KPI 30km/h on urban roads

Methodological guidelines

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About Trendline

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

At the core of the Trendline project are the following eight KPIs:

Indicator	Definition
Speed	Percentage of vehicles travelling within the speed limit
Safety belt	Percentage of vehicle occupants using the safety belt or child restraint system correctly
Protective equipment	Percentage of riders of powered two wheelers and bicycles wearing a protective helmet
Alcohol	Percentage of drivers driving within the legal limit for blood alcohol content (BAC)
Distraction	Percentage of drivers NOT using a handheld mobile device
Vehicle safety	Percentage of new passenger cars with a Euro NCAP safety rating equal or above a predefined threshold
Infrastructure	Percentage of distance driven over roads with a safety rating above an agreed threshold
Post-crash care	Time elapsed in minutes and seconds between the emergency call following a collision resulting in personal injury and the arrival at the scene of the collision of the emergency services

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

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

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

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

Terms and definitions

Annual Average Daily Traffic (AADT)
The total number of road motor vehicles passing a point of a road, over a year, divided by 365.

Urban area/Built-up area
Area within urban boundary signs.

Urban road (or road inside urban areas)
Public road inside urban boundary signs, excluding urban motorways.

Lane
A lane is part of a roadway that is designated to be used by a single line of vehicles to control and guide drivers and reduce traffic conflicts.

Motorway (European Commission, 2019b):
A road, specially designed and built for motor traffic, which does not serve properties bordering on it and which meets the following criteria:

(a) it is provided, except at special points or temporarily, with separate carriageways for the two directions of traffic, separated from each other either by a dividing strip not intended for traffic or, exceptionally, by other means;
(b) it does not cross at level with any road, railway or tramway track, bicycle path or footpath;
(c) it is specifically designated as a motorway.

Expressway (European Commission, 2021):
Road specially built for motor traffic, which does not serve adjacent properties, and:

a) Is accessible only from interchanges or controlled junctions;
b) Is specially sign-posted as an express road and reserved for specific categories of road motor vehicles;
c) On which stopping and parking on the running carriageway are prohibited. Entry and exit lanes are included irrespective of the location of the sign-posts.

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 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 much clearer understanding of the different issues that influence overall safety performance, the Commission elaborated, in cooperation with Member State experts, a first set of key performance indicators (KPIs). The KPIs relate to main road safety challenges to be tackled, namely: (1) infrastructure safety, (2) vehicle safety, (3) safe road use including speed, alcohol, distraction and the use of protective equipment, and (4) emergency response. The aim of the KPIs is connected to EC target outcomes.

The Commission Implementing Decision C(2021)5763 final of 5.8.2021 concerning the adoption of the work programme for 2021-2023 and the financing decision for the implementation of the CEF foresaw a technical assistance action for the collection of Key Performance Indicators for road safety in EU Member States. The action builds on a previous CEF support action in 2020-2022 which established the Baseline project to collect 8 road safety Key Performance Indicators (KPIs) in 18 EU Member States. On the 10th of August 2022, a call was published with reference "MOVE/C2/2022-54— Technical Assistance for the development and collection of Road safety Key Performance Indicators (KPI)". The call also required to *"test some new, complementary and experimental indicators, to be defined by the consortium and agreed by the Commission. As a minimum, an indicator related to enforcement should be included."* Except for Enforcement, no specific other theme was proposed for the experimental and complementary indicators; it was up to the consortium of applicants to make a proposal.

