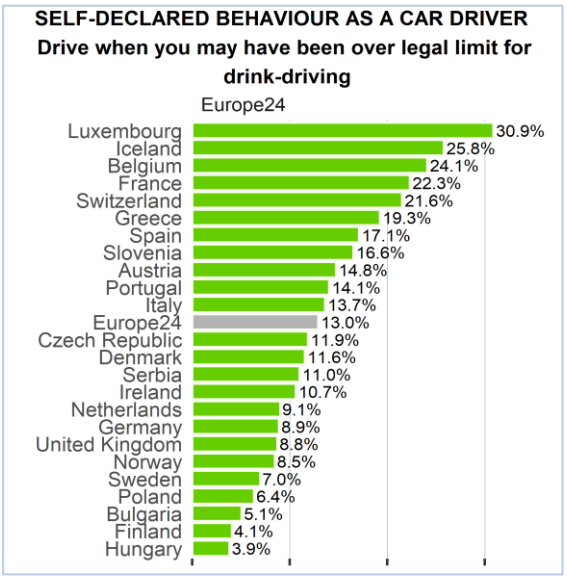
3.9.1 Self-declared behaviour

Within the ESRA2 survey, the percentages of drivers driving after drinking alcohol or when being over the legal limit for drink-driving at least once over the last 30 days have been estimated for the European countries based on the self-reported survey. These results are available separately for passenger car drivers and motorcyclists/moped riders. It is shown that more car drivers declare having been over the legal limit for drink-driving in Luxembourg, Iceland and Belgium, while the lowest percentages are found in Hungary, Finland and Bulgaria. Furthermore, in Luxembourg, Portugal and Switzerland, the percentages of drivers reported to have driven after drinking alcohol are the highest among the examined countries, while the lowest percentages are reported in Hungary, Norway and Poland.

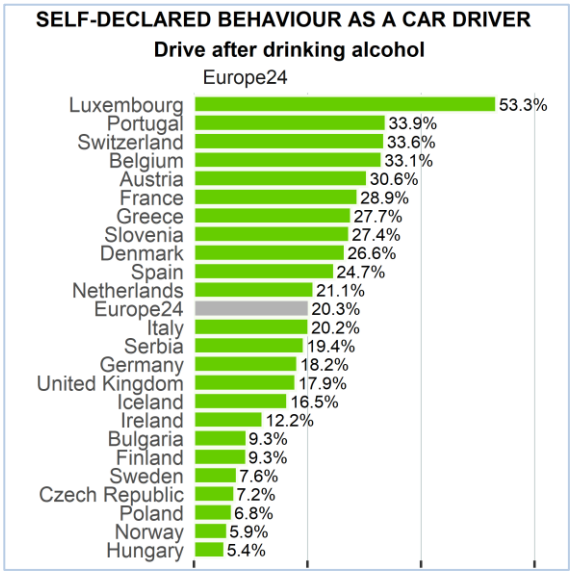
This ranking of the countries differs when examining results of motorcyclists/moped riders. The highest number of PTW riders being over the legal limits are found in the UK, Norway and France.

Figure 15. Self-declared behaviour concerning DUI of Alcohol

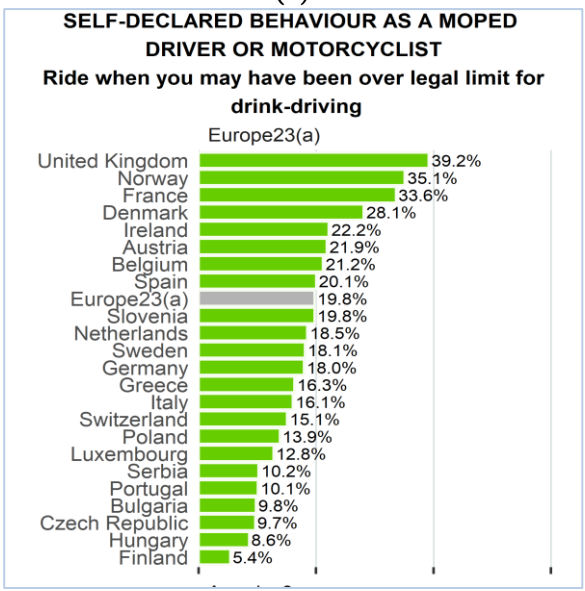
(a)



(b)



(c)



% at least once in the past last 30 days
Reference population: (a), (b) car drivers;
(c) motorcyclists/moped riders

Source: ESRA 2 (www.esranet.eu)

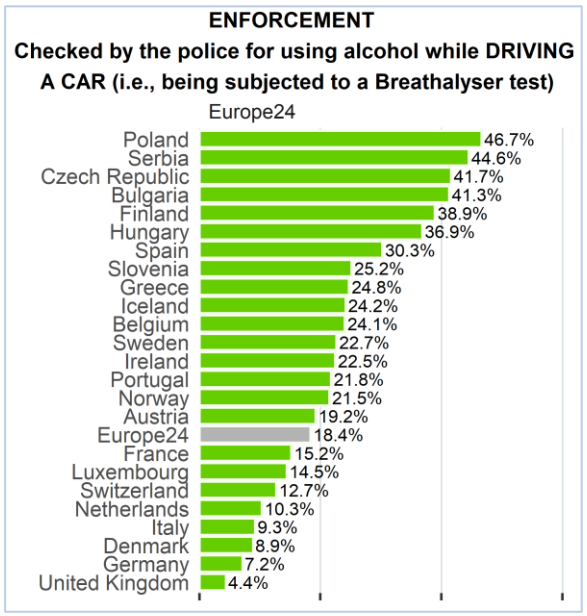
3.9.2 Enforcement results and perceptions on DUI of alcohol

Based on the same self-reported survey, results on enforcement practices in European countries can be found. Thus, most passenger car drivers have reported that they have been checked by Police for DUI of alcohol in Poland, Serbia, Czech Republic and Bulgaria, while the lowest percentages are found in the UK, Germany and Denmark.

