

Definition of a safe barrier for a motorcyclist

A litterature study from 2015.

Three authors who represents three fields:

- Maria Nordqvist, SMC/ the riders
- Göran Fredriksson, SVBRF /the barrier producers
- Jan Wenäll, VTI/the Swedish testhouse



The Swedish Motorcyclists Association - SMC

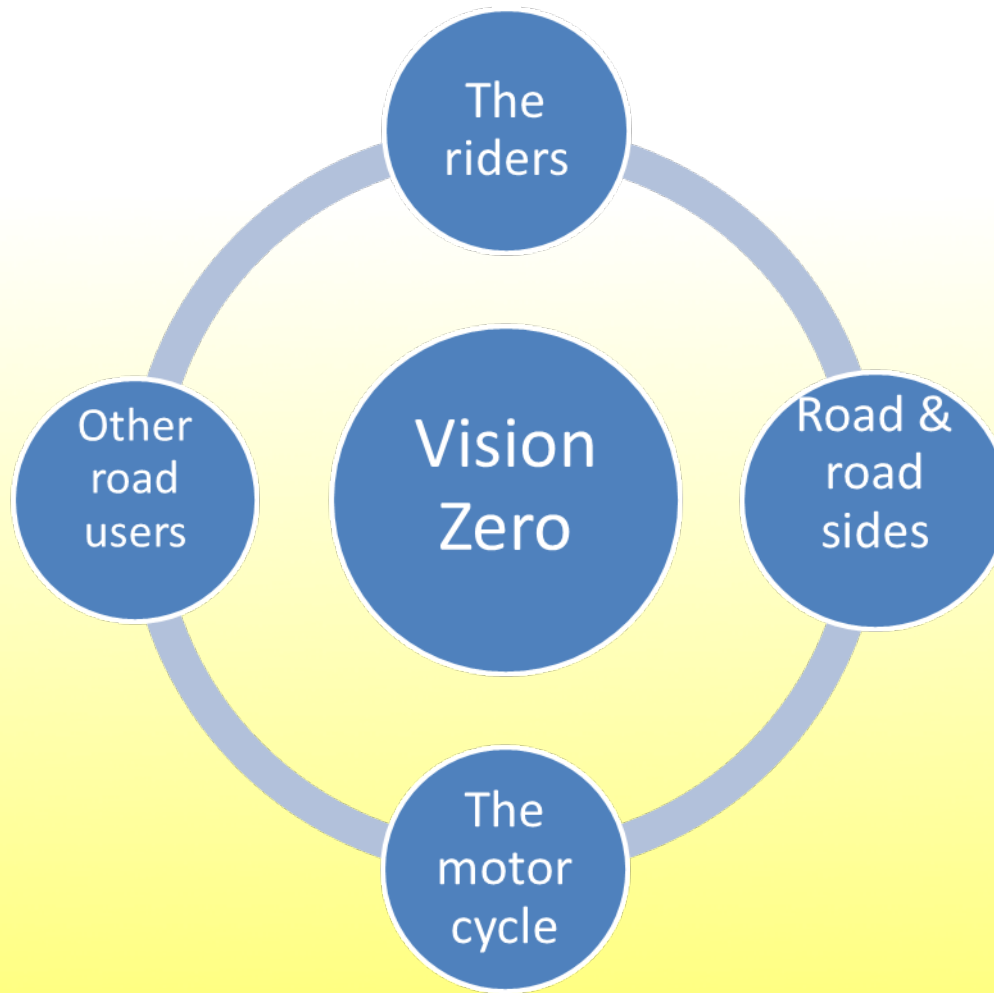
- Founded 1963
- 70 000 individual members, 400 clubs and 21 districts
- 30 % of the Swedish MC owners are members
- Offer loads of activities for riders all over Sweden
- Most important to our members is our political work – including safety
- Safer roads and barriers is a top priority for our members!



Cable barrier attack on E16 in 2001.



