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UK Health
Security
Agency

Heathrow Noise and Airspace Community Forum

Deep Dive: Health evidence and policy

24 September 2025

Benjamin Fenech PhD
Noise & Public Health Programme Lead

Health evidence

Effect	Specific outcomes	Key metric used	Current strength of the evidence
Cardiovascular	Hypertension Coronary Heart Disease (CHD) Acute Myocardial Infarction (AMI) Stroke	L_{den} , L_{eq16hr} and L_{eq24hr}	Sufficient
Self-reported sleep disturbance	Interference with falling asleep Awakening/ interference with staying asleep	L_{night} and L_{max}	Sufficient
Objective sleep disturbance	Awakening	L_{night} and L_{max}	Sufficient
Cognitive development	Reading Standardised test scores	L_{eq} , L_{den} and, for a few studies, L_{max}	Sufficient
Annoyance	Bothered, disturbed or annoyed by noise at home	L_{eq24hr} , L_{den} and L_{dn}	Sufficient
Hearing impairment	Loss in hearing	L_{eq8hr} (individual exposure)	None at <75 dB(A)
Mental health, wellbeing and quality of life	Wellbeing Quality of life Psychological symptoms Psychological illnesses e.g. depression, anxiety Medication for psychological illnesses	L_{eq8hr} (individual exposure) L_{eq16hr} and L_{eq8hr}	Sufficient

Table 4.1 Strength of evidence for health and quality of life effects from environmental noise

<https://www.heathrow.com/company/local-community/noise/making-heathrow-quieter/noise-action-plan>

Health evidence

Why do we research noise and health?

- ✓ to understand how noise affects health
- ✓ to understand which aspects of health are affected
- ✓ to understand the quantitative relationship between noise exposure and health risk
- ✓ to quantify the health effects at a population level
- ✓ to understand which interventions are effective at reducing adverse effects
- ✓ to support the economic case for action
- ✓ to prioritise the right interventions for the right population subgroups



Recap (NACF SEP 2024)



- There are **multiple pathways** through which aviation noise affects long-term physical and mental health
- Current evidence suggests that **efforts to reduce both noise exposure and annoyance** are warranted
- Emerging evidence suggests that **certain individuals are at higher risk of adverse effects**
- Still many unknowns – a case for **monitoring & evaluation**
- The health evidence **doesn't give us all the answers**

