



# EUROPEAN SURVEY GLARE ON ROAD TRAFFIC

3 out of 4 of the respondents believe that glare prevention should be better regulated



242

CLUBS

147

COUNTRIES

80M+

MEMBERS

**NORTH & CENTRAL AMERICA**

29 Clubs  
20 Countries

**EUROPE**

103 Clubs  
50 Countries

**MENA**

32 Clubs  
21 Countries



**SOUTH AMERICA**

14 Clubs  
11 Countries

**AFRICA**

27 Clubs  
21 Countries

**ASIA PACIFIC**

37 Clubs  
24 Countries



ONE OF THE WORLD'S  
LARGEST NOT-FOR-  
PROFIT CONSUMER  
ORGANISATIONS



FIA IS IN A UNIQUE  
POSITION TO  
FACILITATE  
COMMUNICATION  
AND EXCHANGE OF  
IDEAS AMONG THE  
80M+ ROAD USERS IT  
REPRESENTS

## 10 European mobility clubs have conducted a survey of motorists

More and more **members are complaining about glare** in road traffic, ranging from irritation to reports of near accidents. The survey was developed together with other FIA clubs, with the ADAC (Germany) and ANWB (The Netherlands) as key players, in order to determine whether it is a matter of individual, particularly sensitive people or a phenomenon that affects a large proportion of drivers and road users and ultimately even impairs road safety. In the end, 10 European mobility clubs took part in the survey.

**Two ways of asking motorists** for their vote were implemented:

- **ANWB** (The Netherlands), IAM Roadsmart (England), BIHAMK (Bosnia-Herzegovina), AMZS (Slovenia) and NAF (Norway) **called on their members** to complete the 6-page questionnaire online via their media such as member magazines, online and social media presences. Around 22,000 members responded to the call.
- The ÖAMTC (Austria), TCS (Switzerland), TCB (Belgium) and ACL (Luxembourg) joined **ADAC** in conducting a representative **survey via a market research company**. The difference: not only do those who feel blinded give their opinion, but a structured and supervised survey of a good 1,000 drivers in each case, taking into account the demographic balance (in Luxembourg just under 500).

In both cases, the same questionnaire was used.

## Main findings of the representative «ADAC method» survey

The comprehensive survey of motorists was conducted up to the end of 2023 to determine the extent to which they are affected by glare from light sources on vehicles and what restrictions they experience when driving. To summarise, the representative survey conducted by a market research institute came to the following findings for Belgium, Germany, Austria and Switzerland (4.312 interviews):

- 71 % of the respondents find the glare unbearable or annoying
- 32 % almost always or regularly feel dazzled
- 51 % of respondents pinch their eyes shut or even close them briefly
- 58 % have problems perceiving objects in the vicinity of the dazzling light source\*
- 30 % stated that they continued to see an image of the light source for a limited time after passing it (afterimage), or even felt pain\*

\*Indication of physiological glare and restriction of perception/vision

**75%** of those surveyed consider it is necessary to **review and update the regulations** on reducing glare from vehicle lighting. The survey thus gives the mobility clubs a clear mandate to take action to protect consumers and introduce measures that ultimately lead to less glare in road traffic.

## Main findings of the «ANWB method» survey by call to club members

ANWB, AMZS and NAF recruited their respondents via their own member base. The sample sizes per organization/country are:

- The Netherlands (ANWB): 13.640
- Slovenia (AMZS): 2.766
- Norway (NAF): 1.108
- Bosnia Herzegovina (BIHAMK): 181

### The findings:

- 80 % of the respondents find the glare intolerable or annoying
- 50 % almost always or regularly feel dazzled
- 52 % of respondents pinch their eyes shut or even close them briefly
- 64 % have problems perceiving objects in the vicinity of the dazzling light source\*
- 25 % stated that they continued to see an image of the light source for a limited time after passing it (afterimage), or even felt pain\*

\*Indication of physiological glare and restriction of perception/vision

**81%** of those surveyed consider it necessary to **review and update the regulations** on reducing glare from vehicle lighting. The results of United Kingdom are not included because IAM did not ask exactly the same questions.