Motorcycle safety – a shared responsibility

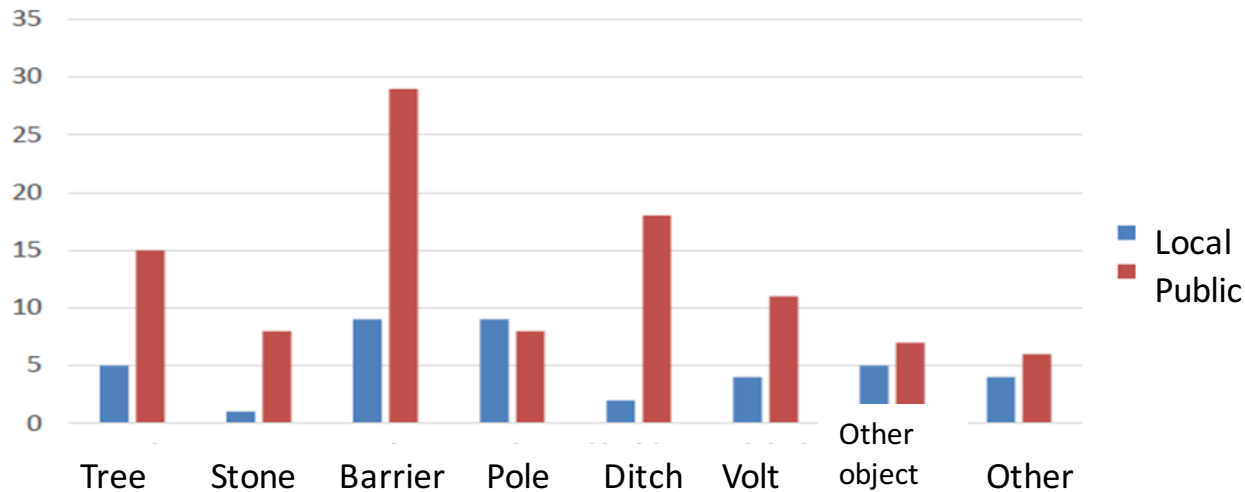


Vision Zero: The responsibility for road safety is shared between those who design and those who use the road transport system.



Barriers are the most common crash violence in fatal single vehicle crashes in Sweden

Crash violence in fatal single accidents with motorcycles
2005-2013 (141 accidents)



In 3 out of 10 singel accidents the rider was killed when crashing into a barrier, which corresponds to 1 out of 10 fatalities

