

# ECF Position Paper on Key Performance Indicators and data for Cycling Safety



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## Context

The European Union has a set of data that it collects road safety data from the Member States<sup>1</sup>. This is useful data and information however there is also much data that is missing. In the EU Road Safety Policy Framework 2021-2030<sup>2</sup>, the Commission set out to establish "...a range of key performance indicators for road safety (KPIs) at European level directly related to the prevention of death and serious injury to provide focus for intervention strategy and delivery."

These are the 8 recommended KPIs for member States to collect.

<b><u>Indicator</u></b>		<b><u>Definition</u></b>
1	Speed	Percentage of vehicles travelling within the speed limit
2	Safety belt	Percentage of vehicle occupants using the safety belt or child restraint system correctly
3	Protective equipment	Percentage of riders of powered two wheelers and bicycles wearing a protective helmet
4	Alcohol	Percentage of drivers driving within the legal limit for blood alcohol content (BAC)
5	Distraction	Percentage of drivers NOT using a handheld mobile device
6	Vehicle safety	Percentage of new passenger cars with a EuroNCAP safety rating equal or above a predefined threshold
7	Infrastructure	Percentage of distance driven over roads with a safety rating above an agreed threshold
8	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

<sup>1</sup> [https://ec.europa.eu/transport/road\\_safety/statistics-and-analysis\\_en](https://ec.europa.eu/transport/road_safety/statistics-and-analysis_en)

<sup>2</sup> [https://ec.europa.eu/transport/road\\_safety/eu-road-safety-policy/what-we-do/key-policy-documents\\_en](https://ec.europa.eu/transport/road_safety/eu-road-safety-policy/what-we-do/key-policy-documents_en)

## Key Recommendations

***We welcome the introduction of using safety Key Performance Indicators in improving the use of data to improve road safety around the EU. However, we believe that they can and should be improved if they are to assist in targeting cyclists and pedestrians. Cycling fatalities have not decreased since 2013, there may be many reasons for this unfortunately we do not believe that the current list of KPIs will bring us much nearer to understanding why. Is this because an increase in the number of cyclists, are drivers more distracted, are infrastructure improvement good enough.***

- ***We do not believe that bicycle helmet use is a particularly useful metric that can help us understand cycling road safety. Bicycle helmet use is a better measure of the perception of risk of those cycling, not for safety in itself. Bicycle helmets are a very inefficient safety measure. They do not stop the crash from happening, they must be perfectly fitted to work efficiently, they are not designed for high-speed crashes, nor concussions, and they are often not convenient for cyclists to use.***
- ***We have recommendations for other KPIs which include cyclist numbers/modal share, and also the amount of cycling infrastructure as a proportion of total infrastructure. We show that both the numbers of cyclists, and the amount of cycling infrastructure are much better correlators of cycling safety (lower fatalities). We understand that these are correlations and not causation, but this is the nature of KPIs they are there to point us in the right direction to provide insight into risks and hazards.***

## Main points

### 1. ECF welcomes the introduction of EU Commission Key Performance Indicators (KPIs)

ECF applauds this attempt by the Commission to improve the collection of data, to provide some KPIs and to provide incentives for Member States to achieve better road safety outcomes.

Speed limit offences is a useful KPI. Speed is an important part of the Safe System approach. In around 30% of fatal crashes, speed is an essential contributory factor and exceeding speed limits is very common. Typically, 40 to 50% of drivers travel faster than the speed limit, and between 10 to 20% exceed the speed limit by more than 10 km/h<sup>3</sup>. ETSC<sup>4</sup> claim that 2,100 lives could be saved each year if the average speed dropped by only 1 km/h on all roads across the EU.

The fourth KPI on percentage of drunk drivers is also a good KPI, around 25% of road fatalities are linked to alcohol and “drink-driving”<sup>5</sup>, and when a driver has a BAC of 1.5g/l the injury crash rate is 22 times that of a sober driver<sup>6</sup>. Research has concluded that better enforcement of drink driving behaviour can have a positive impact on cycling safety<sup>7</sup>.

