

Understanding Road Risk with STATS19

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Programme

- What do STATS19 and Risk mean?
- Can risk be measured by counting?
- What other data apart from counts can be used, and how?
- What is exposure, and how is it worked out?

What is STATS19?

- GB data standard for recording injury collisions reported to the police
- Under-reporting of injuries short of death is known to occur
 - Example DfT estimate: 74% not recorded
- Makes three metrics available
 - Collisions
 - Resulting casualties (used in this presentation)
 - Involved vehicles

What is Risk?

- “Has somebody got to die?”
- Is risk the same as danger?
- Is risk qualitative or quantitative?

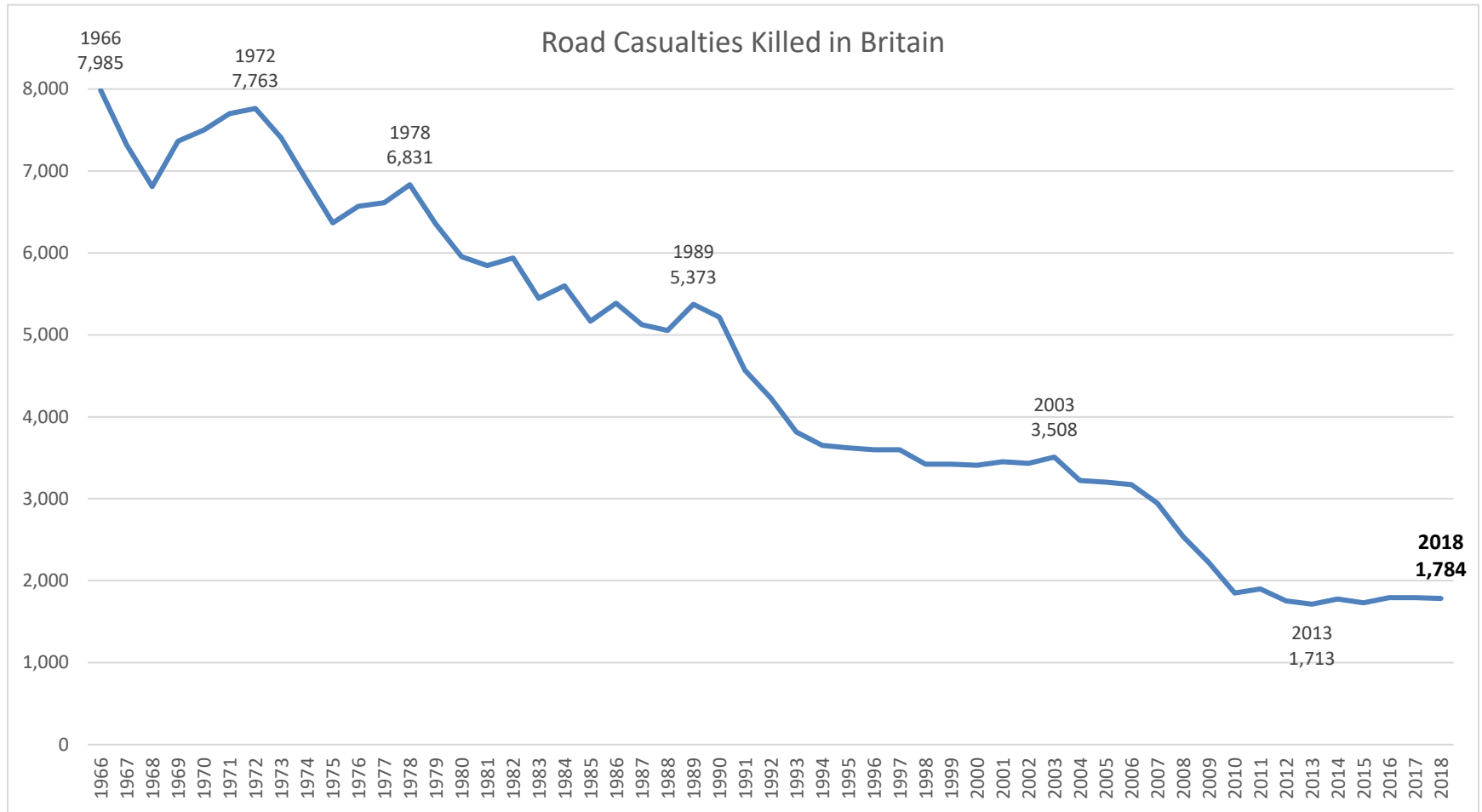


Historical context

- **1896** First GB road fatality – a pedestrian
- **1926** Official statistics begin
- **1966** Worst year: 7,985 killed
- **2018** 1,784 killed
 - All figures from DfT (unless otherwise stated)
- Is this a measure of “Risk”?
 - Comparison: 1,867 road deaths in Romania, 2018