TRAFIKVERKET

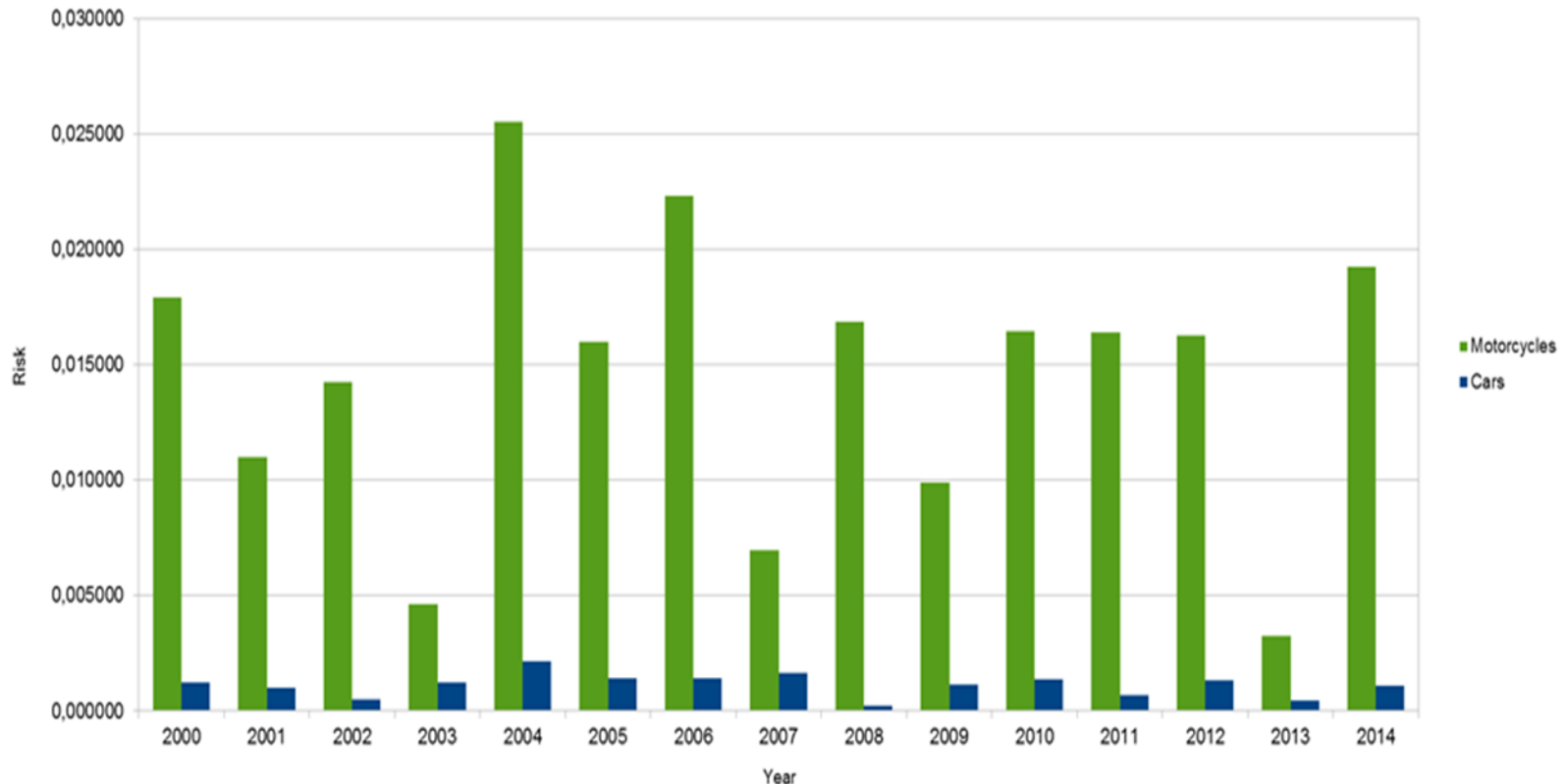
Source: Indepth studies of fatal motorcycle accidents on motorcycles with 2 wheels in Sweden 2005-2013, The Swedish Transport Administration



Sveriges MotorCyklister

The risk of fatality with barrier per 1000 vehicles – higher risk for riders compared to motorists