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<sup>3</sup>[https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwix95i7ocrqAhUNqaQKHVOdBrUQFjAKegQIAhAB&url=https%3A%2F%2Fec.europa.eu%2Ftransport%2Froad\\_safety%2Fsites%2Froadsafety%2Ffiles%2Fpdf%2Fersosynthesis2018-speedspeedmanagement.pdf&usq=AOvVaw0tfYe3BWQFAufMn\\_vtNU7-](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwix95i7ocrqAhUNqaQKHVOdBrUQFjAKegQIAhAB&url=https%3A%2F%2Fec.europa.eu%2Ftransport%2Froad_safety%2Fsites%2Froadsafety%2Ffiles%2Fpdf%2Fersosynthesis2018-speedspeedmanagement.pdf&usq=AOvVaw0tfYe3BWQFAufMn_vtNU7-)

<sup>4</sup> Henk Stipdonk “The mathematical relation between crash risk and speed; a summary of findings based on scientific literature” quoted in ETSC PIN Report <https://etsc.eu/reducing-speeding-in-europe-pin-flash-36/>

<sup>5</sup> ETSC (2014), PIN Flash Report 27, Ranking EU Progress on Car Occupant Safety <https://etsc.eu/ranking-eu-progress-on-car-occupant-safety-pin-flash-27/>

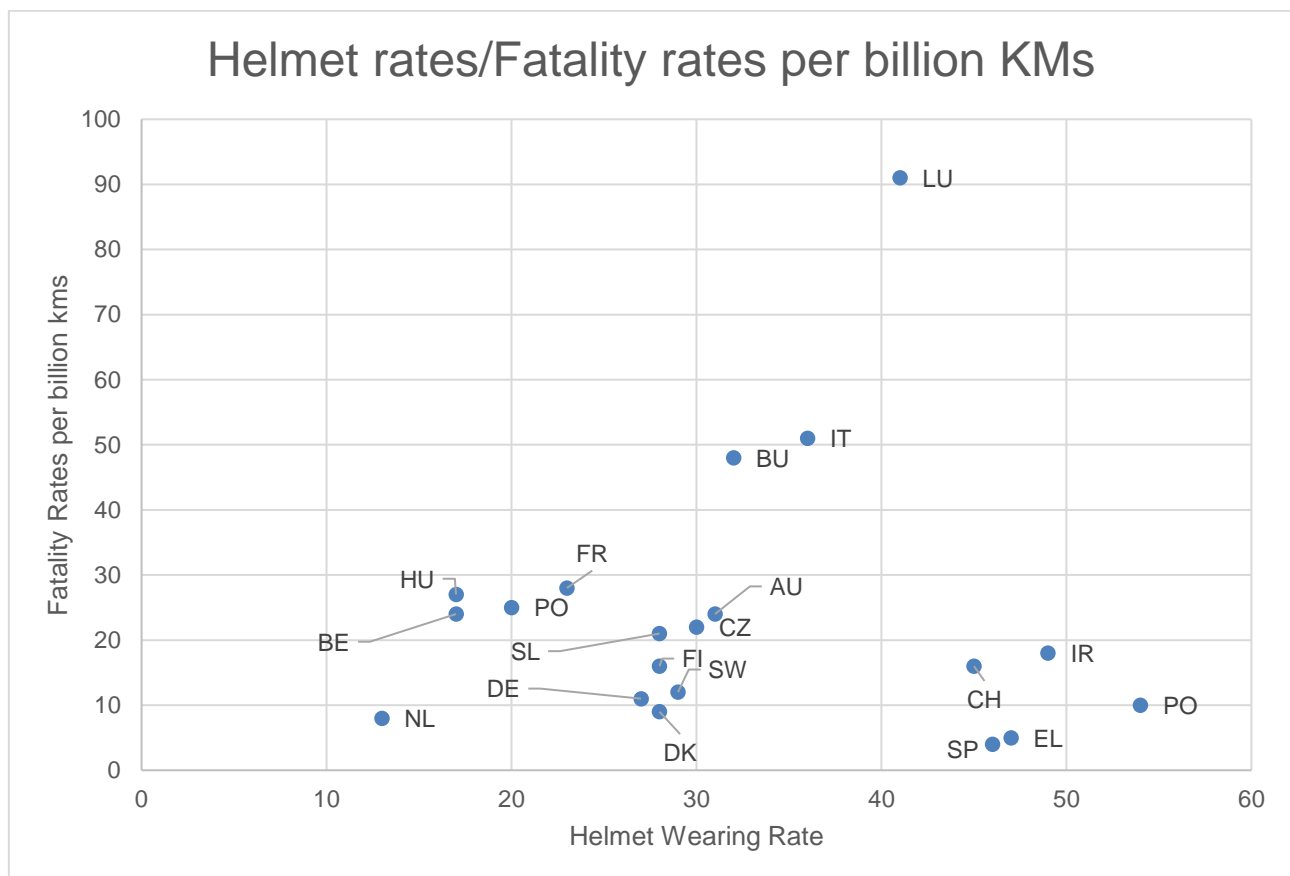
<sup>6</sup> <https://etsc.eu/projects/smart/>