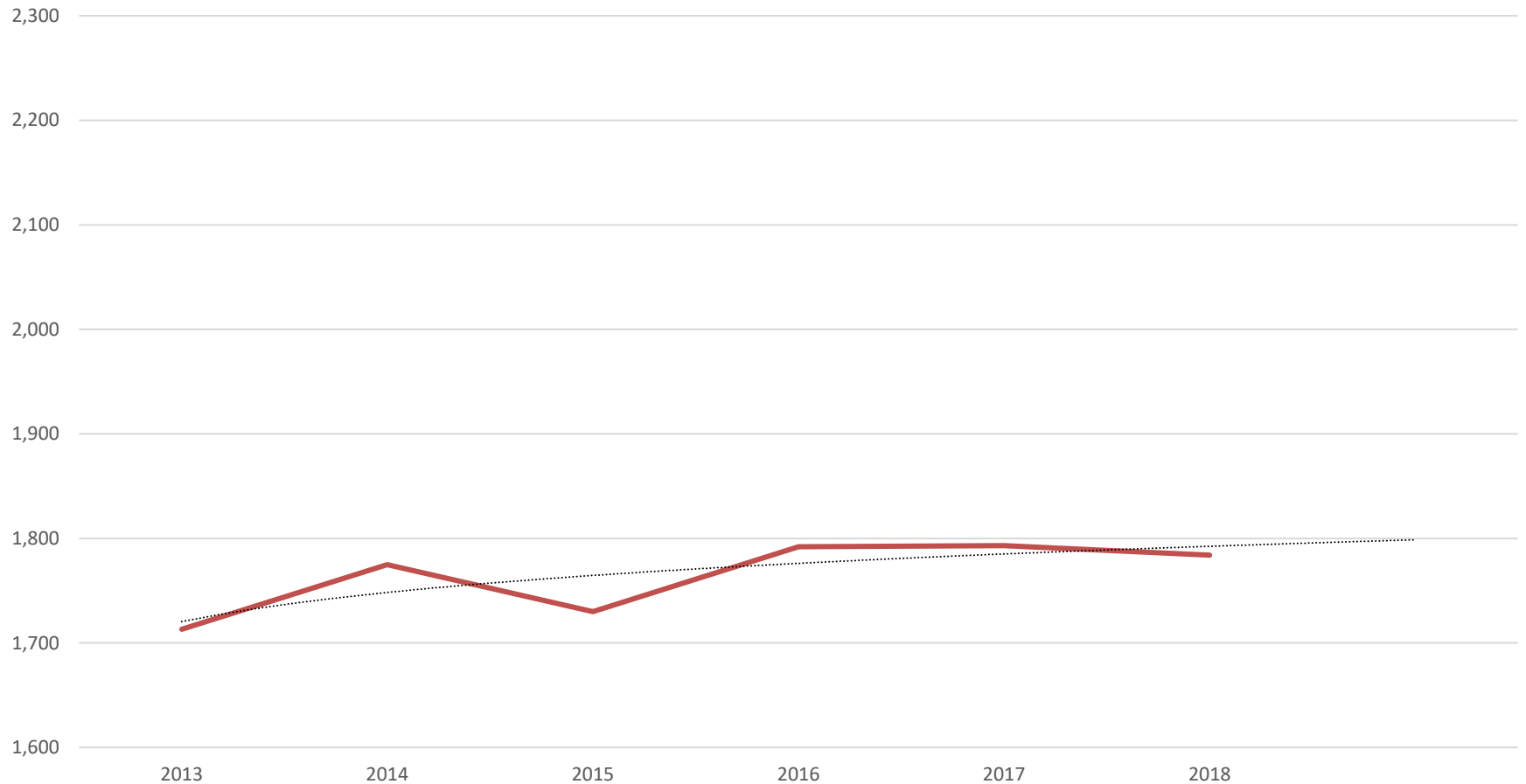
Source: www.statista.com

Do lower counts mean less risk?



Where to begin?

Killed casualties



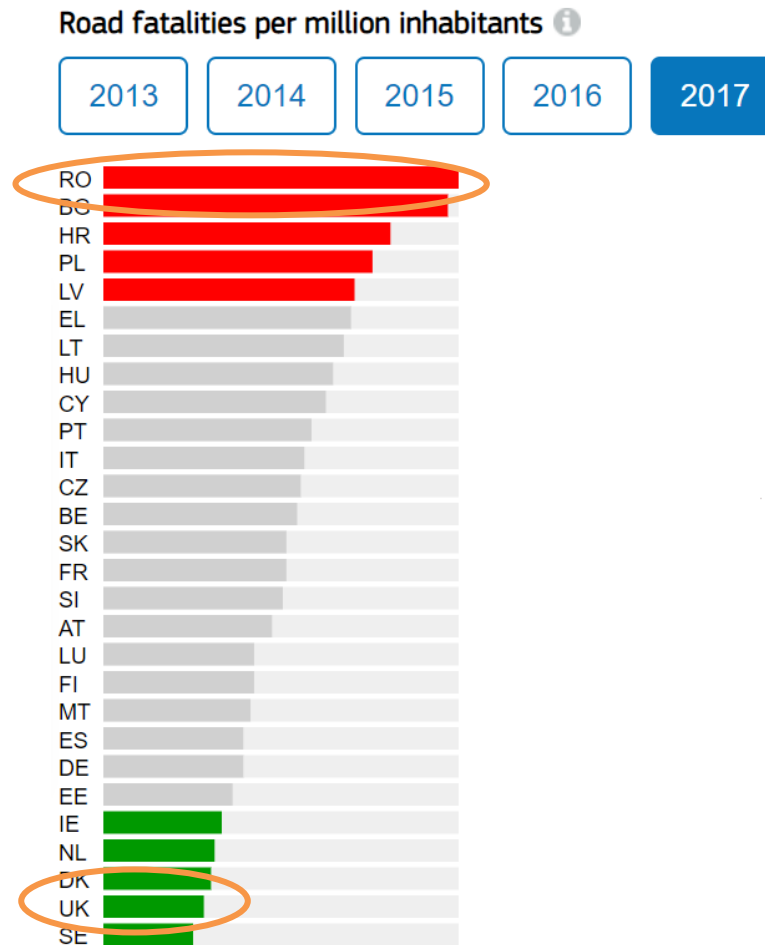
Converting counts to risk

- Risk is the probability that a bad thing happened to a member of a given group
- **Calculate:**
count of bad things that happened
divided by
count of group members exposed to bad things
- For example:
1,784 killed casualties in 2018
divided by
64,553,909 GB population in 2018