Fatal crashes with barriers - motorcycles compared to cars



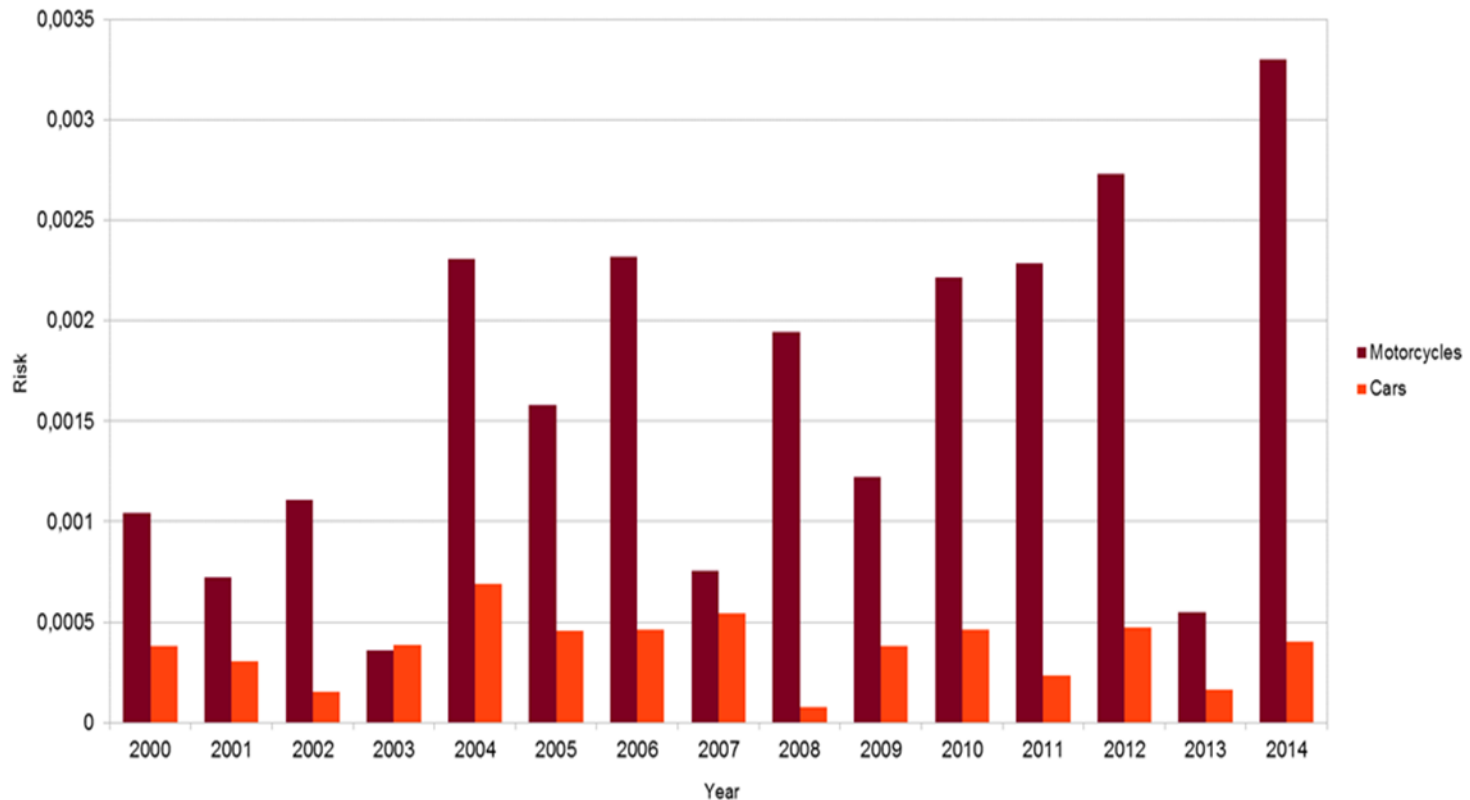
Source: The in-depth studies of fatal accidents, the Swedish Transport Administration and vehicle fleet SCB June 30 each year.



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The risk of fatality per 1000 kilometer- higher risk for riders compared to motorists

