

# Updating WHO guidelines on Environmental Noise

Martin van den Berg  
Member of Guideline  
Development Group

# Timeline

- 1999 Guidelines for Community noise
- 2009 Night noise Guidelines
- 2013 Start of update
- 2018 Publication update Guidelines for Noise

# Reasons for update

- New research
- European Noise Directive 2002
- Handbook for the Development of Guidelines WHO 2012
  - WHO Guideline Review Committee
  - External review group
  - Guideline Development Group: GDG
  - GRADE\*: (explicitly) assessing quality of evidence

\*Grading of Recommendations, Assessment, Development and Evaluation

# Scope

- Included sources
  - Aircraft
  - Road traffic
  - Railway
  - Windturbines
  - Leisure
- Excluded
  - Industry
  - Neighbour

# Priority Health outcomes

Health outcome (noise indicator)	Priority Health outcome measures reviewed	Disability Weight
Cardiovascular disease ( $L_{den}$ )	Self-reported, measured, prevalence, incidence, hospital admission or mortality due to: <ul style="list-style-type: none"> <li>- ischemic heart disease (including angina pectoris and/or myocardial infarction)</li> <li>- Hypertension</li> </ul>	Disability Weight for IHD: 0.405  Disability Weight for hypertension: 0.117
Effects on sleep ( $L_{night}$ )	- % highly sleep disturbed, self-reported, assessed with a standardized scale	Disability Weight for % highly sleep disturbed: 0.07
Annoyance ( $L_{den}$ )	- % highly annoyed, preferably assessed with standardized scale	Disability Weight for % highly annoyed: 0.02
Cognitive impairment ( $L_{den}$ )	- Reading and oral comprehension, assessed by tests	Disability Weight for impaired reading and oral comprehension: 0.006
Hearing impairment and tinnitus ( $L_{Aeq, 24hr}$ )	- Permanent hearing impairment, measured by audiometry	Disability Weight for mild severity level (threshold at 25 dB) for childhood onset: 0.0150

# Review reports

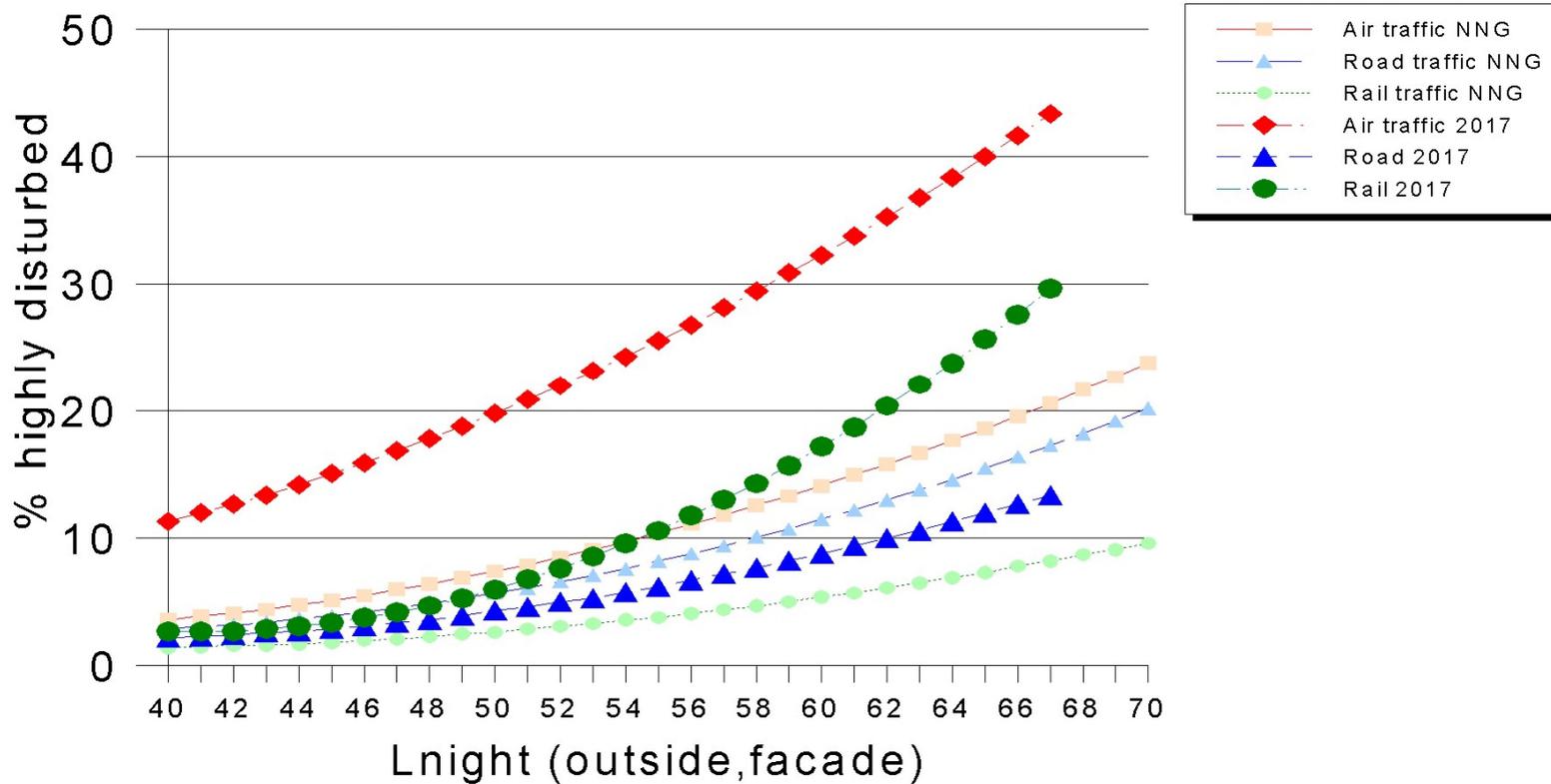
	Nr pages	Nr ref's
Environmental Noise and Adverse Birth Outcomes*	16	35
Environmental Noise and Permanent Hearing Loss and Tinnitus*	55	221
Transport Noise Interventions and their Impacts on Health*	71	127
Systematic review on cognition	110	47
Systematic review on effects on sleep	61	147
Noise Annoyance	153	66
Cardiovascular and metabolic effects of environmental noise	257	564
	723	1207