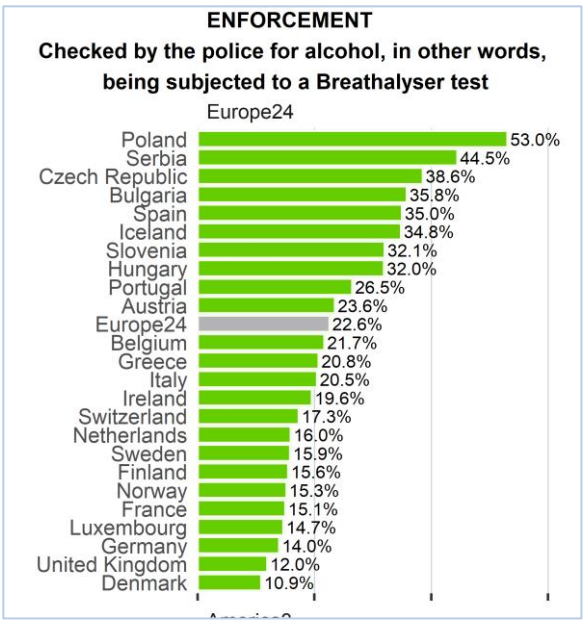
It is also interesting to see that in Greece, Bulgaria, Italy and Sweden, more than 85% of drivers believe that traffic rules concerning DUI of alcohol are not being checked sufficiently by Traffic Police, while the respective percentages in Iceland, Switzerland and Norway are about 55%-64% (lowest).

Figure 16. Enforcement results and perceptions concerning DUI of Alcohol

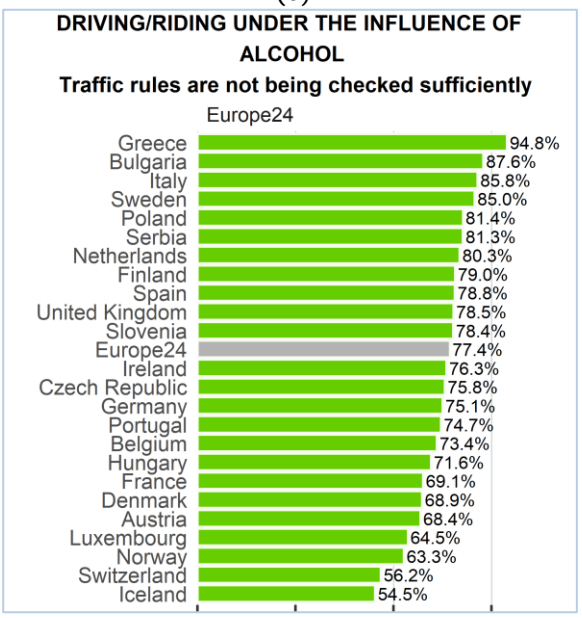
(a)



(b)



(c)

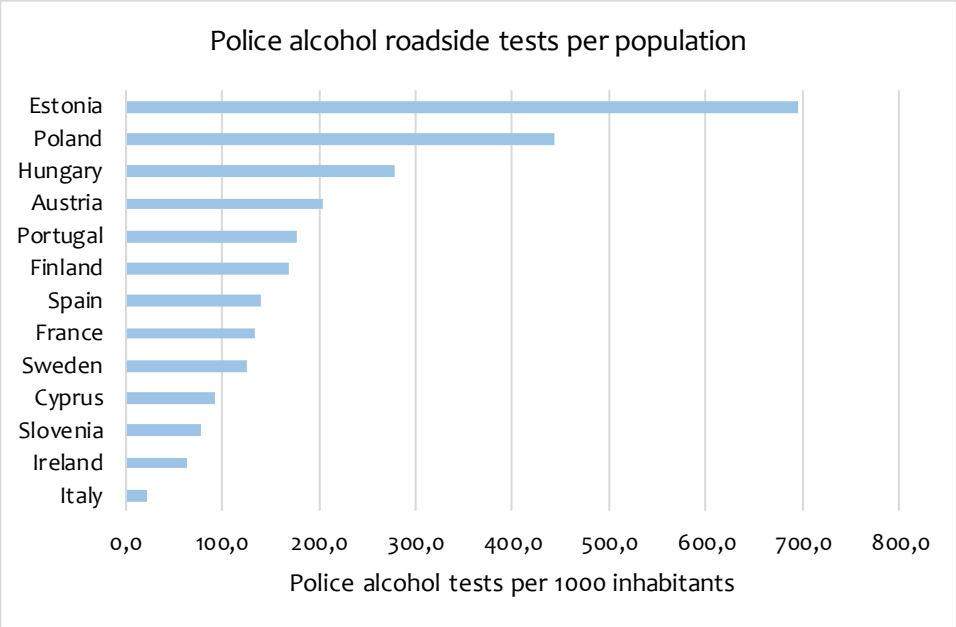


(a) % at least once in the past 12 months; (b) % of likely; (c) % of agreement
Reference population: (a), (b) car drivers; (c) all road users

Source: ESRA 2 (www.esranet.eu)

Data on the number of police alcohol roadside tests are also available for 13 European countries. Figure 17 shows the number of those tests per 1.000 inhabitants for 2019. In Estonia and Poland, more than 400 police alcohol breath tests per 1.000 inhabitants were conducted, while in Estonia the respective number is higher almost 700. The lowest number of police alcohol tests per 1.000 inhabitants is found in Italy, Ireland and Slovenia.

Figure 17. Police alcohol roadside breath tests per population, 2019

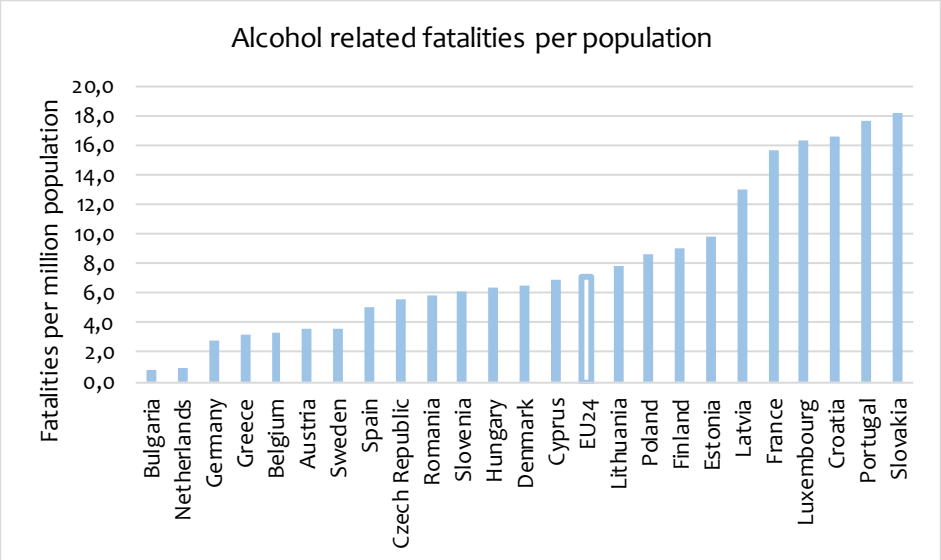


Sources: ETSC (PIN Flash 42), Eurostat

3.9.3 Alcohol related fatalities

Finally, the number of alcohol related fatalities per million inhabitants in 2019 is shown for the European countries. In Slovakia, Portugal, Croatia and Luxembourg more than 16 alcohol related fatalities per million inhabitants were recorded in 2019, while in Bulgaria and the Netherlands, the respective ratios are below 2. However, it is noted that due to different national policies (e.g. in the Netherlands post mortem testing is not allowed) or different national definitions for alcohol related fatalities, these results are not fully comparable among the Member States.