A consortium of 25 EU Member States proposed the "Trendline" project to continue and elaborate the work on key performance indicators. The consortium has identified 10 experimental indicators that will be tested and assessed during the project. The working titles of these indicators are:

1. Driving under the influence of drugs
2. Share of 30km/h road length in urban areas
3. Red-light negations by road users
4. Compliance with traffic rules at intersections
5. Helmet wearing of PMD riders
6. Self-reported risky behaviour
7. Attitudes towards risky behaviour
8. Use of lights by cyclists in the dark
9. Enforcement of traffic regulations
10. Alternative speeding indicators

1.2. Why a KPI on share of 30km/h road length in urban areas

Speed is known to influence crash risk and crash severity (e.g., SWOV, 2021; OECD/ITF, 2018) and safe speed is one of the pillars of the safe system approach (e.g., OECD/ITF, 2016). Where conflicts between motorised traffic and vulnerable road users (i.e., pedestrians and cyclists) are possible, a speed of 30km/h or less is considered safe (Tingvall & Haworth, 1999; OECD/ITF, 2016; SWOV, 2019; European Commission, 2021a).

Lowering speed limits to 30km/h in urban areas has received a lot of political attention at international level in recent years. Reducing the road travel speed to 30 km/h in areas where vulnerable road users and vehicles mix in a frequent and planned manner, was one of the most specific recommendations of the so-called Stockholm Declaration (Swedish Government, 2020) which was later adopted by the United Nations as part of the launch of the decade for Action on Road Safety 2020-2030 (United Nations, 2020). At European level, the European Parliament adopted a Resolution called for a "maximum default speeds of 30km/h in residential areas and areas where there are high numbers of cyclists and pedestrians" (European Parliament, 2021b).

Moreover, more and more cities (e.g. Graz, Bologna, Brussels, Paris, Grenoble, Bern, Zurich, Helsinki, Oslo, Edinburgh, Amsterdam, for an overview see for example Yannis & Michelaraki, 2024) have already implemented lowering speed limits in urban areas to 30km/h, not only for safety reasons, but also for liveability and to discourage the use of cars. In Greece, an important measure of the National Road Safety Strategic Plan 2021-2030 is the wide implementation of 30km/h zones in urban areas. Spain has even issued nationwide legislation for speed limits of 30 km/h and 20 km/h on certain types of roads.

It should be noted that the target value for this KPI should not be set to 100%. To prevent rat running through residential areas, it is important to have main arterials with a speed limit of 50km/h or 70km/h (that are designed in such a way that 50km/h or 70km/h is the safe speed).

1.3. Purpose of this document

This document presents the methodological guidelines for an experimental KPI on the share of 30km/h road lengths in urban areas. The KPI is defined as follows:

Share of 30km/h road length of the total length of urban roads.

The next chapter discusses the scope of the KPI and the values that need to be provided. Chapter 3 subsequently discusses the data requirements and the actual estimation of the KPI.

2. Scope of the KPI and values to be provided

2.1. Scope of the KPI

The recommended definition of the KPI is:

Share of 30km/h road length of the total length of urban roads.

In a formula this looks like

$$KPI30 = \frac{length\ of\ urban\ roads\ with\ speed\ limit\ \leq 30km/h}{total\ length\ of\ urban\ roads}$$

It is important to clarify what is considered to be an urban road. An urban road is defined as **a public road inside urban boundary signs.** Urban motorways and urban expressways are excluded for this KPI because cyclists and pedestrians are expected to be not allowed on these roads.

Please note the following

- Urban areas/built up areas are areas marked by built-up area signs at every road entering the area. In many countries the default speed limit for such areas is or used to be 50 km/h.
- For countries which do not systematically use the built-up area signs for densely populated areas, a country-specific definition could be used that is based on the population density to make the set of built-up areas considered more complete and comparable with other countries.
- Woonerfs, bicycle streets and pedestrian zones should be included in the analysis and should be considered as equivalent to roads with a speed limit of 30 km/h or less. Footpaths and solitary bicycle paths should be excluded for reasons of simplicity. Private roads should be excluded as well.

2.2. KPI values to be provided

The minimum requirement for this KPI is to provide:

- The share of 30km/h road length of the total length of urban roads, expressed in percentage, for a given year.