\* Already published in special issue of the International Journal of Environmental Research and Public Health

[http://www.mdpi.com/journal/ijerph/special\\_issues/WHO\\_reviews](http://www.mdpi.com/journal/ijerph/special_issues/WHO_reviews)

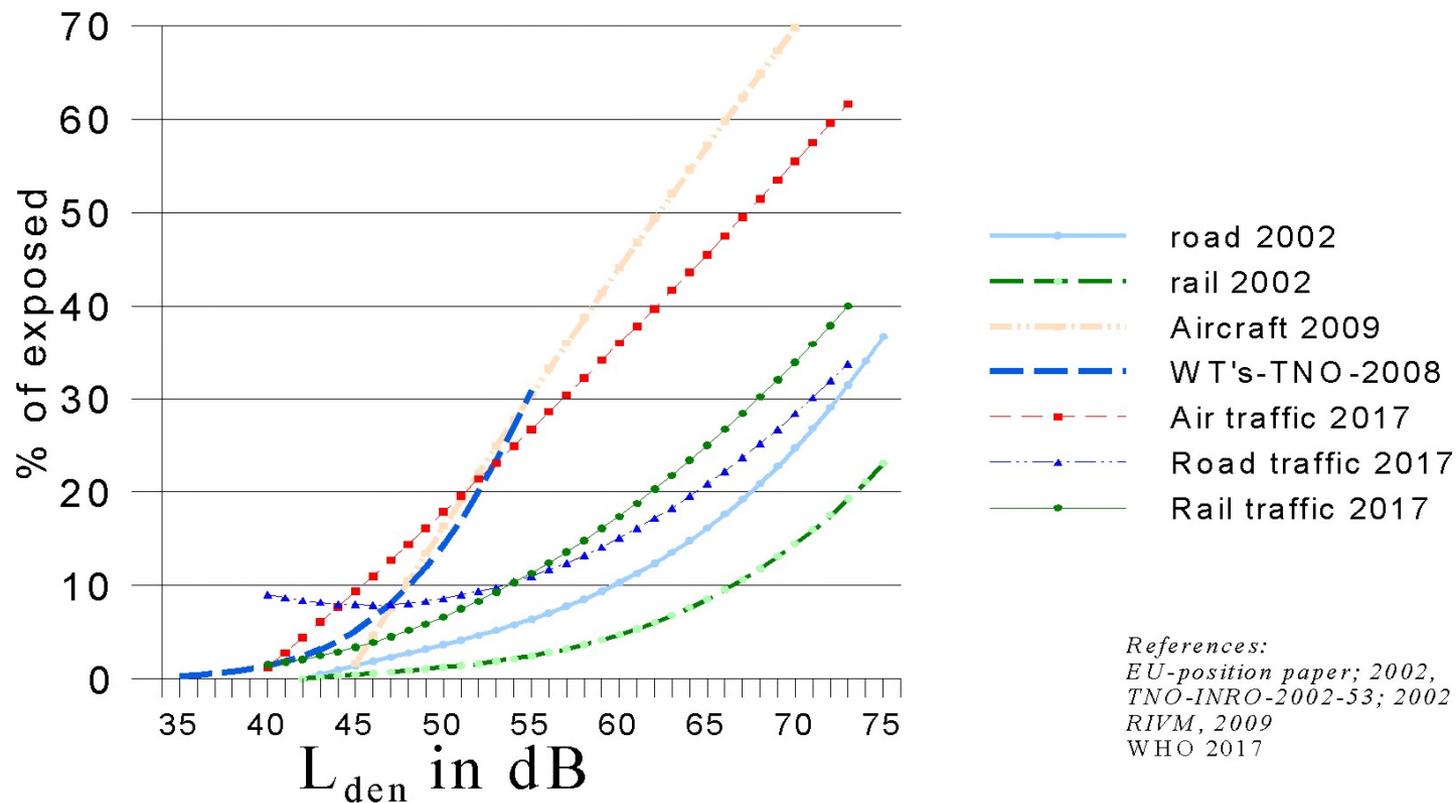
# Exposure Response Functions

## Highly disturbed by noise at night



# ERF Annoyance

## Highly annoyed by noise



# ERF IHD

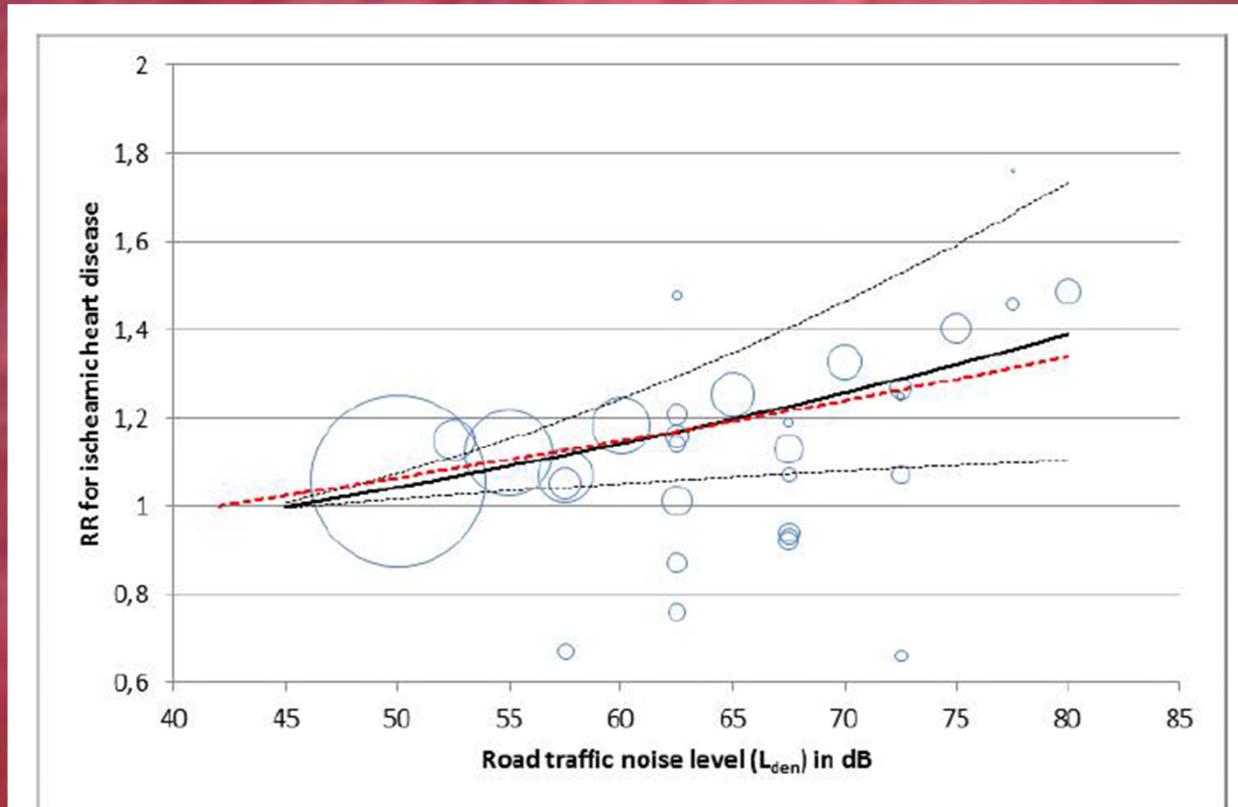


Figure 12.5 Pooled dose-response association between road traffic noise exposure (L<sub>DEN</sub>) and RR of ischaemic heart disease (IHD) (P for non-linearity = 0.85). Road traffic noise was modelled with restricted cubic

Road traffic	RR=1.08 (95%CI 1.02-1.15)/10dB	High quality
Railway	RR = 1.18 (95%CI 0.82-1.68) /10 dB	Very low quality
Air traffic	RR=1.05 (95%CI 0.95-1.17) /10 dB	Low quality

**Table 19.** Summary of evidence from the individual studies on the effect of the intervention on health outcomes.

	Number of Papers	Evidence <sup>1</sup> That Health Outcome Changed			Observed Magnitude of Change in Health Outcome		
		YES	NO	n.a.	Magnitude <i>at Least</i> as Predicted by ERF	Excess <sup>2</sup> Response	n.a. <sup>3</sup>