Expressing the result

- 0.0000276 fatalities per person
 - What a horrible number!
- **27.6 fatalities per million people**
 - Looks better (but who can visualise a million people?)
- Fatalities have been “normalised”
 - i.e. rescaled to allow for comparison of corresponding values by eliminating the effects of gross influences
- Comparison: **99.0 fatalities per million people** in Romania, 2018

Risk in action: EU road deaths by population



Source: EU

https://ec.europa.eu/transport/facts-fundings/scoreboard/compare/people/road-fatalities_en

Expressing the result another way

- Stand it on its head:
64,553,909 GB
population

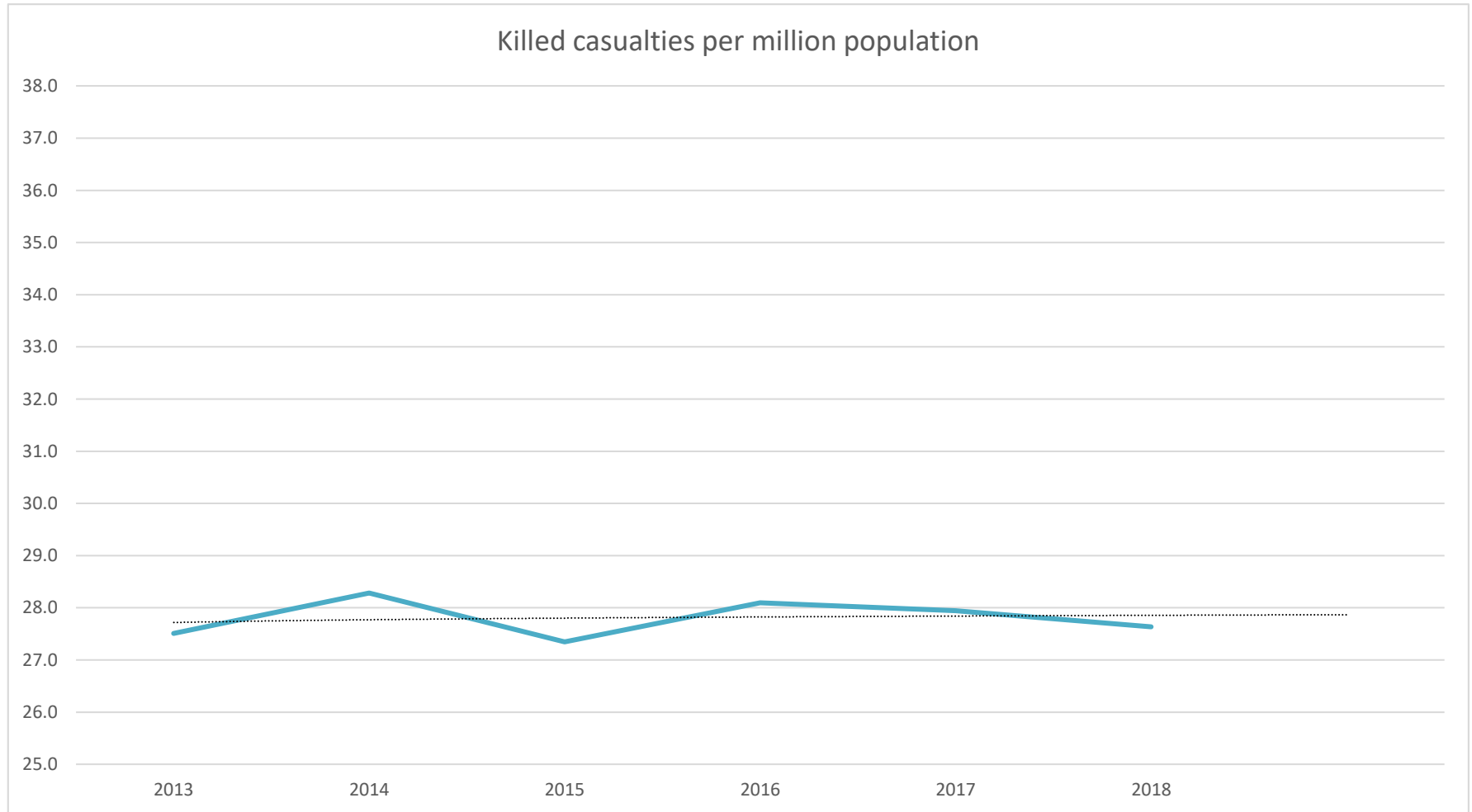
divided by

1,784 killed casualties
- **One fatality per
36,185 people**



Image:
Chad Davis on Flickr
Wisconsin, 2010

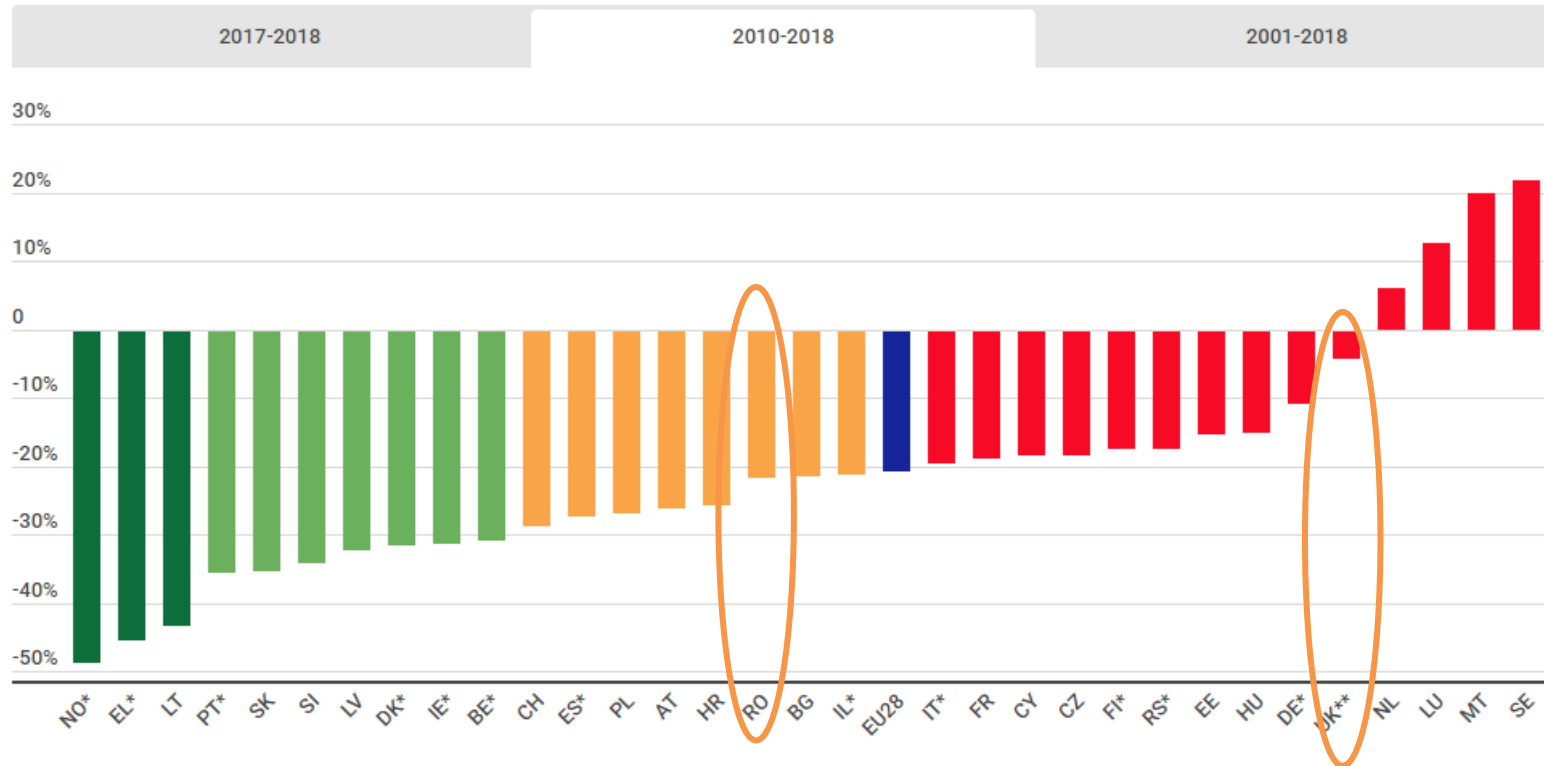
Risk: count relative to population



Risk in action: the flipside

Note: *provisional data for 2018

**UK data for 2018 are the provisional total for Great Britain for the year ending June 2018 combined with the total for Northern Ireland for the calendar year 2018