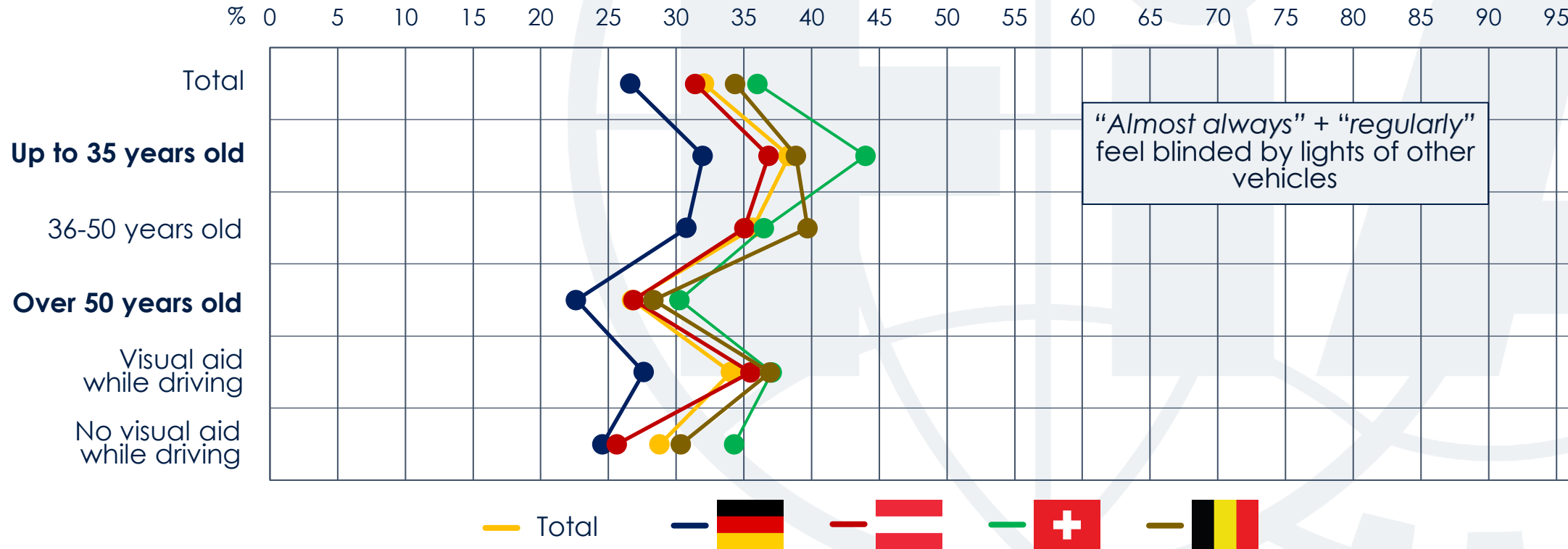
## Voices of consumers

ANWB collected **more than 6.000 entries of respondents**. To show the concerns and complaints of the consumers, here are some of them, standing for several hundreds each:

- “The **balance between “seeing and being seen” is gone**. Car lights have become so bright that other road users are (almost) invisible. The one who gets to drive the brightest headlights has the best vision, those around are overruled by a large amount of light, which literally blinds.”
- “I often find the current car lighting very irritating. It seems like some **vehicles are constantly running high beams**. And the adaptive/self-thinking lights are also irritating. Sometimes it looks like flashing disco lights. Up for improvement/fine-tuning.”
- “In fact, I think that numerous **one-sided accidents at night** on the country road are due to those light cannons of the oncoming traffic, which simply make it impossible to see the road in front of you. In rain, it is then even more dangerous!”
- “I was recently so **blinded by lights from the car behind** me that I automatically looked in my mirror. As a result, I drove hard into the pavement and had a burst tire.”
- “Apart from the far too bright light, the **colour is also a problem**. From intense white, it suddenly changes to a blue flash, as if a blue flashing light is approaching. Very confusing. 2nd issue are the tall SUVs. The intense white and bright light is so high that it shines straight into the mirrors. Extremely annoying.”