Figure 18. Alcohol related fatalities per million inhabitants by country, 2019



Sources: ETSC (PIN Flash 42), Eurostat

3.9.4 Discussion

Concerning the overall national Baseline KPIs based on roadside measurements, in all countries, more than 97% of drivers drive within the legal limit for blood alcohol concentration (BAC), with the highest percentages being recorded in Poland (99,7%) and Portugal (99,2%) and the lowest in Spain (97,6%) and Luxembourg (97,3%). The respective proportion for Czech Republic is 96,2%, which is based on non-random breath tests coming from enforcement actions following road crashes. Regarding the KPIs based on the period-based prevalence survey, the respective KPIs are 96,1% in Finland, 96% in Ireland and 94,3% in Sweden. Additionally, the KPI on DUI of alcohol for Germany, based on a trip-based prevalence survey, is 99,7%.

For most countries, there is no significant difference of drivers' behaviour concerning DUI of alcohol among the different types of roads, neither a common pattern among the Member States. In contrast with the results by road type, the KPIs by time period differ a lot for almost all Member States who provided such data. Concerning results of the roadside measurements, the KPI values are lower during night-time for all countries, with the lowest KPIs being observed at weekends compared to weekdays for all countries. Additionally, during daytime, fewer drivers are driving within the legal BAC limits at weekends compared to weekdays in some countries. This pattern is also observed in the Czech Republic, where police enforcement data related to crashes were analysed. Also, for the countries with available KPIs by gender and age group, the percentages of female drivers driving within the legal BAC limits are higher than those of male drivers, and this slightly more in Belgium, Finland and Sweden, but nowhere the difference is beyond the confidence intervals. Also, comparing the indicators for all age groups, a common pattern is not identified, however, minimum samples are not reached for all age groups by most countries, which affects the reliability and comparability of data.

An initial comparison between the Baseline KPIs on DUI of alcohol and alcohol related fatality rates per million inhabitants for 2019 is attempted, however, a clear relationship cannot easily be identified. Both the different data collection methodologies used for the KPIs and the different national policies or definitions used for the alcohol related fatalities do not allow at the moment a direct comparison of these two types of indicators.

Additionally, an initial comparison of the Baseline results coming from the roadside surveys and the ESRA 2 survey results based on the self-declared behaviour of drivers shows that there is a similar pattern of the performance of the countries, which can also be explained by the perceptions of drivers concerning national enforcement procedures. For example, the highest national overall KPI on DUI of Alcohol based on roadside measurements is found in Poland, which agrees with the ESRA 2 results based on the self-reported behaviour of car drivers. Also, in Poland, based on data reported by drivers but also on the national statistics of Traffic Police, the number of police alcohol tests is among the highest in Europe.

4 Conclusions on data quality and recommendations for the future

4.1 Comparability and quality of data

The Member States could choose the most suitable data collection methodology for the estimation of the KPI DUI of Alcohol. Eight countries collected data through roadside measurements by the Police (random breath testing) and another six countries collected data on self-reported behaviour via anonymous surveys. The anonymous surveys on self-reported behaviour were either online, telephone, paper surveys or a combination of these methods was selected. Out of these six countries, four Member States collected data based on the "period-based prevalence" method and two countries based on the ‘trip-based prevalence’ method. Only one country used alcohol testing results from enforcement actions (not random) following a crash.

The main stratification levels of the roadside surveys were road type and time period. At minimum 10 different locations per stratum (road type or time period) are required for the alcohol measurements. Also, a minimum total sample of 2.000 measurements is required, while for each stratum or combination of strata (e.g. road type x time period), the minimum required sample is 500. However, not all countries reached these minimum requirements, with Latvia and Luxembourg including less than 10 locations per road type or time period, while the minimum samples for weekday/night-time and weekend daytime/night-time were not reached by few countries. It is also noted that not all road types are included in the results for all countries, i.e. in Latvia no motorways exist, while in Poland, motorways were not included in the survey. When examining the data collected for the combination of the strata road type and time period, the minimum samples are not achieved in most countries, and especially during night-time (weekdays or weekends) outside urban areas (either on rural roads or motorways), when the traffic is lower.

Concerning the self-reported surveys, a minimum sample of 1.000 respondents is recommended for the period-prevalence surveys and a minimum sample of 2.500 respondents for the trip-based surveys, which is reached by all countries. The main stratification levels for the questionnaire surveys were age, gender and region/state/town. The minimum samples for these countries by gender are reached, while no country reached the minimum required samples for all age groups, especially the 18-24 age group. For the period-based prevalence surveys, different time periods were used for the definition of the KPI, i.e. 30 days for Austria and Finland, 12 months for Sweden. Regarding the trip-based prevalence survey, the sample stratification differs between the two countries; with road type and time period being the main strata for Bulgaria and gender, age, region and highest level of education being for Germany. Both countries provided their results by road type and time period, however, a lower number of respondents was identified during night-time (both on weekdays and weekends).

A far as the data weighting is concerned, in most cases when the stratification levels were road type and time period, the recommended Baseline weight formula was used, including strata sampling weight (road type x time period or only time period), session sampling weight (traffic counts) and traffic volume weight (if available). However, the actual weighting procedures and sources do differ between the Member States, with national traffic volume data often lacking. In the case of surveys on self-reported behaviour, data were weighted according to age, gender and region/state/town, so that the total sample corresponds to the total (driving) population. However, it should be noted that 3 out of 13 countries have not applied any weighting of data.

It is also noted that all countries estimated the KPI DUI of alcohol for passenger cars only, except Belgium (also light goods vehicles), Spain (also motorcycles) and Czech Republic (also goods vehicles, buses, motorcycles), where alcohol testing results from enforcement actions following crashes were used.