Source: ETSC

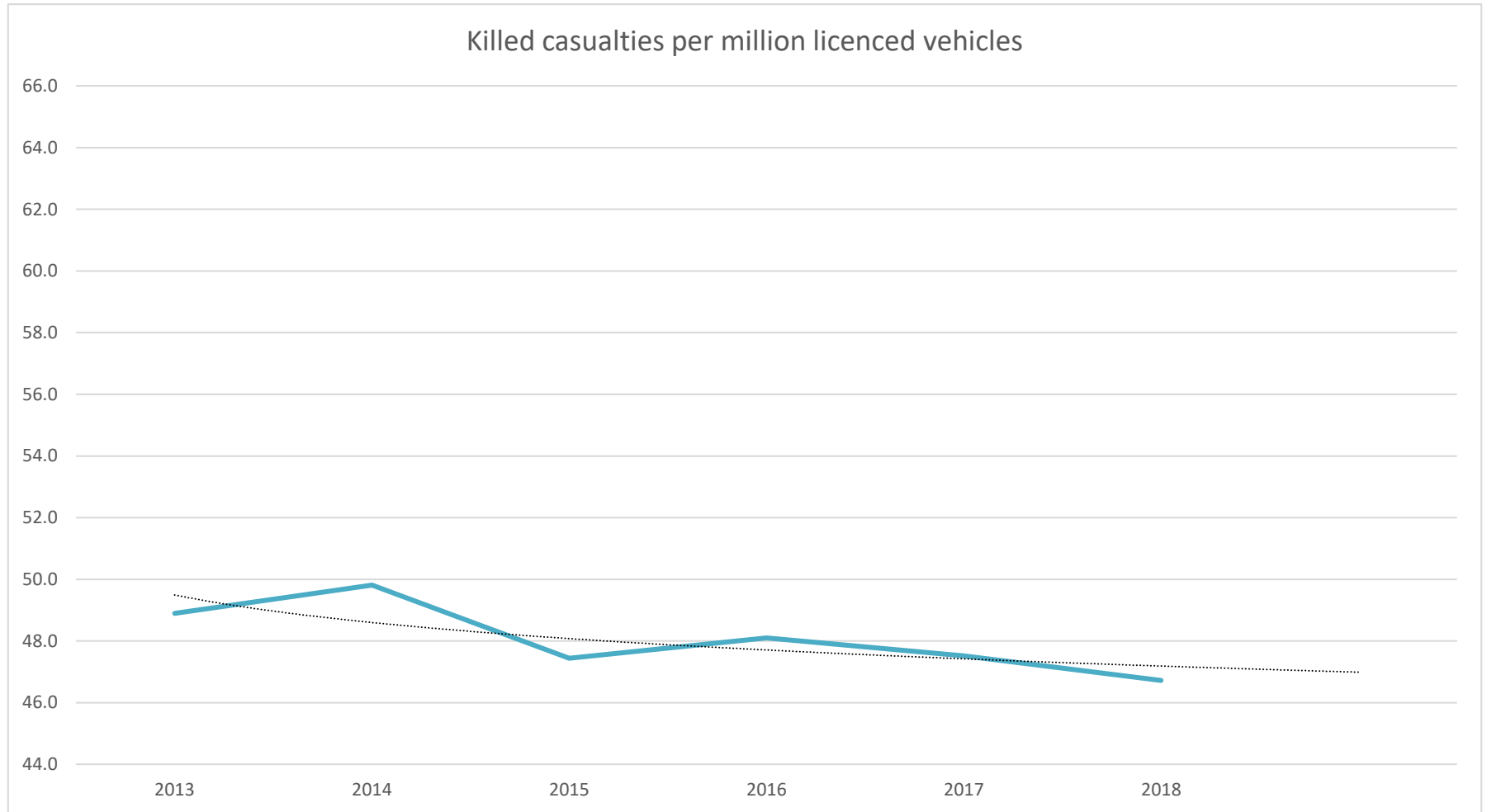
<https://etsc.eu/euroadsafetydata/>

What should we rescale by?

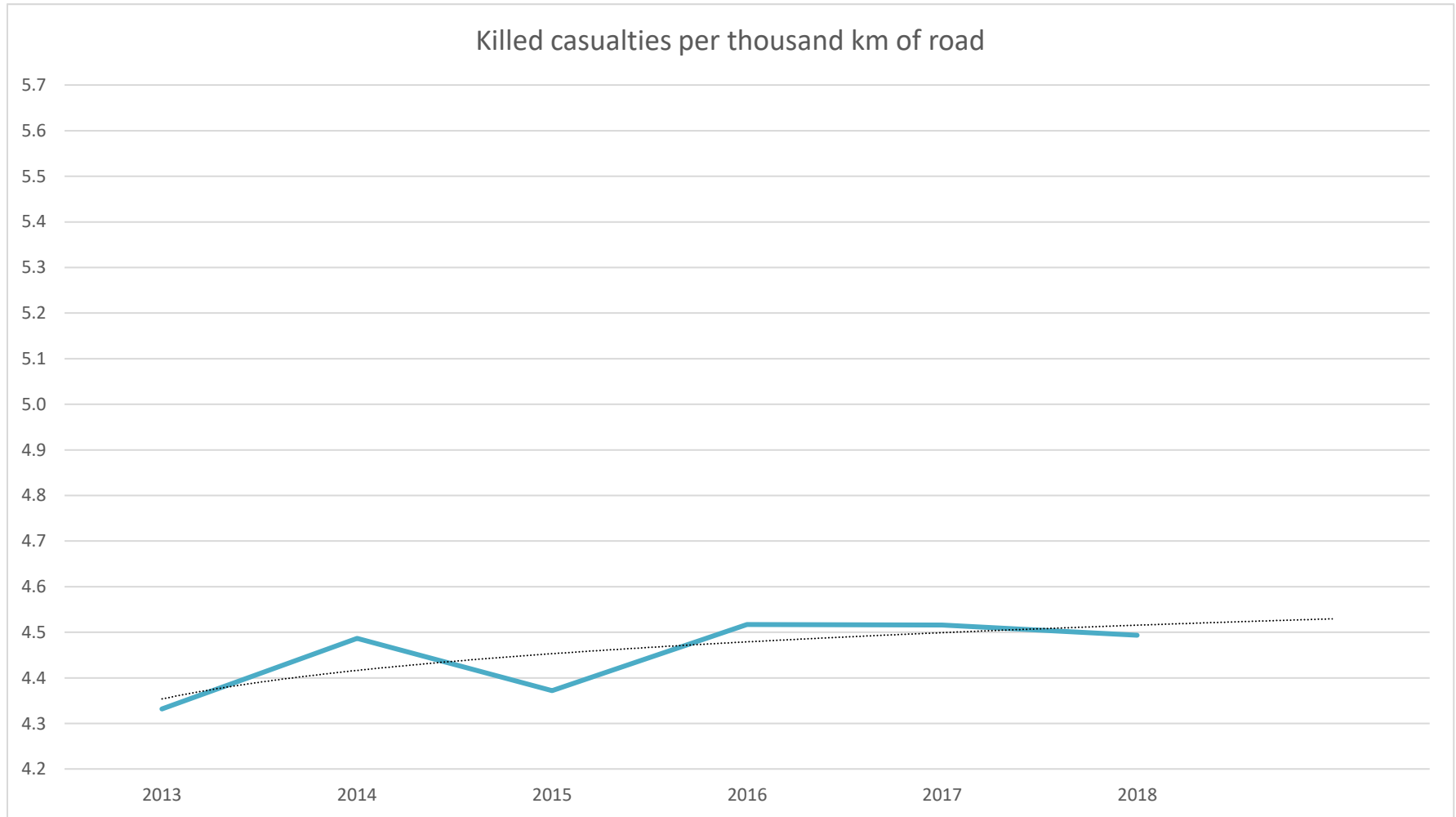
- Populations are not equally exposed
 - At national level, ignores foreign visitors
 - At local level, not only locals use local roads
- Casualties attributed to presence of vehicles
 - So should fleet size be relevant?
- Authorities are responsible for safety of roads
 - So should network length be relevant?