<sup>7</sup> <https://www.tandfonline.com/doi/full/10.1080/01441647.2020.1823521>

## 2. ECF recommends removing bicycle helmets use as a KPI

However, ECF does not believe that measuring helmet use is a suitable safety KPI. We do not believe this effectively measure safety. Helmet use in the Netherlands is negligible yet it has some of the safest cycling in the world. In countries where cycling is more dangerous bicycle helmet use is often high. It is more likely that bicycle helmet usage measures the fear that a cycling population feels when sharing the road with motor vehicles in dangerous circumstances.

If we compare helmet wearing numbers to fatality rates, we do not see a clear correlation of safety with helmet use, rather a random pattern appears.<sup>8</sup> If we plot on a scatter graph to see if we can visualise any correlation, there is no clear pattern. We have no clear trend line between the two sets of data, it is a clear random pattern, indicating a lack of correlation between fatality (our proxy for safety) and helmet wearing rates<sup>9</sup>.



We have a further concern with bicycle helmets being used as a safety indicator. If these EU KPIs are set to outcome targets based on the indicators, and if Member States are to be assessed on these measures, it will be a simple question of imposing a helmet law to improve a countries safety 'score'. This is a simple-to-implement measure that will not improve the safety of cycling, nor the safety of other road users, nor will it promote cycling, but it will make the implementing country to be seen to be doing 'good' work when seen through the lens of the Key Performance Indicators. A helmet wearing KPI gives Member States a good

<sup>8</sup> Fatality rate; deaths per billion km from <https://www.itf-oecd.org/exposure-adjusted-road-fatality-rates-cycling-and-walking-european-countries> Helmet rates from ESRA [https://road-safety.transport.ec.europa.eu/statistics-and-analysis/data-and-analysis/country-profiles\\_en](https://road-safety.transport.ec.europa.eu/statistics-and-analysis/data-and-analysis/country-profiles_en). Survey question "Percentage of cyclists that say they always cycled with a helmet in the last 30 days" Caveat; fatality rates are for various years covering 2013-2015, whereas the helmet wearing numbers are from 2018.

<sup>9</sup> The coefficient of determination  $r^2$  of these data, which measures how much two sets of data correlate, is 0.000137814. A figure between 0.5 and 1 shows a strong correlation.

excuse to implement inefficient but 'easy fix' measures, rather than rewarding them for the more difficult but efficient and successful safety measures.

This does seriously question the need to 'penalise' those countries that do excellent work on cycling safety such as the Netherlands that implement the important, and perhaps more challenging work, like installing good infrastructure, rather than implementing what would be a comparatively simple bicycle helmet law.

An easy to implement Mandatory Helmet Law (MHL) for cyclists will not achieve safety nor sustainable mobility targets. There is good evidence that:

1. The implementation of a MHL leads to a reduction in the number of cyclists<sup>10</sup>.
2. A MHL does not improve cycling safety<sup>11</sup>

ECF is sceptical of the road safety benefits of bicycle helmet legislation, and fears that the main consequence of mandatory legislation would be a reduction in the number of cyclists<sup>12</sup>. There are several ways to improve cycling safety more effectively than tracking helmet use or introducing mandatory helmet laws. Therefore:

- The EU should not promote bicycle helmet mandatory laws without sound evidence that this would be beneficial and cost-effective compared to other safety initiatives
- The focus should be on well-established measures to promote cycling and cyclists' well-being, such as safer infrastructure, vehicles, and rider/driver behaviour.
- There should also be the recognition that the benefits of cycling far outweigh the risks, and any reduction in numbers through mandatory helmet laws would always bring about a public health *disbenefit*<sup>13</sup>
- Remove levels of bicycle helmet usage from the Commission Road Strategy KPIs measurement unless it is used as a means of conveying the perception of risk amongst cyclists.

