

# **Research on Standards for Automotive Lighting in Aging Society**

## **Report Commissioned by JAPAN**

April 2024

National Traffic Safety and Environment  
Laboratory

# Background

Traffic accidents often occur at night when visibility is reduced for drivers. Glare from oncoming and following vehicles' headlamps can delay the detection of pedestrians, leading to serious accidents.

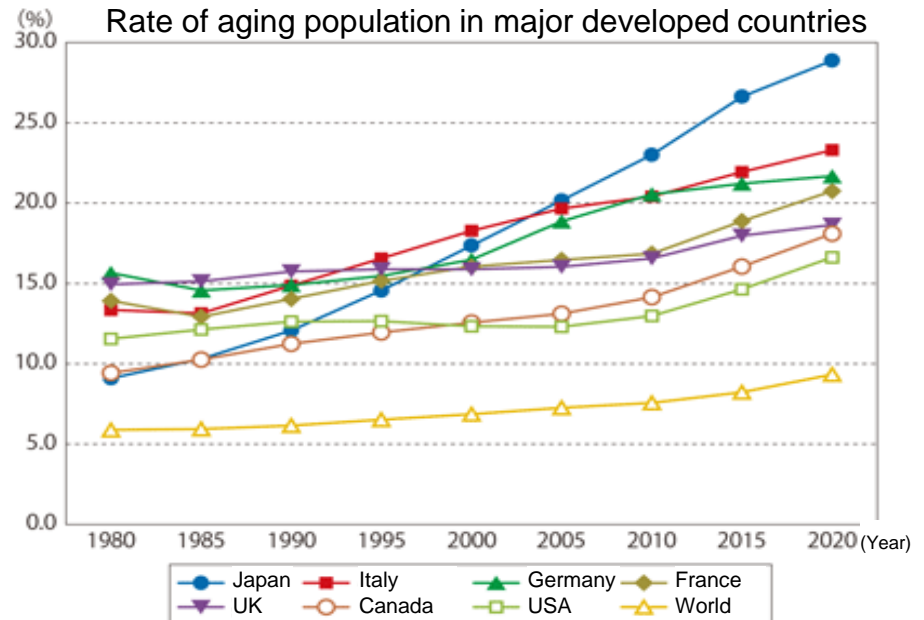


Reduced vision at night

- Reduced eyesight
- More dazzled by lights

**In particular, elderly people are more affected by glare due to the clouding of their eye lens**

**Japan, where society is most rapidly aging, is well positioned to propose technical solutions to the rest of the world**



# Objectives

UNECE/GRE has held informal meetings since 2015 to improve the visibility and anti-glare performance of headlamps.

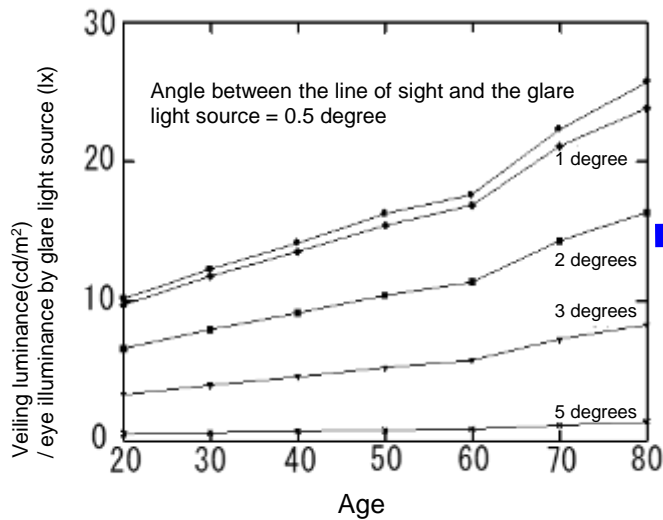
The ageing population was added as a consideration item to SLR64-01-Rev.1, but specific discussion has not yet begun.



- **Analyze how the drivers' vision changes as they age, etc.  
(Reduction of eyesight, More dazzled by lights, etc.)**
- **Study ways to improve visibility and anti-glare performance with new headlamps technologies**
- **Contribute to establishing technical regulations**

# Study on the Impact of Aging on Drivers' Sensitivity to Glare

How veiling luminance by the glare light changes as the driver ages (simulation analysis)