Vehicles: risk relative to fleet

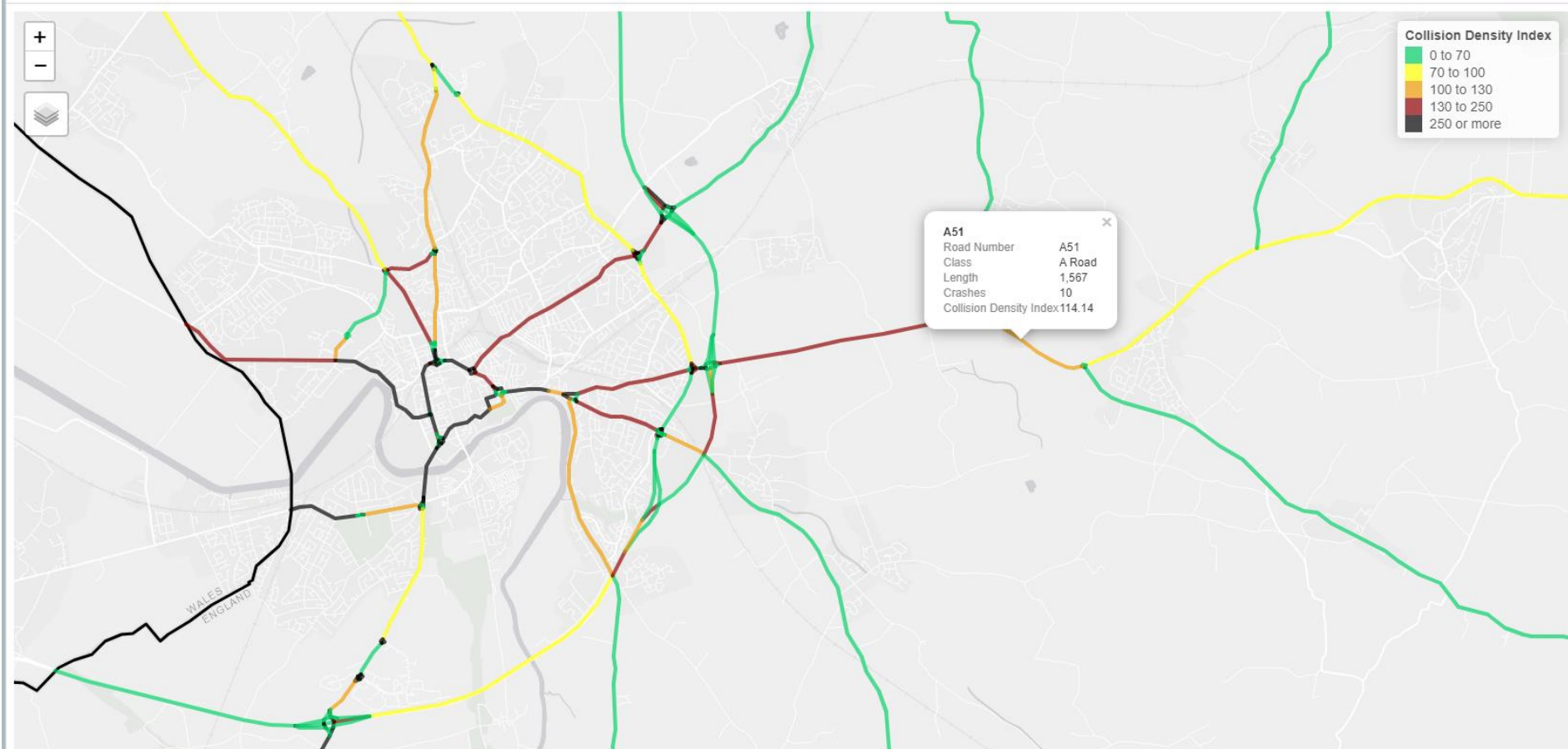
Killed casualties per million licenced vehicles



Density: risk relative to road length



Density: the universal comparator



Source: MAST Online
www.roadsafetyanalysis.org

What is exposure?

- Fleet size and network length are useful, but limited
- Traffic counts can combine the two
 - Actual vehicles passing a given point
 - Averaged over a year to allow for variation
 - Known as **Annual Average Daily Flow**
 - Example <https://roadtraffic.dft.gov.uk>
- Distance between the count points is known
- $\text{AADF} \times \text{distance between points} \times \text{days in the year}$ equals
vehicle distance travelled