### 3. ECF recommends modal share as a safety indicator

Given the low numbers of third-party crashes involving pedestrians and cyclists as the crash partner, we would recommend that the numbers of cyclists and pedestrians should be considered as a safety indicator. 83% of cyclist fatalities, and 99% of pedestrian fatalities come about in crashes with motorised vehicles<sup>14</sup>. The amount of motorised traffic and cyclist/pedestrian traffic is an excellent indicator of safe or dangerous roads. Recent research<sup>15</sup> has shown that it is in fact **numbers of pedestrians and cyclists that is the highest indicator of their safety, not only for pedestrians and cyclists themselves, but for all road users in urban areas**. It is high powered, high speed, and heavy vehicles that bring most risk onto our roads. We should be aiming at a human centred transport system to reduce transport risk, and also improving air quality; reducing CO2 emissions; improving citizen health; and making more liveable, people friendly urban areas.

Progressive Member States that provide good cycling infrastructure use not only motor vehicle speed, but also density of traffic as a way of categorising how risky a road is<sup>16</sup>. If a road has higher speeds, but also a high number of motorised traffic then it is classed as more dangerous for cyclists and a higher level of cyclist infrastructure is implemented.

<sup>10</sup> <https://ecf.com/groups/ecf-helmet-factsheet> <http://www.cycle-helmets.com/cycling-1985-2019.html>

<sup>11</sup> <https://www.sciencedirect.com/science/article/abs/pii/S0001457596000164>  
[http://www.cycle-helmets.com/canada\\_helmets.html](http://www.cycle-helmets.com/canada_helmets.html)  
[http://www.cycle-helmets.com/zealand\\_helmets.html](http://www.cycle-helmets.com/zealand_helmets.html)

<sup>12</sup> <https://ecf.com/what-we-do/road-safety/ecf-position-helmets>

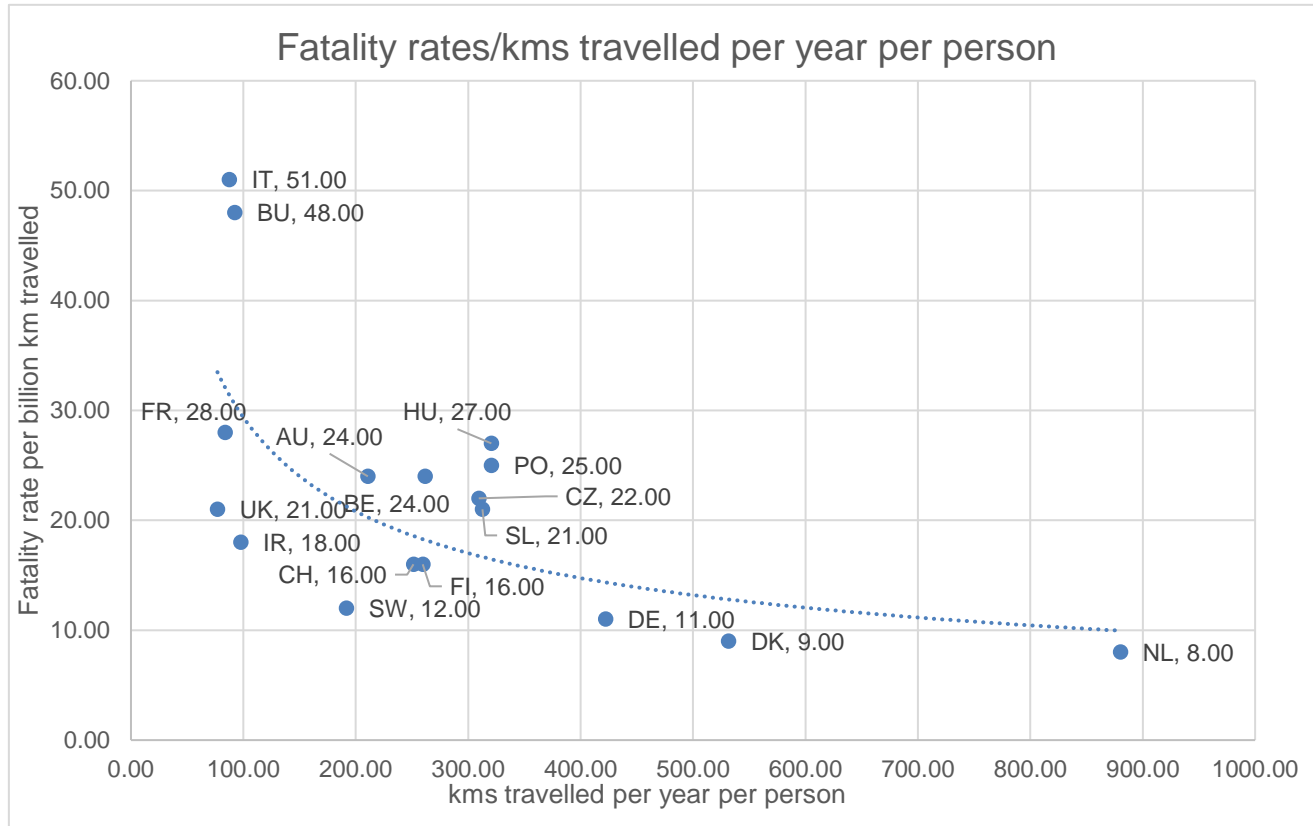
<sup>13</sup> <https://pubmed.ncbi.nlm.nih.gov/22462680/>