<b>ROAD TRAFFIC NOISE SOURCES (33)</b>							
Outcome: Annoyance (23)							
A Source Intervention	9	*****		**	*****	*****	**
B Path Intervention	6	*****			****	** ?	**
C New/Closed Infrastructure	2	**			**	**	
D Other physical	6	*****					
Outcome: Sleep Disturbance (6)							
A Source Intervention	1			*			*
B Path Intervention	2	**					**
C New/Closed Infrastructure	2	**					**
D Other physical	1	*					
Outcome: Cardiovascular Effects (4)							
D Other physical	4	***	*				
<b>AIRCRAFT NOISE SOURCES (7)</b>							
Outcome: Annoyance (4)							
B Path Intervention	1	*					*
C New/Closed Infrastructure	3	***			***	***	
Outcome: Sleep Disturbance (2)							
C New/Closed Infrastructure	2	**			*		*
Outcome: Cognitive Development in Children (1)							
C New/Closed Infrastructure	1	*					*
<b>RAIL NOISE SOURCES (3)</b>							
Outcome: Annoyance (3)							
A Source Intervention	1	*					*
C New/Closed Infrastructure	1			*			*
E Education/Communication	1	*					

\* Statistical significance of finding reported in the original study. \* Finding interpreted by original, or current, authors based on data/tables/plots in original study. <sup>1</sup> Note that the evidence is indirect for Interventions Type D (Other Physical). <sup>2</sup> Excess response occurs where the total difference between the observed before and after outcomes is greater than the magnitude of the change in response estimated from an ERF, for a given change in exposure. <sup>3</sup> n.a. = not applicable/not available: no change in exposure or not reported. ? = unclear finding.

# Next steps

- After the review of the effect reports it is up to the GDG to formulate limits. According to the Handbook they may be:
- Strong recommendations
  - the guideline communicates the message that the desirable effects of adherence to the recommendation outweigh the undesirable effects.

# Next steps

- Conditional recommendations
  - When the quality of evidence is low or very low so it is unclear if potential benefits outweigh potential harms
- *Research recommendations*
  - When there is a lack of evidence, or the available evidence is insufficient, research recommendations should be specified, and prioritized if appropriate.

# Final steps

- Recommendations to be discussed with stakeholders
- Guidelines submitted to WHO Guideline Review Committee
- Approval
- Publication & dissemination