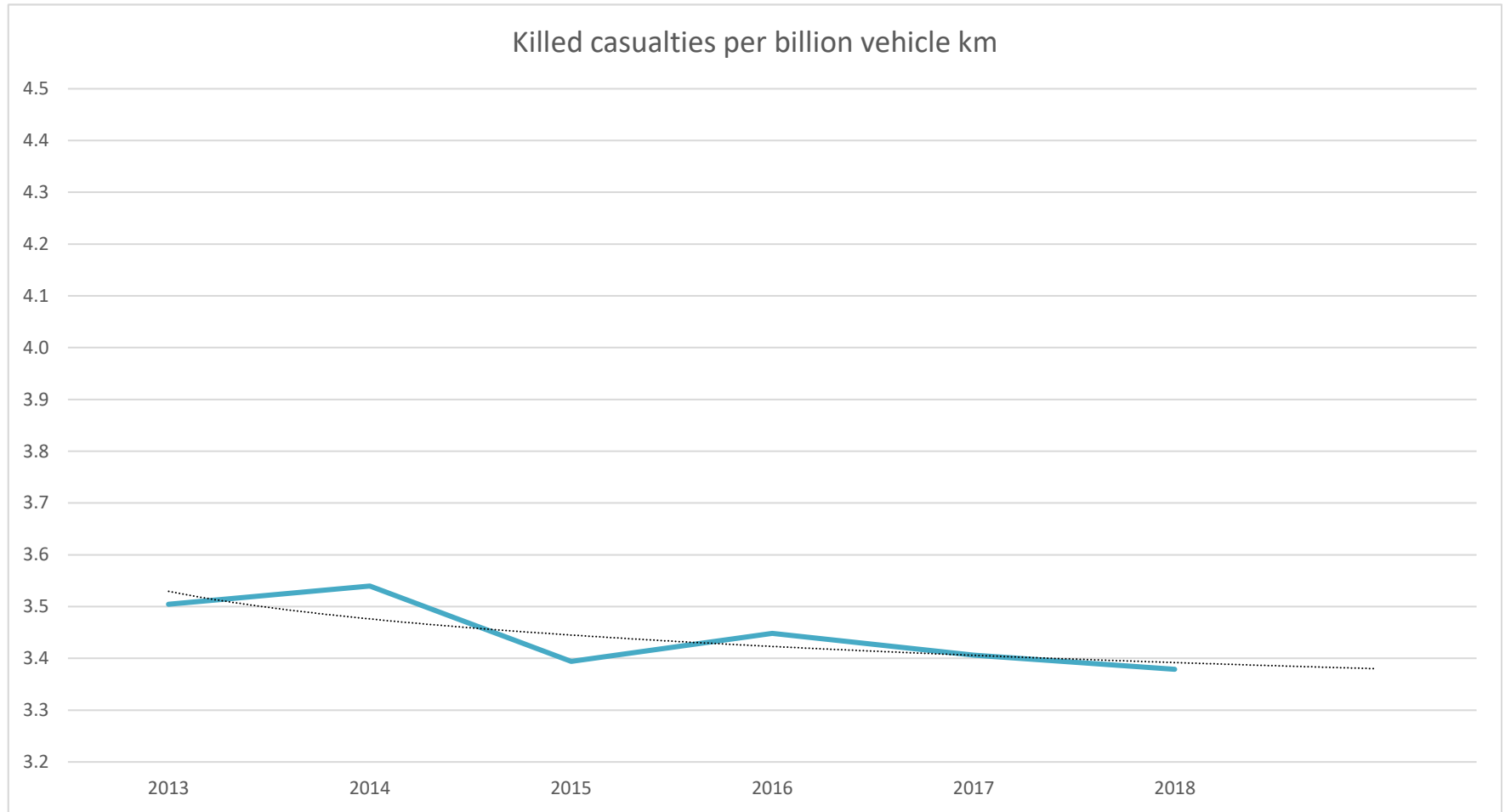
Converting counts to rates

- Rates are the frequency with which bad things happen, compared to everything that happened
- **Calculate:**
count of bad things that happened
divided by
the total of everything that happened
- For example:
1,784 killed casualties in 2018
divided by
528,000,000,000 vehicle km travelled in 2018

Expressing the result

- 0.0000000000379 fatalities per person
 - An even more horrible number!
- **3.38 fatalities per billion vehicle km travelled**
 - Looks better (but who's driven a billion km?)
- Once again, fatalities have been “normalised”
 - i.e. rescaled to allow for comparison of corresponding values by eliminating the effects of gross influences
- Turning it upside down doesn't help
 - 295,964,126 vehicle km travelled per fatality

Rate: count normalised by exposure



Rates in action: RSF EuroRAP

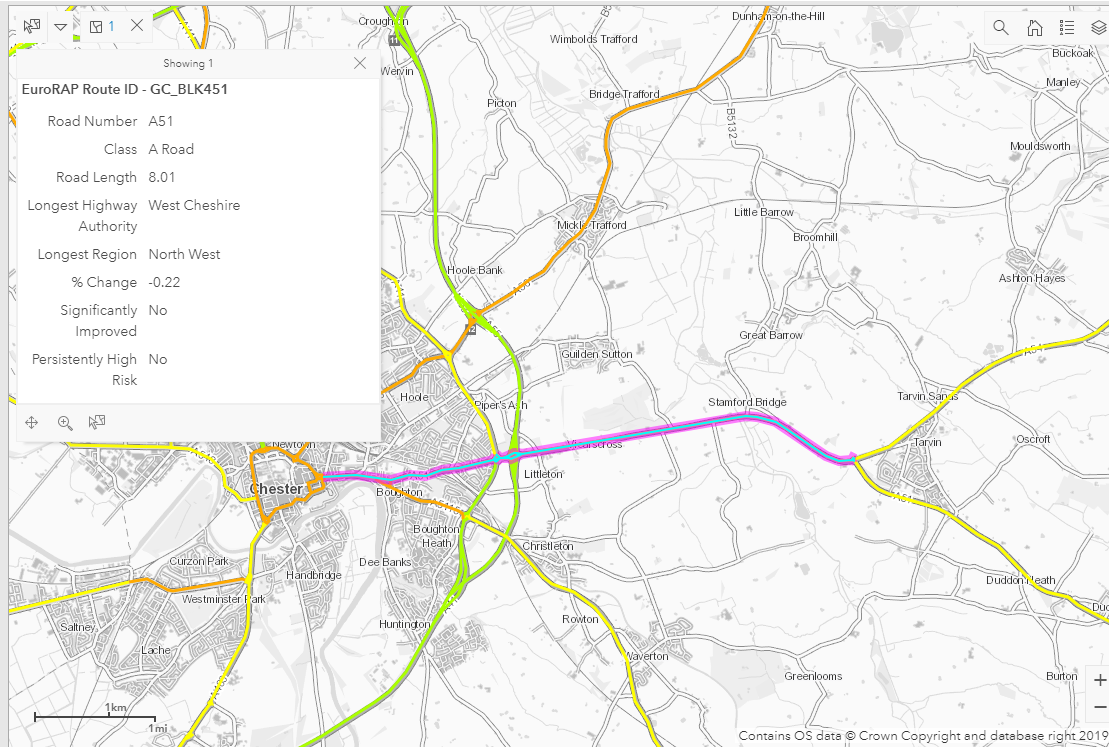
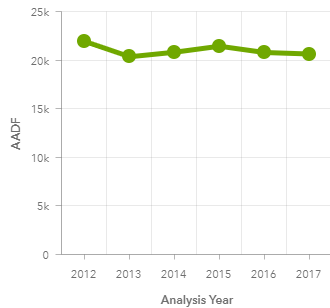
Route Details