As mentioned above, different data collection methodologies were used for the KPI DUI of alcohol, which does not allow direct comparisons among all countries. Thus, in this report, results and the respective metadata were presented and discussed separately by main data collection method. However, even when comparing results of the countries using the same methodology, KPIs are not fully comparable, due to various deviations from the minimum methodological requirements, (too) small samples for specific strata, differences in weighting of data, different questions used for the definition of the KPIs in the case of self-reported surveys, etc. Thus, for instance, for the national KPIs on DUI of alcohol based on roadside surveys, minimum sampling requirements (min. 10 locations per stratum, min. sample of 500 tested drivers per road type (3 types) and time period (4 periods)) are achieved only by two countries, while in the other countries, either minimum samples are not achieved or motorways are not included in the measurements. With regard to the different week periods, sufficient driver sample is only achieved by all 8 MS that conducted a roadside survey within Baseline for weekdays. For all other week periods, 2 or more countries have a too small sample. For the 3 road types, generally all MS achieved the min. sample, except 1 Member State for motorways (and also Latvia, where no motorways exist). Similarly, the different time periods used for the definition of the KPI based on the period-based surveys (30 days vs 12 months) and the non-weighting of data in some countries do not allow fully reliable comparisons of the performance of the countries.

4.2 Recommendations

The main purpose of the project is the data collection and calculation of the road safety KPIs in the EU countries, that will serve as a baseline for the monitoring of the evolution of their road safety performance within this decade. Thus, it is essential that the comparability of the KPI results over time will be ensured in the following years. Within this context, it is recommended that any change in the methodology of the data collection and calculation of the KPIs in the future will not affect the comparability of the KPIs over time, but in parallel will allow the Member States to focus on those KPIs that are of higher importance for them and make the collection of the minimum required data more feasible.

For the KPI DUI of Alcohol, an issue of comparability among the countries exists due to the different main methodologies used for the data collection. The most appropriate methodology to deliver an accurate picture, which is mostly recommended by the EC, is the roadside breath testing of randomly selected drivers on a representative sample of locations. In countries where this is legally allowed, it is recommended to opt for this methodology either in collaboration with police forces (ideal) or to collect random samples of voluntarily participating drivers. It is noted that the collection of representative samples depends highly on the good collaboration with the police. Due to the difference between enforcement priorities and data collection for KPIs, some local police zones may not want to collaborate, or will focus on the regions where there is a high probability of intoxicated drivers, which may lead to biased samples.

In case such data collection method cannot be used by all countries, it is recommended to keep the three alternative optional data collection methods as indicated in the Baseline project. However, the results of these different data collection methods should not be reported in the same comparative table, and also the associated targets should be different.

Concerning the roadside survey, the minimum required strata in the Baseline project for the KPI DUI of alcohol were road type (motorways, rural roads, urban roads) and time period (weekday/ weekend x daytime/night-time). No notable differences of the KPI values by type of road were found. On the contrary, a clear pattern was found by time period. When examining the KPIs for the combined strata (by road type and time period), differences in the performance of the countries seem to exist, however, most countries that dispose such data did not provide adequate samples in order to obtain reliable conclusions. Thus, the same strata are recommended to be kept with a focus to obtain adequate samples at least for each road type and time period, but also for the combination of the two strata (road type x time period).

KPIs for DUI of alcohol by gender and age group were provided by a few countries. The results showed that there is a difference in the DUI of alcohol by gender mainly for the countries that used the self-reported survey as the data collection method. Notable differences by age group were not found. However, the small size of the samples for specific age groups do not allow to make reliable comparisons. KPIs by gender and age group are recommended to be gathered and further explored by more countries, including those that used the roadside breath tests, which would also allow to identify the target groups that are of higher risk.

Among the countries that have selected road type and time period for the stratification of their samples, the minimum samples per road type have been met for almost all of them, while lower samples than the minimum required were collected for specific time periods by some of them, especially during night-time. The minimum required samples for the combination of the two basic strata (road type x time period) are not met in almost all countries that provided more disaggregate data. On that purpose, the minimum samples should be revised, so that it will be feasible for the Member States to collect more comparable data for the different strata or combinations of strata, taking also into consideration issues such as, low traffic during night-time in specific road types, different minimum samples for small countries, etc. In case that the collection of adequate samples for all strata is not feasible, focus is recommended to be given on the night-time driving in order to explore the drivers' behaviour by road type, gender or age group.

A significant limitation highlighted in the project is the lack of traffic volume data, that is mainly reflected at the weighting of the data and the calculation of the final results. An approach of weighting was suggested in the Baseline project, which was applied by some Member States. Estimates of traffic share by road type and time period or proxies of traffic volume were used for the weighting of the results by a few Member States, which, however, do not allow to assess safely the comparability of the data. Therefore, minimum requirements for the weighting of the data should be defined, either for the calculation of the KPIs in one stratum or for the calculation of national KPIs (including more strata or combinations of strata).

KPIs presented as the percent compliance with the maximum legal limits may minimize the size of drink-driving problem and its effect on road safety outcomes, which needs to be better communicated, with an emphasis on the night-time related results. Complementary indicators to the KPIs could also be considered, such as indicators on intoxication levels (0-0.2g/l, 0.2-0.5 g/l, 0.5-0.8 g/l, etc.), which would allow to better assess the problem and compare the performance of the countries that dispose different maximum BAC limits. Also, the KPI could be extended to other vehicle types (motorcycles, goods vehicles, etc.) or different driver types (e.g. novice drivers, professional drivers) for which different BAC limits are in force. Finally, enforcement related indicators could be explored and associated with the KPI results.

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6 Annex 1. Requirements for representative Alcohol measurements

6.1 Overall principles

Information by random breath testing is gathered by means of roadside surveys. During a roadside survey, drivers are randomly selected and stopped. The alcohol level of each of these drivers is assessed by means of alcohol breath testing. Some basic information about the driver (e.g. age, gender) and the trip (e.g. length, motive) can optionally be observed or asked.

The objective of roadside surveys is to estimate the percentage of drivers respecting the legal limit for drink-driving. The theoretical population (100%) refers to the total of all journeys (at least from the vehicle types being surveyed) over the national territory. In other words, this reflects the total number of kilometres driven. Hence, by weighting the results by number of kilometres driven on the different stratification variables employed, the percentage of drivers respecting the legal limit will also reflect the percentage of kilometres driven with an alcohol concentration below the legal limit.

For drink driving the main strata that are known to contribute to prevalence are time of day (day vs. night) and day of week (week vs. weekend), and interactions of both. Furthermore, different road types also need to be taken into account. Road type and time period are the minimum required stratifications for this KPI.

Since the overall KPI estimate is expected to be representative for the total of all kilometres driven in a country, the theoretically optimal strategy to estimate the overall prevalence is to sample all strata according to traffic volume of each combination of the different strata. This overall strategy would, however, be detrimental for the accuracy of specific low-volume strata that are of interest. For drink-driving, for instance, night-time drivers, and more particularly weekend night drivers, are at a significantly higher risk for drink driving than weekday daytime drivers. Since traffic volumes during weekend nights are generally very low, strictly proportionate sampling according to traffic volume data would lead to much wider confidence intervals (less accurate estimates) for weekend night drivers than for higher volume time periods.