<sup>14</sup> <https://etsc.eu/how-safe-is-walking-and-cycling-in-europe-pin-flash-38/>

<sup>15</sup> <https://epjdatascience.springeropen.com/articles/10.1140/epjds/s13688-022-00339-5#citeas>

<sup>16</sup> Details can be found here <https://ecf.com/projects/scap>

We can again plot fatality rates but this time with regards to kilometres travelled per year per person<sup>17</sup>, we see a much clearer correlation between these two indices<sup>18</sup>.



Remember, that these are correlations and not causation but KPIs work on providing good indications on what we focus on to reduce risk. Where we have a good clear correlation, we should focus our attention on investigating the causal relationships between an element in the road environment and the risk that it brings.

Perhaps we can note here also that this also conforms to the 'Safety in Numbers' principle<sup>19</sup>, in other words that with an increase in the total number of cyclists, the risk decreases for each individual cyclist. Again, this is a correlation and there could be other confounding reasons (such as increased infrastructure development improving safety and increasing the number of cyclists), however this does seem to be a strong correlation across many administrations, and from the individual street level to a broader national level<sup>20</sup>

Having access to the number of cyclists and other road users and the distance/time they spend on the roads also allows us to understand the risk associated with each mode under various conditions. We know that there are less people being killed on bicycles at night, but we do not know how many cyclists there are at night, we do not therefore understand if night time cycling is a risk. We know that pedestrian fatalities have fallen over the past 10 years, but we do not if that is due to people feeling less safe walking.

<sup>17</sup> All data from <https://www.itf-oecd.org/exposure-adjusted-road-fatality-rates-cycling-and-walking-european-countries>

<sup>18</sup> The coefficient of determination  $r^2$  of these data was 0.37. A figure between 0.5 and 1 shows a strong correlation. So, statistically for modal share around 63% of the fatality *cannot* be 'explained' by the modal share. This is not as good as the correlation between infrastructure and fatality rates (next point) but is still a much better fit than bicycle helmets.

<sup>19</sup> <https://injuryprevention.bmj.com/content/9/3/205>

<sup>20</sup> <https://ecf.com/resources/cycling-facts-and-figures/safety-numbers>