EuroRAP Route - GC_BLK451
A51, West Cheshire
8.01 km

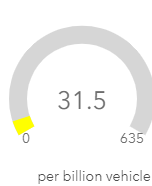
Fatal and Serious Collisions
2015-2017 - 7
(2012-2014 - 9)

Change in FSC
-22.2%
from 2012-2014

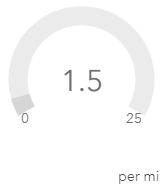
Average Annual Daily Flow



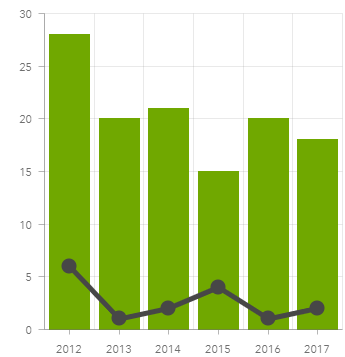
FSC Risk Rate 2015-2017



FSC Density



Collisions



Analysis and dashboard by



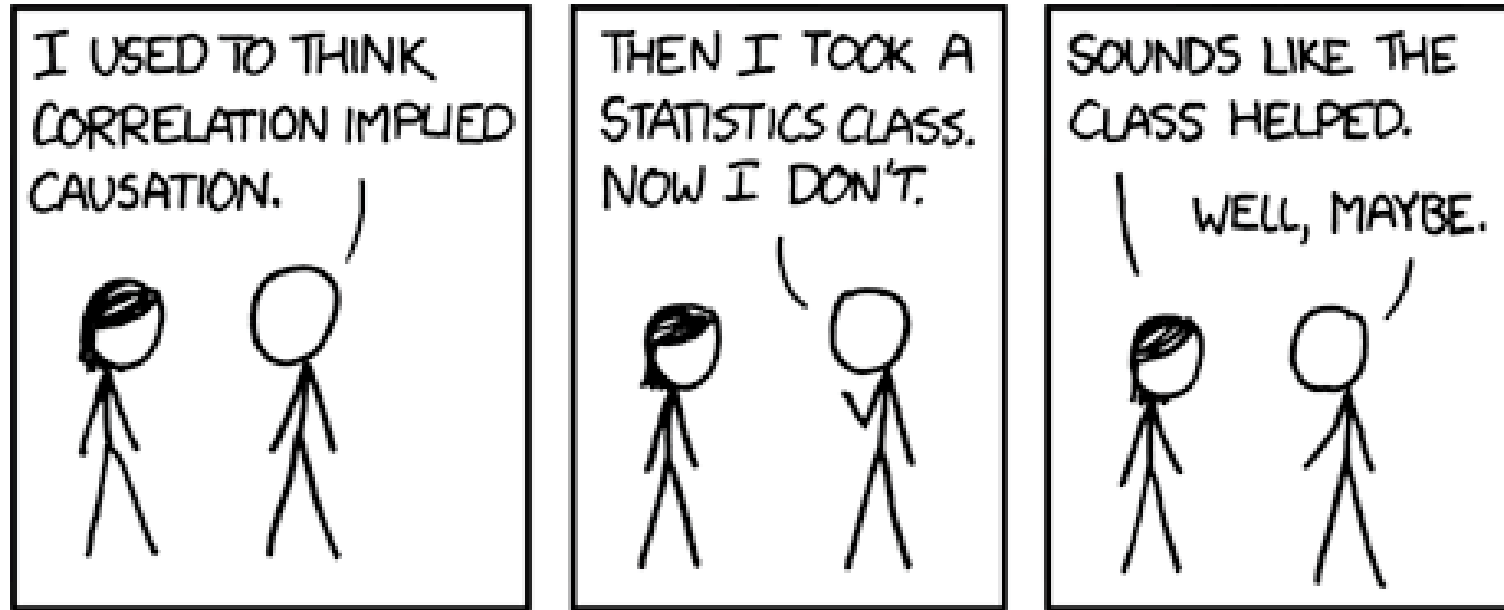
Is exposure rate better than risk?

- Removes some assumptions:
 - Every member of the population has the same risk
 - Each vehicle poses an equal risk
 - Every road exhibits the same risk
- BUT it requires more detailed data
 - For example: pedestrians
 - Population is not equal to footfall
 - Traffic on motorways is irrelevant
 - More prone to seasonal and weather variation
 - Harder to compare one area against another e.g. London
- Sometimes, this data simply does not exist

Can all metrics be normalised the same?

- **Casualties** are people, so best normalised against population
 - Pitfall: unequal exposure
- **Vehicles** travel different distances, so best normalised against vehicle distance
 - Pitfall: different types of vehicle travel different distances, dependant on place and time
- **Collisions** are system failures, so best normalised against network size
 - Pitfall: engineering and usage differences between road classes and areas

Does less recorded risk mean less future danger?



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Questions and comments