6.2 Vehicle types / drivers to be considered

The minimum requirement for vehicle types is the inclusion of passenger cars. Passenger cars are defined as a motor vehicle with 3 or 4 wheels, mainly used to transport people, seating for no more than 9 occupants (including the driver). Motor vehicles with these characteristics used as taxis as well as motor caravans are also included (CARE (2018)).

Goods vehicles, buses and motorcycles are optional supplementary vehicle categories1, which can be included, if this is possible for the Member State. However, this should only be done if the results can be disaggregated by vehicle type in the analysis. In such cases, the data collection should include a variable "vehicle type" with the different categories included. If different vehicle types are included, these should be clearly defined (cf. CARE definitions). If goods vehicles are included, a further differentiation can be made between light goods vehicles (e.g. vans) and heavy goods vehicles (e.g. trucks).

6.3 Road types to be included

The roadside survey should provide a representative sample of all traffic in the study region. This covers in most countries three main road types: motorways2, rural non-motorway roads (defined as roads outside built-up areas), and urban roads (defined as roads inside built-up areas). These are the minimum required road types for the roadside surveys. A deviation from this minimum requirement is only possible in exceptional cases: if a specific road type is non-existent in a country (e.g. Latvia) or if it is not feasible for the police (researchers) to organise control sessions on a road type (e.g. in some countries this can be the case for motorways). This should be fully explained in the methodological report.

The road types considered should be generally defined in the methodological report (general characteristics like traffic signs to define inside/outside built-up area, different speed regimes and number of lanes…).

6.4 Time period (time of day and day of week)

Separate results are required for night hours and daytime hours as well as for weekdays and weekend days. As a minimum requirement, weekdays, week nights, weekend days and weekend nights are covered in the survey (cf. DRUID D2.1.2 Guidelines for roadside surveys).

For the sake of comparability, it is recommended to classify week/weekend x day/night periods based on DRUID's classification (see Figure): Period 1, 2 and 3 can be merged and represent weekday, Period 4 is week night, Period 5, 6 and 7 are weekend days and Period 8 is weekend night.

Figure 2.1 presents the eight different DRUID time periods.

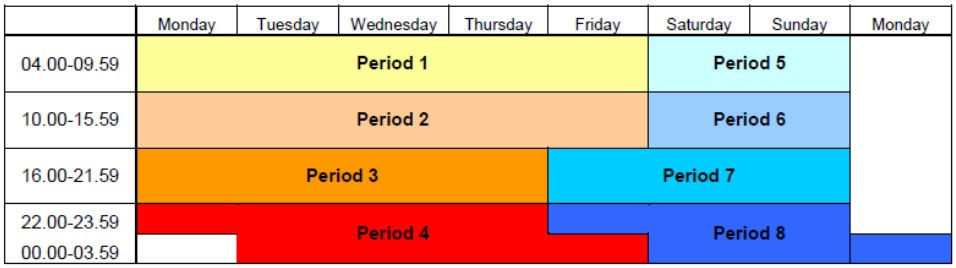

Figure 2.1. DRUID time periods

6.5 Measurement procedure for roadside breath testing

6.5.1 Sampling methods

Drivers need to be sampled randomly. This means that the selection of drivers should be undertaken irrespective of possible suspicion for driving under the influence. Any selectivity, either in the locations chosen (e.g. problematic areas for DUI) or in who is being checked and who is not (e.g. based on suspicion), leads to a bias and decreases the representativeness of the data.

Random roadside breath testing is generally done in collaboration with police forces, as in many countries they (and perhaps they alone) have a legal basis for stopping drivers and testing all drivers stopped. Collaboration in a roadside survey makes it necessary for many police forces to adapt their normal way of carrying out alcohol checks, since often alcohol controls are conducted in a selective way, e.g. based on suspicion of DUI of alcohol, taking characteristics of the vehicle or driver into account, or setting up controls near places with a higher prevalence of DUI.

For roadside surveys to be representative, it is important that police forces stop drivers non-selectively or randomly and take a breath test from each driver stopped. Typically, drivers are sampled in police checks at a particular location where several drivers are checked for the duration of the control session. The police controls forming part of a roadside survey to deliver the alcohol KPI will generally follow the normal legal procedures of police enforcement (including legal actions in case of DUI). The required data for the KPI will be coded as an additional task by the police or by a research worker assisting the control session. Theoretically, in most countries, police officers can check drivers one by one at different locations randomly, although random testing is not allowed in some European countries. In Member States where the police can only stop drivers in the case of certain suspicious signs, the method of random police checks cannot be used.

Researchers generally do not have nor can acquire the legal right to stop drivers randomly on the road and test all drivers stopped. Researchers would therefore generally have to rely on voluntary participation of drivers, which leads to a self-selection or participation bias. In order to avoid a participant/response bias, it is therefore highly recommended to collaborate with police forces to stop and check drivers. If collaboration with police forces is not feasible, researchers can ask drivers to take a voluntary breath test for research purposes. This can be done at places where drivers have already stopped, such as parking places and gas stations. However, participation rates and response bias (e.g. drunk drivers may not agree to participate) would be methodological challenges where drivers are not stopped by the police. Breath testing based on voluntary participation should be avoided, but if it is employed, non-response characteristics should be included and analysed (participation rates by location, gender, age, etc.) in order to evaluate if there are systematic differences between participants and non-participants.

Results from random and voluntary breath testing cannot be mixed and should be presented separately. The methodological report should clearly define the procedure used.

6.5.2 Minimum sample size for drivers

Defining a minimum required sample size is by definition arbitrary since it depends on the level of accuracy that is considered adequate. With typical overall prevalence percentages in the range of 1 to 2 percent (cf. DRUID prevalence studies: Houwing et al., 2011 A, B), accuracy (width of the 95% confidence interval) in the order of range of 0.5 percent points for the general KPI for DUI of alcohol can be considered acceptable (see Table 1 next page).

The lower and upper bounds of the 95% CI using a sample of n=2,000 are in the range of 0.5% (1% ±0.44 to 2% ±0.61), so 2,000 drivers should be sufficient to provide frequency estimations (percentages) with sufficient accuracy. Therefore, an absolute minimum of 2,000 tests of drivers of passenger car drivers is required. This minimum refers to required valid data points in the survey dataset in order to be considered for the national KPIs. Annex 2 gives an overview of the argumentation behind the minimum driver sample.