**Veiling luminance by glare light-source of elderly drivers is 2 to 3 times higher than younger drivers**

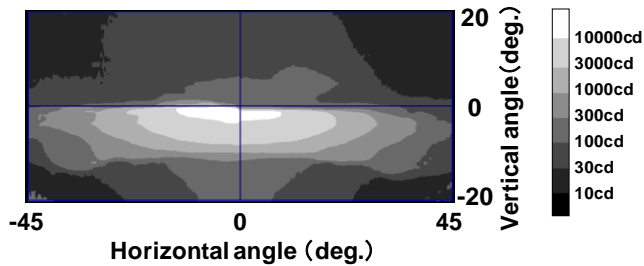


(a) Younger drivers

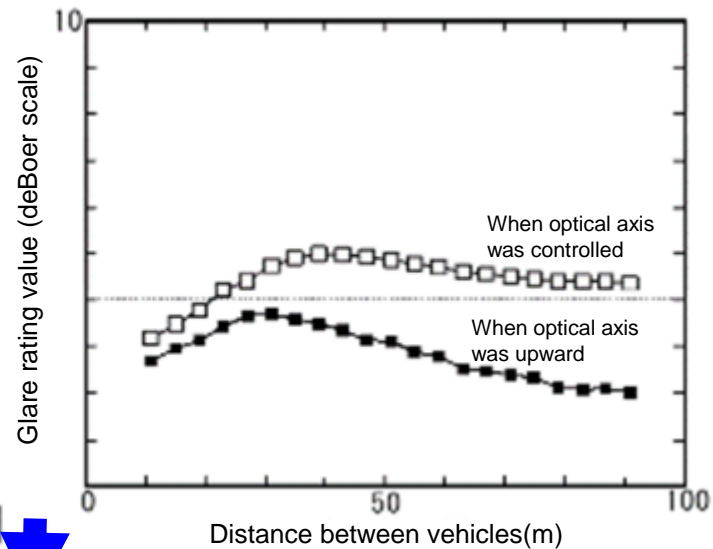
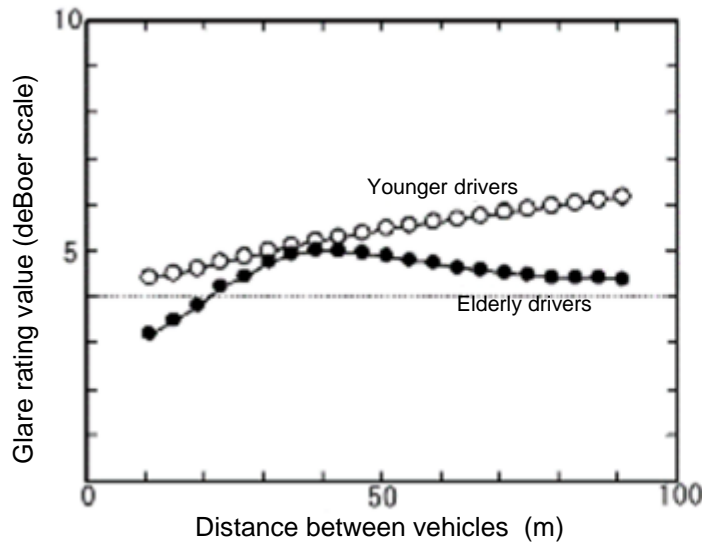


(b) Elderly drivers

# Study on the Impact of Aging on Drivers' Sensitivity to Glare



We estimated glare value due to oncoming vehicles based on averaged light distribution of 4 vehicle models.



Elderly drivers are more sensitive to glare

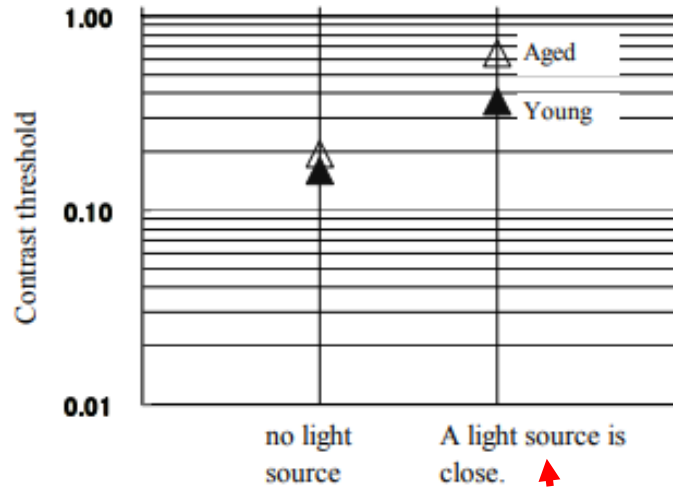
# Study on the Impact of Aging on Drivers' Sensitivity to Glare

Experiment on the visibility of pedestrians in the vicinity of a glare light source



\*Assuming a pedestrian crossing the road from the right side (60 m ahead of the vehicle)