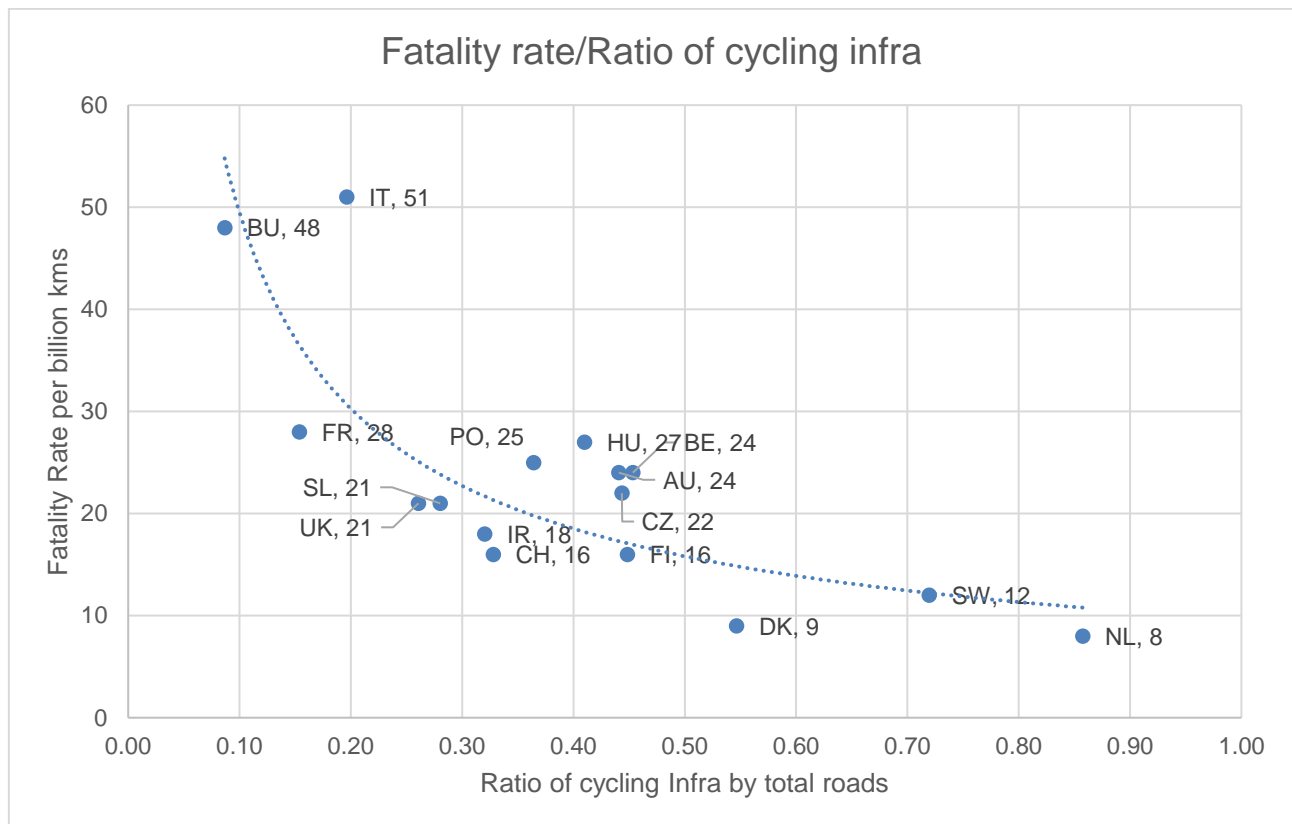
We therefore recommend that the EU requires the Member States to collect modal share data through distance or time travelled in order to better understand the risk on the roads for each user, and also as an indicator of safety within each country.

#### 4. ECF recommends cycling infrastructure as a safety indicator

We would also recommend a KPI on cycling/walking infrastructure, or the percentage of the road network which can be safe for cycling or walking. Research<sup>21</sup> has shown that the amount of cycling infrastructure is an excellent indicator of cyclist/pedestrian safety.

Again, if we return to our graphs and we plot cyclist fatality rates with percentage of cycling infrastructure as a percentage of overall road infrastructure<sup>22</sup>, we do see a much clearer correlation with safety, i.e., lower fatality rate. This also provides a more accurate portrayal of cyclist safety than a bicycle helmet wearing indicator.

Again, we have a clear trend line between lower fatality rates and a higher ratio of cycling infrastructure as a proportion of all road infrastructure<sup>23</sup>



We conclude that cycling infrastructure is also a much better indicator of cycling safety than bicycle helmet use.