## Glare is not (only) an issue of elderly people

In the representative survey conducted by a market research institute came to the findings for Belgium, Germany, Austria and Switzerland, that older drivers (50+) and those not using visual aids while driving feel less often blinded:



## Conclusions of the survey findings

- Glare in road traffic is not a phenomenon of hypersensitive individuals
- The majority of drivers surveyed feel dazzled in road traffic
- Not only psychological glare, but also physiological glare occurs to a considerable extent in road traffic (afterimages, light haze and painful sensations are signs of a reaction of the sensory organ of the eye to (too) strong and intense incoming light with high luminance in the eye and on the retina)
- Over  $\frac{3}{4}$  of all respondents favour amendments to the legal regulations to reduce glare in traffic



## Possible causes and effects

The **requirements for approval** of vehicle lights are set in **luminous flux** and **illuminance** values of the light beam and the light distribution. The (human) **eye** instead “measures” **luminance** and **contrast**. Due to the construction of the eye, it copies a sharp image of the light source in all details onto the retina. The higher the luminance of the light source and the sharper the contrast in the light source, the more side effects occur in the eye.

Additional, the cells on the retina are very **sensitive to blue light**, which increases the side effects like glare with light sources, which have a high part of blue light in their light colour distribution.

Last but not least, the eye is **much more sensitive** and the **range for brightness is much higher** than at any camera system (up to 140 dB), the minimum viewing angle is much smaller (lower than 1/60 degrees; detecting objects in size of almost 1 cm at 50 m distance). Probably no imaging method is capable of reproducing these properties, so **simulations can lead to incorrect results**. That makes it difficult to measure light beams with technical devices in comparison with the (human) eye and to simulate effects onto the eye and inside of it. It is therefore recommended to take account of the perception of road users, as set out in this survey of the mobility clubs.



## Possible causes and effects

UK opticians argue that many patients don't have an eye problem, but were nevertheless bothered by glare. The main problem of glare in traffic is the pitching movements of the vehicles and thus the significantly higher illuminance levels at the eye than those permitted by law in point B50L or zone 3. This not only drastically reduces contrast vision at the moment of glare, but also results in a **significant loss of visual performance** due to the necessary dark adaptation after the immediate glare.

Respondents often mention SUVs and vans as source of glare. The fact that the study participants specifically named these cars but not trucks, is remarkable, but might be because those of trucks are mounted lower and have less luminance and bigger size. For SUVs, the angle between the view to the road and the glaring light source is smaller than for normal cars. The **high position of the headlights** can also glare into the back mirrors of the car in front in city traffic.

ADB systems are not detecting all road traffic participants, for example at crossings. Additional, a study found out, that **ADB systems react slower** to upcoming vehicles than a human driver would do, who reacts already on indirect light perception, that indicates an upcoming vehicle. That might be fatal on road crests and windings.

## Recommendations

- The regulations for the design of lights and headlamps for road traffic should take greater account of the risk of glare for road users
- Intuitive reactions such as squinting or even briefly closing the eyes, frequent blinking as well as looking directly into the dazzling light source should be considered as potential road safety risks
- Psychological glare causes distraction and reduced attention to road traffic, which should be recognised as a risk to road safety
- Physiological glare reduces visibility and the perception of objects and obstacles, and should be categorised as a significant risk to road safety
- Further studies should be carried out to investigate the causes of glare, and to determine limit values for luminance
- A new assessment is needed as to what extent the lighting technology used increases road safety through improved vision
- GRE should recommend WP.29 the establishment of a taskforce on glare (prevention)



**Good vision with low  
glare – for a high level  
of safety on the road**