It is impossible to guarantee the minimum number of measurements for all possible combinations of all levels of stratification. For the combination of road types and time periods, this would lead to 3 x 4 = 12 levels for passenger cars only. If Member States optionally want to have disaggregated results by vehicle type, then the minimum sample size of 2,000 drivers should be applied for each additional vehicle type. If, optionally, Member States aim at having regional KPIs (e.g. NUTS 1), including the required stratifications per region, then all minimum sample requirements should be applied for each region.

Prevalence	Lower bound, n=2000	Upper bound, n=2000	Lower bound, n=500	Upper bound, n=500
50%	47,8%	52,2%	45,5%	54,5%
75%	73,0%	76,9%	71,0%	78,7%
90%	88,6%	91,3%	87,0%	92,5%

Table: Assuming simple random sampling and depending on prevalence levels (general prevalence levels of 1-2% while weekend nights can yield percentages up to 10%), the 95% confidence intervals (CI) for n=2,000 and n=500 are estimated using the CI formula above (z value 1.960 for 95% CI)

Since coverage of the three road types and four time periods of roads is required as a minimum, the proportion of measurements sampled in each road and time category should be above 20% to ensure a minimum number of measurements for each stratum, even if this would imply disproportionate sampling. As an absolute minimum 500 measurements for each category of the minimum required stratification variables is required, thus:

- minimum 500 car drivers on urban roads
- minimum 500 car drivers on rural roads
- minimum 500 car drivers on motorways
- minimum 500 car drivers on weekdays
- minimum 500 car drivers on weeknights
- minimum 500 car drivers on weekend days
- minimum 500 car drivers on weekend nights

6.5.3 Sampling and selection of locations

Random breath tests are typically conducted by setting up a police control at a particular location. The selection of locations should be as random as possible, covering the geographical area of the country. There are different options for random location selections: e.g. simple random, stratified random (e.g. random sampling in different regions).

The basic procedure to select locations consists of three steps:

(1) Step 1: The required number of different locations (for the country or per region) is determined.

(2) Step 2: The number of locations is randomly selected on a map using the entire area in question (e.g. country or region), taking sufficient geographical spread into account. The specific requirements for each location do not have to be taken into account at this point. This step is to ensure a reasonable geographical spread of the randomly selected locations.

(3) Step 3: The final locations that will be used for the measurements are manually chosen in the area surrounding the locations randomly selected in the previous step. At this point, the final selection must be based on the location requirements (different road types), inclusion/exclusion criteria (if applicable) and practical considerations. This

final selection can be made using Google Street View or in cooperation with the local police force. Care should be taken to ensure that the different road types are also sufficiently spread geographically.

For the selection of locations (step 3) practical arguments related to conducting alcohol controls should be considered: minimum traffic volume, the ability to stop vehicles in a safe way, and the ability to park the vehicles of the police and researchers and drivers who have been drinking above the legal limit. On motorways, controls can be set up at entrances and exits, or transfer of drivers to rest and parking areas can be considered for safety reasons. Control sessions on high speed roads should always be carried out in accordance with applicable (road) safety regulations. Location bias must be avoided: no specific selection of locations based on proximity to places known for a higher DUI prevalence (e.g. near bars, discotheques…). Since random selection of locations will also include lower volume roads, it is expected that several low volume locations will be available for each stratum. If however traffic flow is too low (less than 10 cars passing per hour), it is acceptable not to include them.

It is recommended to sample the locations for the three road types proportionally to traffic volume (and therefore proportionally to the kilometres driven on each road type in the country or region), assuming that each of the three road types represent a share of traffic volume above 20% of the total traffic volume, based on available national traffic data (e.g. nationally representative traffic/mobility surveys). It is also recommended to carry out location sampling proportional to traffic volumes by time period, and ideally crossed with road types (combinations). If traffic volume by time period is considered, it is recommended to oversample the night-time periods, in order to guarantee sufficient numbers of measurements.

For more information on random sampling of locations and for determination of the minimum sample size, reference should be made to the SafetyNet general recommendations for SPI (safety performance indicators): http://www.dacota-project.eu/Links/erso/safetynet/fixed/WP3/sn_wp3_d3p8_spi_manual.pdf

As an absolute minimum 10 different locations per level of stratification variable are required in order to ensure representative results for the entire road network and all time periods. The minimum required number of different locations for one stratification level is:

- Minimum 10 locations on urban roads
- Minimum 10 locations on rural roads
- Minimum 10 locations on motorways
- Minimum 10 locations on weekdays
- Minimum 10 locations on week nights
- Minimum 10 locations on weekend days
- Minimum 10 locations on weekend nights

Member States can distribute the different locations (within road types) freely over different combinations of strata. It is allowed to re-use the same location for different control sessions (e.g. different times of day or days of week). Where such a crossed design is used, this should be indicated in the methodological report. To ensure a balanced sampling for road types and time periods, a minimum of 2 different locations for each combination of road type (3) and time period (4) (i.e. 12 crossed strata) should be used.

6.5.4 Measurement method

Alcohol concentrations are mostly measured by breathalyzer tests. This is the recommended instrument for data collection. Partners should provide references for the type and brand of the tests used for each datapoint (i.e. tested driver) (cf. infra).

It is also acceptable to use pre-screening (or pre-sampling) using passive alcohol testers (e.g. Fell et al., 2008; Solomon & Domschat, 2016) or so-called 'sampling' devices, not requiring exhalation into a device but detection of alcohol in the ambient air close to the driver (also called "sniffer"). Negative pre-sampling results can be recorded as final results of the test procedure. Positive pre-sampling results should be coded based on the result of a breathalyzer test following the positive pre-sampling test.

Measurement instrument tolerance and error should be described. If a technical reliability margin is used by either the device or in the legal procedures following the reading of the result, the margins should be clearly described in the methodological report. When conversion formulas are used to translate breath into blood (or vice versa) these should also be described. If several measurement methods are used for the same driver, the classification is made according to the national legislation.

Binary breath test results (pass vs. fail, i.e. ≤ legal limit (safe) vs. > legal limit (e.g. alarm/positive) according to the applied legislation) are the key dependent variable. If different groups of drivers are subject to different intoxication

thresholds, the threshold according to national legislation should be used to classify drivers. The methodological report should specify the applicable thresholds for all groups of drivers included in the study. It is optional but recommended to code also the actual BAC level.

During the COVID-19 pandemic police procedures may be different from normal, e.g. pre-sampling may be used less, but breath tests will normally still be used because there is no alternative. Many police forces will probably use extra sanitary procedures during alcohol controls.

6.5.5 Practical organisation of the control sessions

A uniform fieldwork procedure should be chosen. Each location corresponds to a minimum of one control session and should last a minimum of 30 minutes. Control sessions can last longer, but it is recommended to work with sessions of 30 minutes to 1 hour, because the longer a location is in use, the greater the possibility that drivers become aware of the control location (e.g. through alerts on social media) and subsequently avoid it. Controls on high speed roads should always be carried out in accordance with applicable (road) safety regulations.