<sup>21</sup> <https://epjdatascience.springeropen.com/articles/10.1140/epjds/s13688-022-00339-5#citeas>

<sup>22</sup> deaths per billion km from <https://www.itf-oecd.org/exposure-adjusted-road-fatality-rates-cycling-and-walking-european-countries>. Ratio of cycling infrastructure from ECF own research, please contact [c.woolsgrove@ecf.com](mailto:c.woolsgrove@ecf.com) for more details. ECF is currently working on a European wide calculation of cycling infrastructure in all European countries. We will update this document when we have final data.

<sup>23</sup> The coefficient of determination  $r^2$  of these data was 0.62. A figure between 0.5 and 1 shows a good correlation. So, statistically for infrastructure around 38% of the fatality *cannot* be 'explained' by the infrastructure.

## 5. Other Issues

We think it is also important that we have common definitions of modal share, cycling infrastructure, definitions for cities and urban areas in order to compare and contrast progress across countries. Technologies such as cycle tracking and GPS services should be explored as a possible mine for useful data for cyclists and pedestrians use and safety. We would recommend a priority ordering of the current list of EU KPIs should be made, with speed at the top of the list, bicycle helmet use is not necessarily measuring a safety indicator and should be dropped. Finally, we would recommend the adoption of specific targets to reduce deaths and serious injuries of vulnerable road users being included.

See below for a full list of possible KPIs that ECF thinks would be useful for improving cycling safety for cycling and walking. We would prioritise, modal share, speeds, and cycling infrastructure.

## Recommended KPIs and data collection for bicycle safety:

<b>Safety Performance Indicator/data</b>	<b>Justification</b>	<b>How to Measure</b>
Road user distance or time travelled (for all modes)	Exposure data (as mentioned in the data/statistics section) to help track down and focus on areas of risk and help us understand where and how safety interventions are working. Numbers of cyclists also indicate the perception of risk on the road and can also be correlated with actual risk. Cyclist/pedestrian numbers also correlates with a reduction in KSI for <b><i>all</i></b> road users.	Survey of random sample on travel behaviour or counting methods
Road user target fatality rate for member states	Road user target fatality rate (to be used with exposure) to inspire individual Member States to reduce risk within the transport system. Not just a European level target but a target focussed on individual Member States.	Member State fatality figures along with exposure data measured above
% of road network safe for cycling	Basic indicator on whether the road network is safe for cyclists	<p>Consider adapting a common framework for several indicators referring to safe network, safe routes etc. Simplest version would be to define a street section as safe for cycling, if it meets one of the following criteria:</p> <ul style="list-style-type: none"> <li>• speed limit 30 km/h</li> <li>• equipped with cycle lanes (separation from motorised traffic by horizontal markings only)</li> <li>• equipped with cycle paths (separation from motorised traffic by construction)</li> </ul> <p>The definition might also include some quality requirements (e.g., paved surface, minimum width). It can also reference the cycling infrastructure guidance as described in section ...</p> <p>The same definition should be applied consistently to indicators on % of network, % of population with access to safe cycling routes, % of children with safe route to school</p>
% of population with access to safe cycling network	As above, but with more importance given to roads in densely populated areas	
% of population in age range 8-18 with a safe cycling route between home and school	Safe cycling is particularly important amongst children and younger people as a way of building independence. Roads should be safe to cater for everyone. Safety for young people and children on the road acts as a proxy for the safety (and perception of safety) of the road infrastructure for cyclists	



<b>Safety Performance Indicator/data</b>	<b>Justification</b>	<b>How to Measure</b>
% of road network with speed limit 30 km/h or lower	Alternative (for % of road network safe for cycling) set of more detailed indicators. Can be also used in connection with as sub-indicators	See Above
% of road network equipped with cycle lanes		
% of road network equipped with cycle paths		
% of national roads (including motorways, expressways etc.) with alternative long-distance routes for cycling	See section on changes to the Road Infrastructure Safety Management Directive. There are many areas along longer distance routes that are (or could be) popular with cyclists. There are many serious cyclist crashes outside of urban areas (around 40% of fatalities outside urban areas).	% of national (primary, strategic etc.) roads with signed alternative routes for cycling
Total length of certified EuroVelo routes [km]	EuroVelo is a network of European long-distance cycle routes with well-defined and widely accepted certification criteria. This allows to measure not only the quantity but also the quality of cycle infrastructure on European level.	ECF is maintaining a database of EuroVelo routes, including information on certification status. The information is available down to a scale of 1 km
Member states with long term road safety programs including cycling action plan.	For good governance and continued focus on road safety improvements public authorities should have goals and outline how to achieve their goals	Counting of national action plans
% of third-party crashes by mode	Understanding crash opponents would be useful data to understand. Risk for third party crash opponents.	Number of crash opponents between and within modes of transport