Fatal crashes with barriers - motorcycles compared to cars

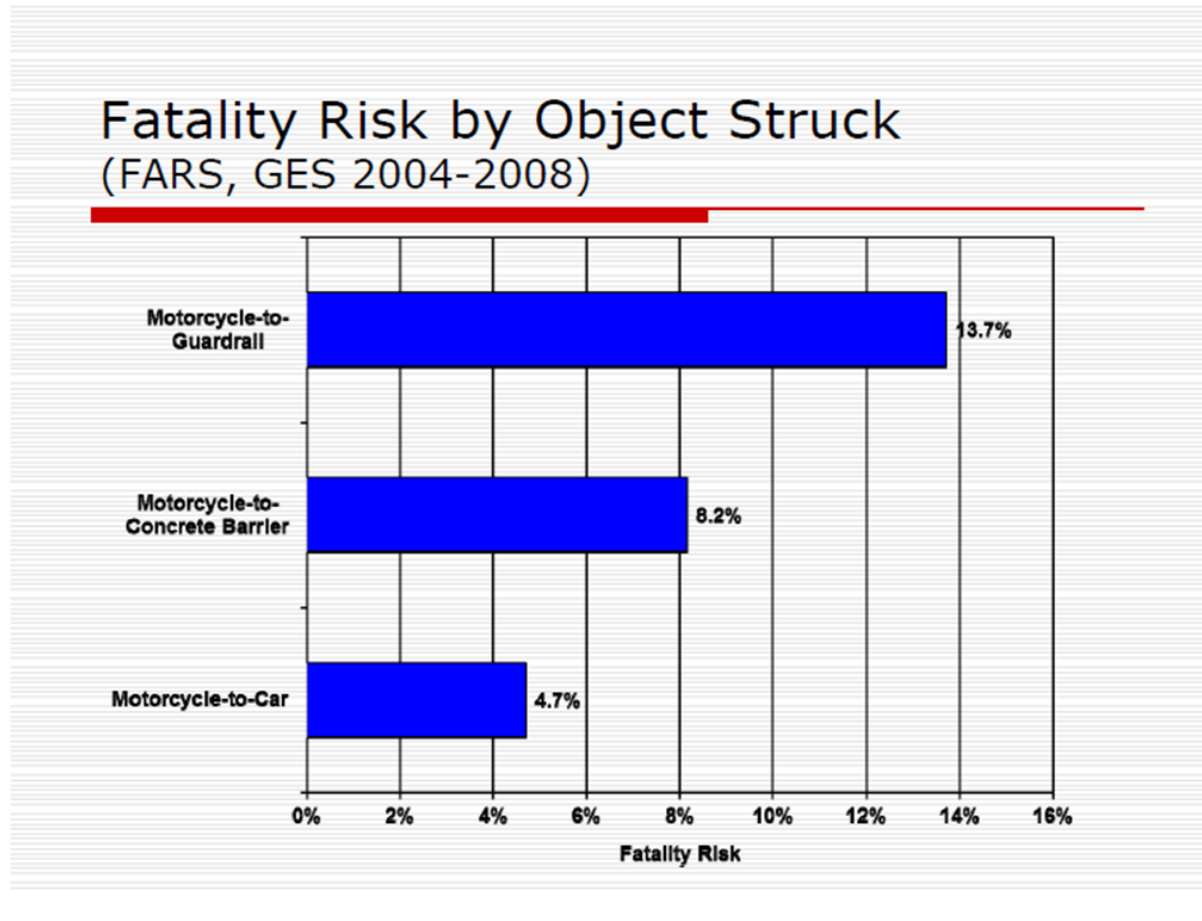


Source: Swedish Transport Administration in-depth studies of fatal accidents and annual mileage according to Trafikanalys. Mileage for a car estimated for 2014. Mileage MC estimated for 2013-2014



Higher fatality risk from guardrails than cars

according to Prof. Clay Gabler



The fatality risk can be reduced by choice of barrier. Higher risk to crash with unprotected poles compared to concrete barrier.



The high injury risk can easily be reduced

- All barriers are a risk for vulnerable road users
- Barriers with unprotected poles increase the risk
- Barriers where riders and/or the bike can get caught increase the risk
- Median barriers should not only prevent head-on collisions – but also minimize injury risk in case of collision
- The risk for riders can be reduced with a wise choice of barrier



Rider got stuck on top of the barrier



Start Nyheter Sport Familj Opinion Nöje & Kultur Bostadspuls M

– Om du kör 80 kilometer i timmen och hamnar i järnpinnar som sticker upp. Då är det ingen som klarar sig oskadd från det.



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The high injury risk can easily be reduced

– More examples

- Forgiving roadsides instead of barriers
- A recovery zone with a wide paved shoulder
- A smooth barrier reduce the risk
- Include motorcyclists in the harmonized standards (EN 1317)
- Prevent the three most common crash scenarios



Finally, loss of friction increase the risk!

Photos from E4, several fatal and seriously injured due to loss of friction in connection with road repair



A safe barrier for motorcyclists is a barrier

- where you cannot be thrown over in a collision
- free from protruding parts where parts of the body and/or the motorcycle can get caught
- free from openings, vertical or horizontal, where parts of the body and/or the motorcycle can become trapped
- with a smooth upper surface
- free from unprotected posts in both the ground level as the top side
- with energy-absorbing MPS
- free from attachments which involve a higher risk of injury and
- located at a distance from the road surface allowing a recovery space



Classification of barriers based on motorcycle collision-friendly features

- Rating on scale from -1 to 5
- Non-desirable features are followed by ** injury reducing design features



Classification of barriers, rate = -1

- Protruding parts on the barrier side and top, accessible posts cc <4 m, sharp edges, large openings in horizontal and vertical direction, uneven side and top, overrun possible (Cable barrier with protruding hooks).



Right photo: Fatal motorcycle crash E 16 15 poles destroyed, high speed. Body parts spread over the road.



Classification of barriers, rate = 0

- W-beam, reference barrier; worlds most used barrier.
- Accessible posts cc <4 m, sharp edges, large openings in horizontal and vertical directions, uneven top, overrun possible.
** Smooth barrier profile.