The minimum sample requirements relate to the number of drivers and locations Member States can estimate how many sessions and control hours will be needed in order to reach the driver sample size required (or aimed for), taking the minimum location sample requirements into account.

Several control sessions can take place at the same location (at different time periods). When planning the control sessions in this way, it should always be ensured that the different combinations of road types and time periods are balanced in number so as to avoid a sampling bias. In order to keep non-response to additional questions as low as possible, it is suggested to let the police ask these questions, have the police breath test after the questions, provide small incentives, and limit the number of questions.

6.6 Temporal considerations

Ideally measurements should be conducted in late Spring or early Autumn. In practice, all months are allowed except December, January, July and August. Holiday periods (bank / school holidays) and hard winter conditions should be avoided, as these disturb normal traffic patterns. When Member States have historical series of measurements it is recommended to use the same period(s) of the year as for the earlier measurements.

Member States willing to organise more than one roadside survey to deliver the KPIs (e.g. one in Spring and one in Autumn) need to comply with the minimum sample size requirements for both measurements combined. The data from both measures can be combined to deliver the overall and disaggregated indicators.

The COVID-19 pandemic has implications on DUI of alcohol behaviour. Therefore, it is recommended not to plan data collection for as long as certain health-related measures are in force such as a lock-down, a night curfew, closed bars/restaurants, limitations of social contacts etc., because these relate to typical risk factors for DUI of alcohol. This restriction also applies to the other methods in these guidelines. The time span of the enforcement data and for self-report surveys should be based on traffic situations as close to normality as possible.

In order to have representative KPIs, it is important to collect data in/from a sufficiently representative context. Countries that have already started with measurements are advised to continue with them. For other countries, the advice is to wait until the traffic situation is as normal as possible again.

6.7 Data analysis

6.7.1 Variables to be coded for roadside breath testing

As a first guideline, it is suggested to include at a minimum for each data point (each tested driver) in the dataset, the following variables:

- binary alcohol test result (2) (below or above legal limit)
- road type (3)
- time period (4)
- date
- start hour
- end hour
- total control session duration

- unique location code (to know which breath test results belong to a same session) (e.g. GPS coordinate of the location, or a qualitative code referring to the location)
- unique session code (only needed if a same location is used for different sessions)
- traffic count duration,
- traffic count total (minimum=cars)

Variables such as road type, time period, location code, session code, day and time of a session, and traffic counts can be coded once per control session by a person from the police or a researcher. These variables should then be added in the dataset to each datapoint from a same control session.

The following list gives the most typical variables which can optionally be coded and included in the dataset:

- Coded per driver:
  - exact BAC level or BAC category
  - driver age
  - driver gender
  - driver type: novice, professional
  - vehicle type (if others are considered)
  - other self-reported or observed variables.
- Coded per control session (once per session) and included in the dataset for each datapoint (driver) from one session:
  - region of control session
  - police zone
  - weather condition
  - flow of traffic
  - number of lanes
  - control lane(s)
  - control direction(s).

Recent types of alcohol testers can automatically store the data on the breath test outcomes which can be exported later. This allows automatic recording of date and time for each breath test result and this could also be used for setting up the dataset, as long as the additionally required control session variables are also collected and combined with this data. If Member States optionally wish to collect additional driver characteristics, then automatically stored data is not sufficient because the breath test result should be coded in combination with the additional variables so as to ensure the data link.

6.7.2 Post stratification weights and statistical analysis

For each country, a general estimate of the percentage of drivers with a blood/breath alcohol concentration below the legal limit (if need be the legal limit that applies in case of novice or professional drivers) should be provided. Since the total population of drivers to which this estimate refers (main KPI) consists of the total of all vehicle movements (min. of passenger cars) over an entire territory over the entire period of the measurement, the overall estimate reflects the percentage of vehicle kilometres driven below the legal limit for drink-driving.

Considering the minimum requirements and optional recommendations above, sampling is stratified according to several parameters:

- Road type (3 levels: motorways, rural roads, urban roads)
- Time period or Day of week and time of day (4 levels: weekdays, weeknights, weekend days, weekend nights)
- Vehicle type (minimally one: passenger cars; possibly more categories)
- (optional) Region (Member State to decide)

For each level of stratification considered, results should be weighted according to traffic volumes. For this KPI it means that the results should at a minimum be weighted according to traffic volume data by road type and time period for car drivers. If other stratifications have also been used, then the weighting should be done according to traffic volume data by the stratifications in question (e.g. by region).

It is recommended to use the exact values for each combination of stratification levels considered (e.g. traffic volume for motorways on weekend nights for personal cars in a certain region). If these combined data are not available, the second-best option is to assume independence of all levels of stratification and use combinations of marginal totals to estimate specific combinations (e.g. traffic volume for motorways, traffic volume on weekend nights etc.).

Traffic volumes are ideally obtained/estimated from national statistical mobility data (e.g. mobility surveys) (recommended option – cf. Druid p. 21: "For most countries traffic data by time period was derived from national traffic surveys"), and otherwise should at minimum be estimated by using traffic counts during the control sessions. The use of traffic volume data (either officially available data or traffic counts) is required to ensure comparability. The results of the Member States should be weighted in a similar way.

Even when national traffic volume statistics are available, traffic volumes should be counted during each control session. Since selection probabilities of tested drivers included in the sample depend on the amount of passing traffic during each control session (traffic density), this information is also necessary to allow correct calculation of the confidence intervals (weighting). When traffic counts are used to infer traffic volumes per stratum, the (estimated) road network length by road type should be also considered for calculating the weights. If no official data on road lengths are available, it is recommended to request estimates from experts from the relevant administration services.

Statistical analysis techniques and tools should be determined by each Member State, and these should be clearly described in the methodological report. Since driver sampling will typically be nested in locations, it is recommended to use appropriate models for two-stage stratified sampling (1st stage= random location selection and 2nd stage= random driver selection within locations). Approximations assuming simple random sampling can be used as long as results are weighted according to traffic volumes.

Input on calculating weights (depending on available data) will be provided at a later stage.

6.8 Requirements for self-reported data

6.8.1 Introduction

Self-reported data can either refer to prevalence of DUI of alcohol over a specific time period (e.g. last 30 days, last 12 months) or to prevalence of use during a specific recent trip (trip-based prevalence). These methods will be referred to as 'period prevalence' and 'trip-based prevalence' respectively.