<b>Safety Performance Indicator/data</b>	<b>Justification</b>	<b>How to Measure</b>
<p>% of cyclists and pedestrians with a 'feeling of safety' or 'feeling of danger' while using the roads</p>	<p>A 'road satisfaction' indicator, as a way of making sure that road safety measures are not simply moving road users from cycling to more protected modes. A road safety intervention can make cycling safer by reducing cycling numbers, but this should not be the intention. The perception of risk is also a good indicator for the success of road safety interventions</p>	<p>Survey of random sample from whole population not just cyclist as it will be important to include those thinking of cycling. Can be done on the road or junction (as is carried out in Copenhagen<sup>24</sup>)</p>

<sup>24</sup> Jensen, S., Rosenkilde, C., Jensen, N., 2006, Road safety and perceived risk of cycle facilities in Copenhagen, [https://nacto.org/wp-content/uploads/2010/08/Cycle\\_Tracks\\_Copenhagen.pdf](https://nacto.org/wp-content/uploads/2010/08/Cycle_Tracks_Copenhagen.pdf)

**Data**

**Helmet wearing rates versus fatality rates**

Country	Helmet wearing %	Fatality rates per billion KMs
Netherlands	13	8
Hungary	17	27
Belgium	17	24
Poland	20	25
France	23	28
Germany	27	11
Slovenia	28	21
Finland	28	16
Denmark	28	9
Sweden	29	12
Czech Rep	30	22
Austria	31	24
Bulgaria	32	48
Italy	36	51
Luxembourg	41	91
Switzerland	45	16
Spain	46	4
Greece	47	5
Ireland	49	18
Portugal	54	10

- Helmet wearing rates from ESRA 2018 <https://www.esranet.eu/en/publications/#europe> Survey question “Percentage of cyclists that say they always cycled with a helmet in the last 30 days”
- Fatality rates OECD/ITF report <https://www.itf-oecd.org/exposure-adjusted-road-fatality-rates-cycling-and-walking-european-countries>
- !!! fatality rates are for various years covering 2013-2015, whereas the helmet wearing rates are from 2018 !!!

R<sup>2</sup> 0.000137814

***KMs travelled per year per person versus Fatality rates***

Country	KMs travelled per year per person	Fatality rates per billion KMs
Italy	87.56	51.00
Bulgaria	92.39	48.00
France	83.77	28.00
Hungary	320.59	27.00
Poland	320.61	25.00
Austria	210.74	24.00
Belgium	261.69	24.00
Czech Republic	309.37	22.00
Slovenia	312.66	21.00
UK	76.91	21.00
Ireland	97.61	18.00
Switzerland	251.31	16.00
Finland	259.53	16.00
Sweden	191.50	12.00
Germany	422.12	11.00
Denmark	531.58	9.00
Netherlands	880.08	8.00

R<sup>2</sup>                      0.37

- KMs travelled per person per year estimations and Fatality rates from OECD/ITF report <https://www.itf-oecd.org/exposure-adjusted-road-fatality-rates-cycling-and-walking-european-countries>

**Fatality rate/Ratio of cycling infra**

	Ratio of cycle infra as a % of total	Fatality rate
Italy	0.2	51
Bulgaria	0.09	48
France	0.15	28
Hungary	0.41	27
Poland	0.36	25
Belgium	0.45	24
Austria	0.44	24
Czech Republic	0.44	22
Slovenia	0.28	21
United Kingdom	0.26	21
Ireland	0.32	18
Finland	0.45	16
Switzerland	0.33	16
Sweden	0.72	12
Denmark	0.55	9
Netherlands	0.86	8

R<sup>2</sup>                    0.626378378

- Fatality rates from OECD/ITF report <https://www.itf-oecd.org/exposure-adjusted-road-fatality-rates-cycling-and-walking-european-countries>
- Ratio of cycling infrastructure ECF own research available on request. Will be public soon.

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