Moreover, it should be documented on what kind of data the KPI value is based. More specifically, the following information should be provided:

- the database(s) that is/are used to calculate the KPI value
- the way in which urban roads are identified in the data
- an indication of the quality of the data (are the speed limits correct/up to date, are all relevant urban roads included in the database).

Potential additional breakdowns are:

- Breakdown by city,
- Breakdown by region/province,
- Breakdown by city size

2.3. Potential additional KPI definitions using the same dataset

There are some potential additional KPI definitions worth considering. First of all, other exposure measures could be used, such as the share in road lane length and the share in distance travelled. The additional KPI definitions are:

- Share of 30km/h road lane length of the total lane length of urban roads.
- Share of distance travelled on 30km/h roads of the total distance travelled on all urban roads.

As the number of lanes and distance travelled are expected to be lower at 30km-h roads compared to roads with higher speed limits, the values of these additional indicators are expected to be lower than the value of the standard KPI. The advantage of these alternative exposure measures is that they better reflect the actual exposure to road unsafety. The main disadvantage is that they are more complicated to determine. Another disadvantage is that an increase of capacity of 30km/h roads (added lanes)/shift in use from 50km/h roads to 30km/h roads results in a better score on the KPI, whereas this is not desirable. Traffic should use the 50km/h roads as much as possible as 30km/h roads are mainly located in residential areas (see for example SWOV, 2023).

Other potential additional KPI definitions start from the concept of ***safe speeds***. As mentioned in the previous chapter, a speed of 30km/h or less is considered safe at locations where conflicts between motorised traffic and vulnerable road users (i.e., pedestrians and cyclists) are possible. At locations without vulnerable road users or where vulnerable road users are physically separated from motorized traffic, driving a car at higher speeds can be safe as well. Two potential additional KPI definitions related to the concept of safe speeds for vulnerable road users are:

- Share of 30km/h road length of the total length of urban roads with mixed traffic.
- Share of urban roads with a safe speed limit for cyclists and pedestrians.

Roads with mixed traffic are defined as roads on which pedestrians and/or cyclists are allowed and are not physically separated from motorized traffic and/or are expected to cross at road sections. Roads with a safe speed limit for cyclists and pedestrians are considered to be (1) roads with a speed limit of 30km/h or lower; (2) roads at which pedestrians and cyclists are not allowed; and (3) roads at which pedestrians and cyclists are physically separated from motorized traffic and are not expected to cross the road at road sections.

When these additional KPIs are provided, one should explain how roads with mixed traffic are selected and/or how roads at which pedestrians and cyclists are physically separated from motorized traffic and are not expected to cross the road at road sections are selected.

2.4. Alternative KPI definitions in the absence of a national database

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

$$KPI30a = \frac{Number\ of\ towns\ with\ a\ default\ speed\ limit\ of\ 30\ km/h\ or\ lower\ on\ urban\ roads}{Total\ number\ of\ towns\ in\ the\ country}$$

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

- Less than 50 000 inhabitants
- Between 50 000 and 249 000 inhabitants
- 250 000 inhabitants or more

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

$$KPI30a = \frac{Population\ of\ towns\ with\ a\ default\ speed\ limit\ of\ 30\ km/h\ \ or\ lower\ on\ urban\ roads}{Total\ population\ of\ the\ country}$$

This KPI should also be expressed as a percentage.

3. Data requirements and KPI estimation

3.1. Introduction

The easiest way to estimate this KPI is by extracting relevant data on road characteristics from available national, international or local databases. This Chapter first discusses the data requirements for calculating the share of 30km/h road length of the total length of urban roads when extracting data from available databases. Subsequently the available national, local and international databases are introduced. Finally, as an alternative, a national authority could distribute a survey among local road authorities to estimate the value of the KPI. This option is discussed in Section 3.4.

3.2. Data requirements

3.2.1. Requirements for the basic KPI

To calculate the KPI '*share of 30km/h road length of the total length of urban roads*', one needs information on:

- the total length of urban roads with a speed limit of 30km/h or lower, and
- the total length of urban roads.