Whereas random roadside breath testing aims at measuring 'point prevalence', or the proportion of the population being under the legal blood alcohol level at any point in time, 'trip-based prevalence' aims at measuring the proportion of the population under the legal BAC limit during one of their last journeys, from which point prevalence estimates can be deduced (possible methods for that are telephone interviews or online surveys). The distinction is clear with 'period prevalence' measurements in which self-reported frequencies of DUI of alcohol in traffic are gathered over a longer time frame (e.g. last month, last year) by using rating scales (e.g. never, sometimes, always).

The trip-based prevalence survey method is closest to the aim of a roadside survey since the DUI state during a specific point in time (a past recent ride) is questioned and information on road type can be collected.

Member States are free to choose either of these options. However, given the smaller effort involved in survey period prevalence, it is recommended that surveys for trip-based prevalence also include a basic question on period prevalence and road type. For general guidelines on survey research, one can consult handbooks like Gideon (2012) or Wolf et al. (2016).

6.8.2 Sample size

Sample size considerations depend on the type of prevalence:

- For estimates of period prevalence, the minimal sample size is 1,000 respondents.
- For estimates of trip-based prevalence, Member States should define the required sample size. The minimum sample will have to be a multiple of 1,000 in that case, 2,500 is considered to be sufficient (cf. Diependaele, 2015 for an example).

Survey research is generally known to have low response rates. Therefore, oversampling is needed. When online panels are used, the required number of completed surveys, in total and for relevant (crossed) population strata (e.g. by age, gender, domicile/region…and combinations) to ensure the representativeness of the sample, can be programmed during the survey set-up. With this method, the survey is sent out to a bigger sample than the required minimal numbers in order to take non-response into account. As soon as the sample requirements are met, which can be separately followed-up for the different crossed strata, the survey stops.

6.8.3 Sampling methods

Random sampling is required. Random sampling from available online research panels is allowed (e.g. from market research agencies like iVOX, GfK). Convenience samples are considered to be too biased to generate a representative estimate.

Stratification according to age, gender, educational level and other population characteristics can be used to ensure proportionality of the sample compared to the population.

6.8.4 Survey methods

Surveying can be self-administered (on paper, online) or with an interviewer (face-to-face, telephone) (or any combination of these).

For estimation of period prevalence, it is highly recommended to use the method and questions on drink driving used in the ESRA survey series (https://www.esranet.eu/) (Meesmann et al., 2021) in order to ensure comparability with earlier research (see box below). A complete overview of the ESRA methodology can be found at: https://www.esranet.eu/storage/minisites/esra2-methodology-report-updatewave2-def.pdf

For estimation of trip-based prevalence, different methods can be used, such as 'roadside interviews' (drivers are approached directly after a trip or during a trip and asked about DUI of alcohol during that trip), 'telephone interviews' (participants are asked about their last trip and then about their DUI of alcohol state during that trip), or online survey (participants are asked about their last trip or about all their trips made in the last 24 hours and then about their DUI state during one (randomly selected) specific trip).

For these methods, reference can be made to the methodological guidelines described by Vollrath et al. (2019) and the study from Diependaele (2015), even though both references are aimed at assessing the prevalence of other driver behaviour (mobile phone use in traffic; sleepiness in traffic). The basic principles are clear though and can be used for different types of driver behaviour:

The proposal is at minimum to ask these KPI related questions:

- Did you drink alcohol in the period before this journey?
- May you have been over the legal limit for drinking and driving during this journey?

These are in line with the proposed ESRA questions for period prevalence. In addition to these trip-based questions it is recommended to also include the ESRA period prevalence questions in the survey.

6.8.5 Recommendations for fieldwork

Some tips to increase the response rate are (Smith & Albaum, 2012):

- Make the survey as short as possible by removing marginal questions
- Make the survey as interesting as possible to the respondents
- Offer an incentive or reward
- Make an appeal to altruism: "I need your help"
- Pre-contact participants to inform them about the survey
- Send reminders to people who did not respond within a certain time. Multiple follow-ups may be needed.
- Be wise in the timing: avoid sending questionnaires or arranging interviews during Christmas, Easter, and other holidays.

Some general advice for formulating multiple choice questions (Krosnick & Presser, 2010):

- Use simple, familiar words (avoid technical terms, jargon, and slang)
- Use simple syntax
- Avoid words with ambiguous meanings, i.e. aim for wording that all respondents will interpret in the same way
- Strive for wording that is specific and concrete (as opposed to general and abstract)
- Make response options exhaustive and mutually exclusive
- Avoid leading or loaded questions that push respondents toward an answer
- Ask about one thing at a time (avoid double-barreled questions)
- Avoid questions with single or double negatives.

6.8.6 Expected results

Prevalence estimates should be provided with a 95% confidence interval (upper and lower border) and standard error. The representativeness of the survey should be indicated in the methodological report, by including a thorough explanation of the sampling, weighting, data processing and analysis procedures. A full overview should also be given of the other methodological sections: type of survey, timing and duration, actual question(s), moments/periods used in the questions, total sample size, sample descriptive data (socio-demographical, mobility related variables), non-response.

It is recommended to weigh results of trip-based prevalence surveys according to traffic volumes by time period and type of road - if these parameters are considered in the survey procedure and questions - according to the same methodology as for the roadside surveys.

6.9 Analysis of police enforcement data

In theory, the minimum requirements for random roadside breath testing also apply for Member States aiming at delivering a KPI based on analysis of enforcement data. Enforcement data can only give a realistic indication of the 'general prevalence' of drink driving when drivers are tested or checked randomly, independent from suspicion of impairment. If not, results will reflect the selectivity in checking drivers. While enforcement data based on random alcohol checks at random locations/moments is useable in calculating behavioural indicators for DUI of alcohol, selective alcohol checks are useful for enforcement indicators.

When police enforcement data are used, it is recommended that data from random checks and data from specific checks on suspicious drivers or from locations known to have a high prevalence of drink driving are clearly separated, analysed and reported separately. Where the analysis is based on a database with selective police checks, one could nevertheless attempt to clean the data by selecting only records at times when large sets of tests were conducted.

If it is possible to select data from random police checks, it is recommended to weight the results according to traffic volumes by time period and type of road - if these parameters are available in the enforcement database - according to the same methodology as for random roadside breath testing by police officers.

It may not be possible to have enforcement data from random checks, since police often select drivers based on certain characteristics (e.g. the appearance of a car or driver) or organises controls at specific risk locations. Such data can still be used for the indicator, bearing in mind that it does not give the true level of drink driving prevalence. KPIs based on selective (suspicion-based) police checks deliver enforcement indicators for drink driving rather than behavioural indicators, and therefore cannot be mixed with KPIs based on random checks. Both types of KPI should be analysed and presented separately.