Reduction in Pedestrian Visibility Due to Oncoming Vehicle Headlights

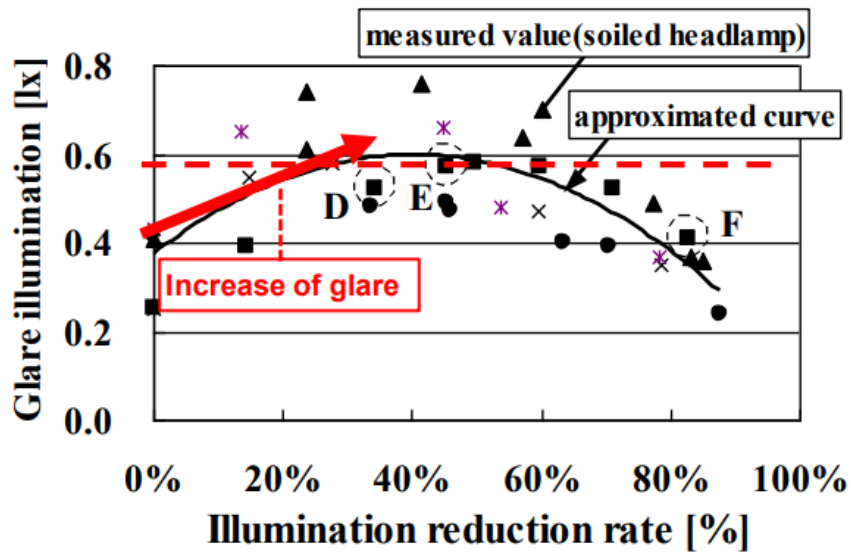


\*The eye illuminance by the light source was 0.1 lx.

Disability glare for elderly drivers is more severe than younger drivers

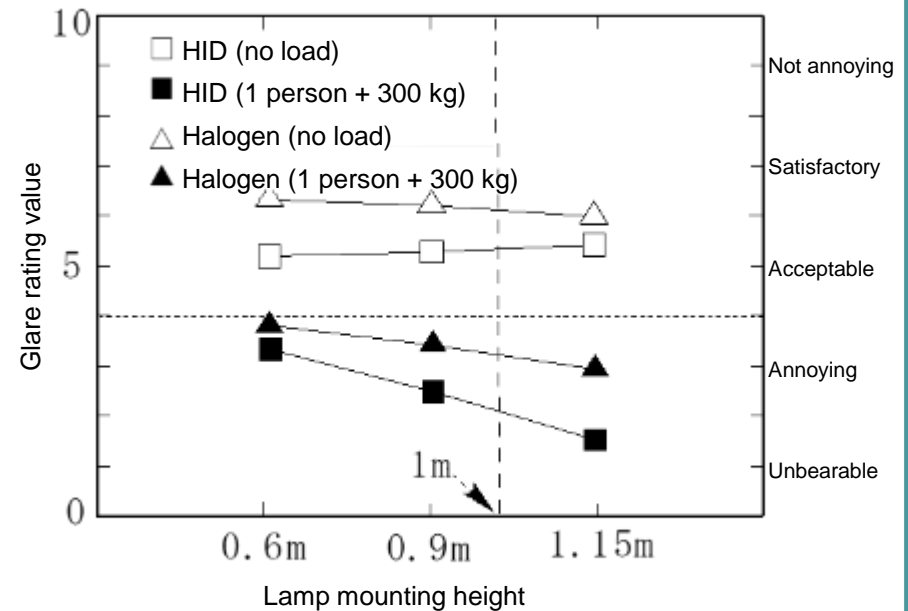
# Other Study Results on Glare Countermeasures

## Glare caused by soil on headlamps



\*Ad-hoc 02 (SLR ad-hoc meeting on “Headlamp levelling” - 2019-11-28)

## Glare caused by load

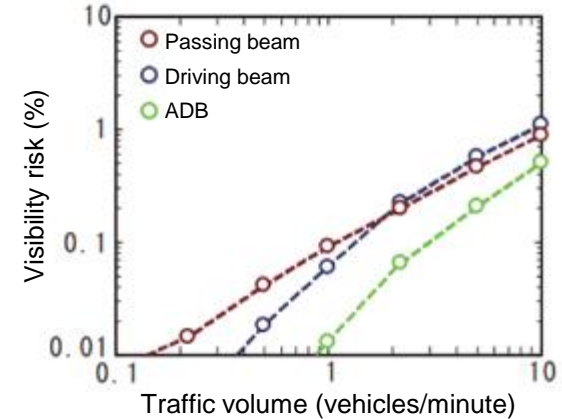


(b) 100 m from oncoming vehicle

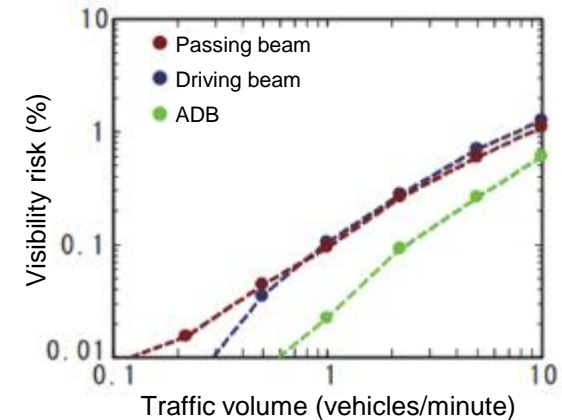
# Proposed Solutions

## What are the solutions?

- (1) Light distribution design that takes into account glare and visibility for elderly drivers.
- (2) Use of auto-leveling, ADB, headlamp cleaner and etc. Evaluate how new headlamp technologies improve visibility and anti-glare performance



(a) Younger drivers



(b) Elderly drivers

Fig. Change in pedestrian visibility risk with various headlamps