In most cases, this information will be extracted from a database or a combination of databases. To be able to extract that information from databases, it should, first of all, be possible to identify urban roads in the databases. Secondly, for these urban roads, one needs information about the speed limit and the length of the roads/road sections.

As was mentioned in the previous chapter, urban roads are public roads within urban boundary signs that are not motorways. How urban roads can best be selected depends on the available data. When geographical data on built-up area borders is available, these data can often be combined with the digital road map in order to select urban roads. Countries which do not systematically use urban area signs for densely populated areas, could undertake an additional analysis using a Geographical Information System (GIS) to determine urban areas and combine that data layer with the digital road map to select urban roads. In case there is no geographical information on urban area borders and different speed limits are used for urban and rural roads, an alternative approach could be to use the speed limit as a selection criterium. The total length of urban roads can be estimated by summing up the lengths of the road sections within urban areas.

Next, within the set of urban roads, roads with a speed limit of 30km/h or less should be selected and the total length of these roads should be determined (see Table 1 for an example of how the data structure could look like). It is important to check whether the information on the speed limit is sufficiently complete and up to date. Whether the information is sufficiently up to date depends on the actual pace of change in speed limits in a country and its urban areas. In case various cities are lowering speed limits on part of their network, it is more important that speed limit information is updated instantly in case of changes or at least frequently, e.g. once a year.

Table 1 Example of a potential data structure for data on speed limits

No of the section	Length of the section (km)	Speed limit (km/h)	Safe Speed limit
1	0,600	30	1
2	0,400	20	1
3	0,800	50	0
4	1,200	60	0
5	…	…	…

3.2.2. Requirements for additional KPI definitions

Several additional KPI definitions were introduced in the previous Chapter. This section describes the data requirements for these additional definitions.

3.2.2.1. Share of 30km/h road lane length of the total lane length of urban roads.

For this KPI definition the total road lane length of both all urban roads and urban roads with a speed limit of 30km/h or less is needed. Therefore, in addition to information on speed limit and length of the road section, one needs information on the number of lanes on the road and/or the total lane length. By summing up all lane lengths for all urban roads and for all urban roads with a speed limit of 30km/h or less, the KPI value can be calculated.

3.2.2.2. Share of distance travelled on 30km/h roads of the total distance travelled on all urban roads

This KPI definition requires data on traffic volumes on all urban roads. For each road section, the annual average daily traffic (AADT) can be estimated on the basis of the available traffic volumes. Subsequently, the distance travelled per road section can be determined by multiplying the AADT with the length of the road section. By summing up all distances travelled for all urban roads and for all urban roads with a speed limit of 30km/h or less, the KPI can be estimated.

3.2.2.3. Share of 30km/h road length of the total length of urban roads with mixed traffic

To be able to calculate the values for this KPI definition, one needs to select all urban roads with mixed traffic. This can be quite complicated and is not straightforward. Examples of situations which can be considered as mixed traffic are:

- roads where cyclists are allowed on the road itself or need to ride on the road because there are no physically separated bicycle paths
- roads on which pedestrians and/or cyclists are expected to cross at road sections.
- roads with physically separated cycling facilities and sidewalks, but at which crossing is not impossible at road sections.

It is recommended to make pragmatic choices on how to operationalize mixed traffic and to describe the choices that were made.

Once it has been determined for each road section whether there is mixed traffic or not, one can select all urban roads with mixed traffic and can subsequently determine the share of roads with a speed limit of 30km/h or less within that selection.