Right photo, fatal crash, rider 2016 E6



Classification of barriers, rate = 1

- Accessible posts cc <4 m, sharp edges, large openings in horizontal and vertical directions, overrun possible.
** Smooth barrier profile with smooth / covered upper side, dividing box beam guard rail (“roofed W-beam”) with smooth steel profile both side and top.



Classification of barriers, rate = 2

- Uneven top, overrun possible. **
Smooth barrier profile, MPS function is, however, non-energy absorbing: Concrete barriers.



Note: Never put large poles on top of the concrete barrier!
At least one fatal crash in Sweden has been caused by a pole.



Classification of barriers, rate = 3

- Uneven top, overrun possible.
** Smooth barrier profile, energy-absorbing MPS (W-beam with MPS according to 1317-8)



Classification of barriers, rate = 4

- Overrun possible.
** Smooth barrier profile, energy absorbing MPS, smooth top ("Euskirchen Plus")

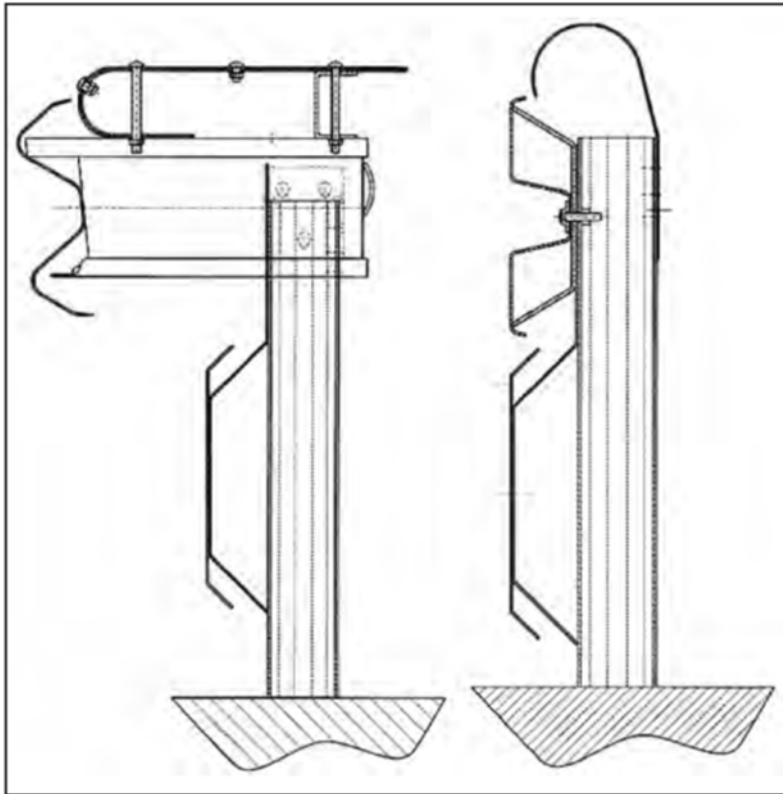


Bild 5: System EuskirchenPlus nach [GÄRTNER]



Classification of barriers, rate = 5

- ** Smooth side with energy-absorbing MPS, smooth top, overrun protection fitted (NA)



Recommendations to road agencies

- **Address** the problem of barriers and motorcycles
- Start a **national program** with a budget including exchange of existing and installation of new barriers
- Cooperate with **insurance companies** at repairs
- Increase the use of barriers in class **2+**.
- Review the demands for barriers on the **TEN-T** roads, always use **class 2+ barriers**
- Huge innovation possibilities for barriers producers for safer barriers on TEN-T roads. However, the producers need a **demand** from the national authorities



More recommendations

- Use **forgiving road sides** instead of side barriers
- **Increase the distance** between barrier and road
- Introduce a program for paved shoulders, especially in **bends**
- Make use of the national information about **injuries** in fatal and serious crashes with barriers
- Ask for **statistics** from insurance companies – costs for the barriers, vehicles and personal injuries



Final recommendations

- Use the **classification table** of barriers while waiting for a standard
- Initiate a new test method



- An urgent need for a standard – why not simplify – with an open standard?
- Include the total costs in the choice of barriers (maintenance and socio-economic costs)
- Cost for loss of 16 lives in three years, € 50 000 000



Thanks!

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