3.2.2.4. Share of urban roads with a safe speed limit for cyclists and pedestrians.

To calculate the value of this KPI definition, one needs to determine for each urban road section whether its speed limit is safe for cyclists and pedestrians. As was mentioned in the previous chapter, roads are considered to have a safe speed limit for cyclists and pedestrians when (1) the speed limit is 30km/h or lower, (2) pedestrians and cyclists are not allowed or (3) pedestrians and cyclists are physically separated from motorized traffic and are not expected to cross at road sections. Similar to the previous KPI definition, calculating the value for this KPI definition will be complicated, because one needs to determine on which roads pedestrians and cyclists are physically separated from motorized traffic and not expected to cross at road sections. Also here it is recommended to make pragmatic choices when selecting these roads and to describe how these roads were selected.

Once it has been determined for each road section whether its speed limit is safe, the total length of all road sections with a safe speed limit can be calculated and related to the total length of urban roads.

3.3. Data sources on road characteristics

Many road authorities keep records of the roads within their jurisdictions, including characteristics such as road section length, number of road lanes and speed limits. Moreover, (international) open data sources like Open Street Map provide information on speed limit and road characteristics. In addition to open data sources, companies like Google and TomTom use classifications of road sections and have information on speed limits and number of lanes for the roads. All such databases can be used to determine the KPI share of 30km/h roads.

A survey was conducted among the representatives of the countries participating in Trendline to examine how many countries would be able to determine the KPI using available databases (Odijk & Weijermars, forthcoming). Only a limited number of countries appear to be able to calculate the KPI using a national database (or combination of databases). In these countries, national databases are available with information on the speed limit and length of road sections and it is possible to select urban roads in these databases. Moreover, the data on speed limits is of sufficient quality and sufficiently up-to-date.

In some countries without a national database, databases from local authorities appear be available in which urban roads can be identified and that contain information about the speed limit and road length. In case (almost) all local authorities in a country have such a database (or regional databases are available for all regions), the data from different road authorities could be combined. When combining data from different road authorities, one should be aware that the structure, completeness and quality of the data is likely to differ between local road authorities within one country. In case databases are available for only some cities or certain regions, one should be hesitant to combine the data from the different road authorities as the share of 30km/h roads might differ considerably between cities and/or regions and the sample might not be representative as it is not a random sample. Therefore, it is recommended to limit the KPI to the cities/regions for which data is available in that case and to not estimate a nationwide KPI.

In addition to national or local databases, international databases, either open source like OpenStreetMap (OSM) or from commercial providers like TomTom or Google, might be used to estimate the KPI. The advantage of international open data sources like Open Street map is that the data from all cities is combined in one database. However, data completeness and data quality appears to differ between countries, regions and cities. The quality of information from companies like Google and TomTom is likely to be higher, but these data need to be bought.

3.4. Alternative approach – survey among road authorities.

In case the KPI cannot be estimated using existing databases with road characteristics, one may consider conducting a survey among local road authorities as an alternative approach. Such an approach was used in the Netherlands in 2009, when a survey was conducted to estimate the share of 30km/h roads and 60km/h roads as well as some characteristics of different types of roads. Almost half (45%) of the road authorities replied to the questionnaire (Weijermars & Wegman, 2011). The results of this survey are in line with more recent estimations based on queries on databases.

Ideally, municipalities provide the following information:

- Estimated total length of urban roads with a speed limit of 30km/h or lower
- Estimated total length of urban roads.
- Estimated share of roads with a speed limit of 30km/h or lower of all urban roads.

When conducting a survey, it is important to clearly describe which roads should be considered to be urban roads, given the national context in a country. In general, the same logics should be followed as when using a database: an urban road is a public roads within urban boundary signs that is not a motorway. Moreover, it would be a good idea to ask respondents for a short explanation of how the road length and share of 30km-h roads are estimated.

Of course, when considering the alternative definitions of the KPI, based on the number of towns with a default speed limit of 30 km/h, a much simpler survey can be undertaken (possibly even at province/ region/district level). In that survey, one could ask about whether or not the default speed limit is 30km/h within built-up areas. Please note that it is important to check whether the default speed limit of 30km/h applies to all built-up areas within the municipality.

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