ANNOYANCE

Annoyance

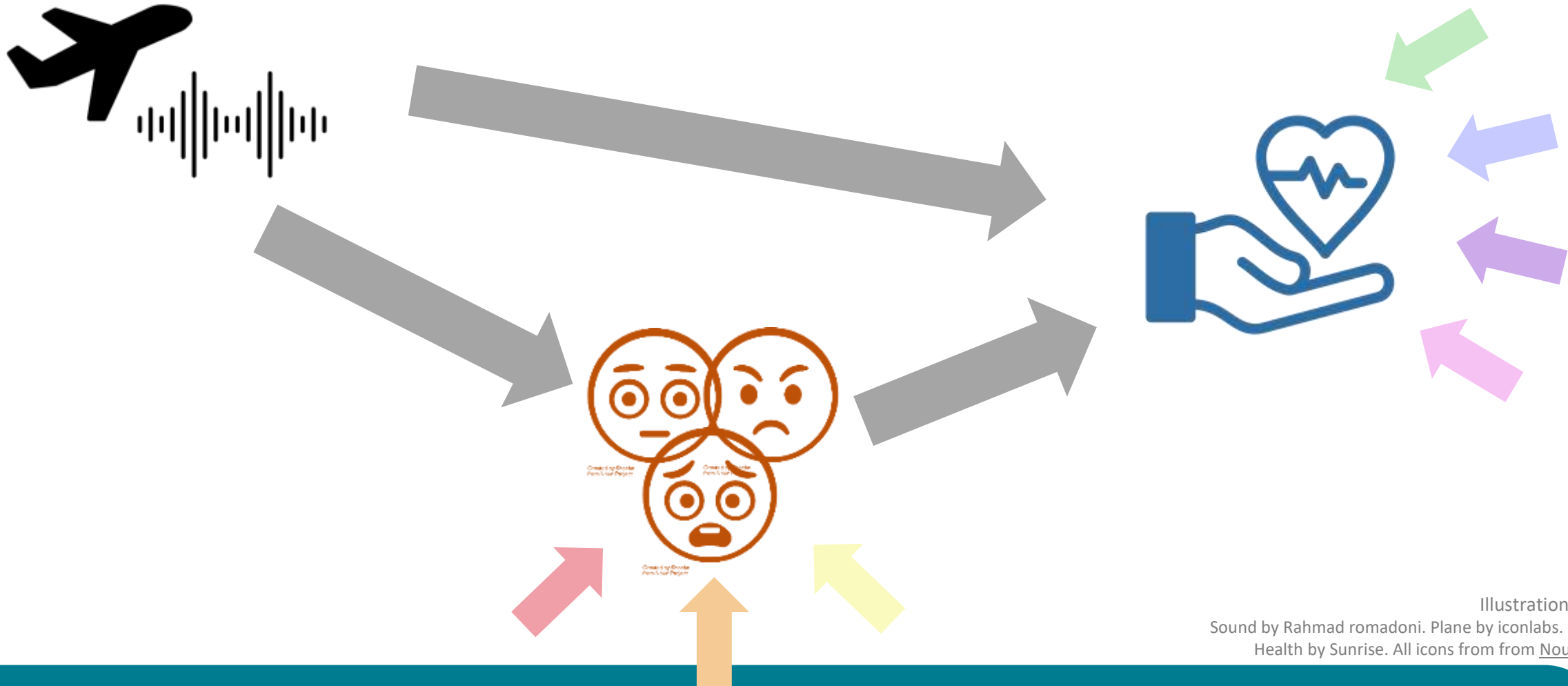
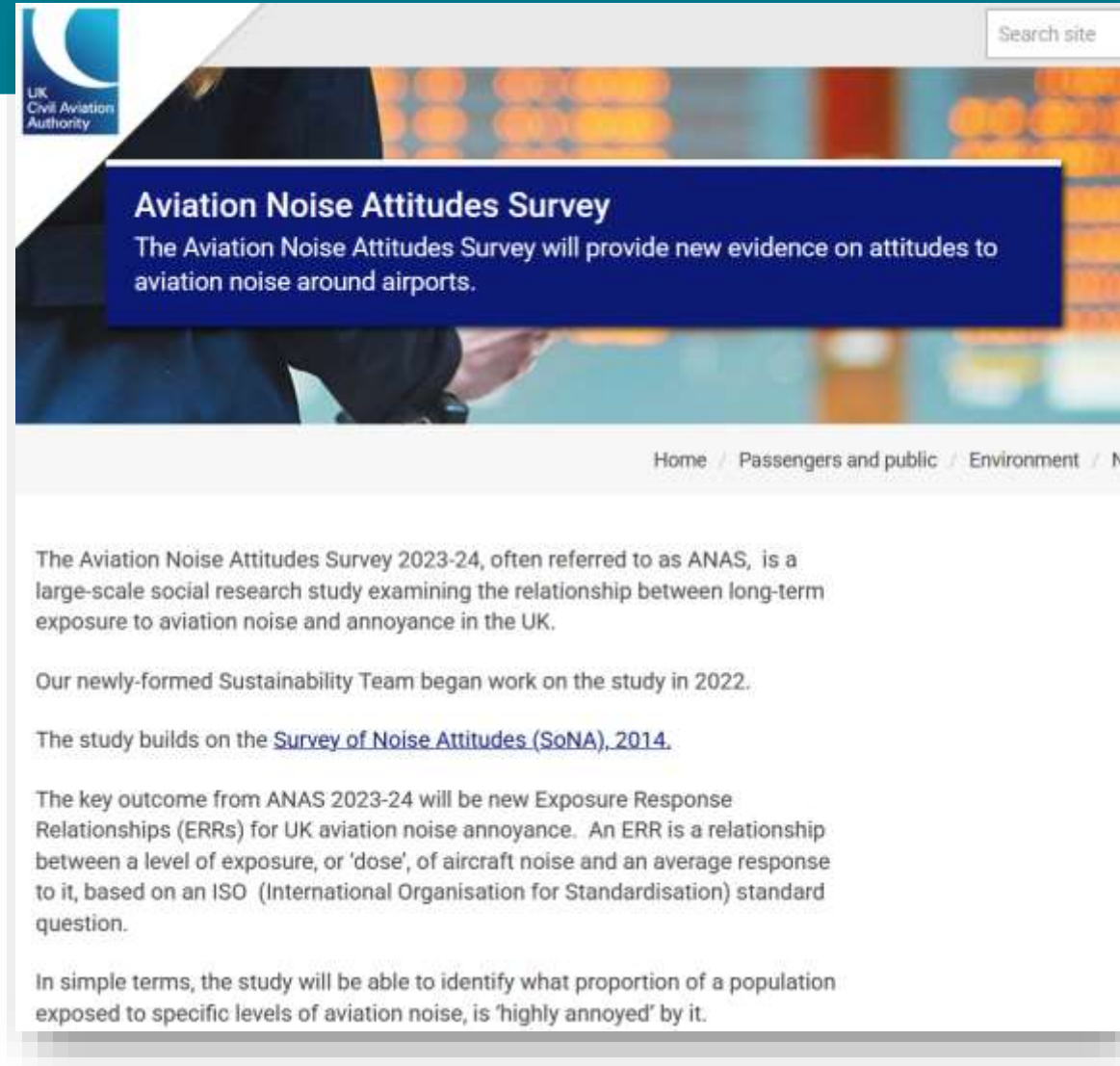


Illustration by B. Fenech 2025
Sound by Rahmad romadoni. Plane by iconlabs. Emotions by Shocho.
Health by Sunrise. All icons from from [Noun Project](#) (CC BY 3.0)

Annoyance



The screenshot shows the UK Civil Aviation Authority website. At the top left is the CAA logo. At the top right is a search bar labeled "Search site". The main header features a blue banner with the text "Aviation Noise Attitudes Survey" and "The Aviation Noise Attitudes Survey will provide new evidence on attitudes to aviation noise around airports." Below the banner is a breadcrumb trail: "Home / Passengers and public / Environment / N". The main content area contains the following text:

The Aviation Noise Attitudes Survey 2023-24, often referred to as ANAS, is a large-scale social research study examining the relationship between long-term exposure to aviation noise and annoyance in the UK.

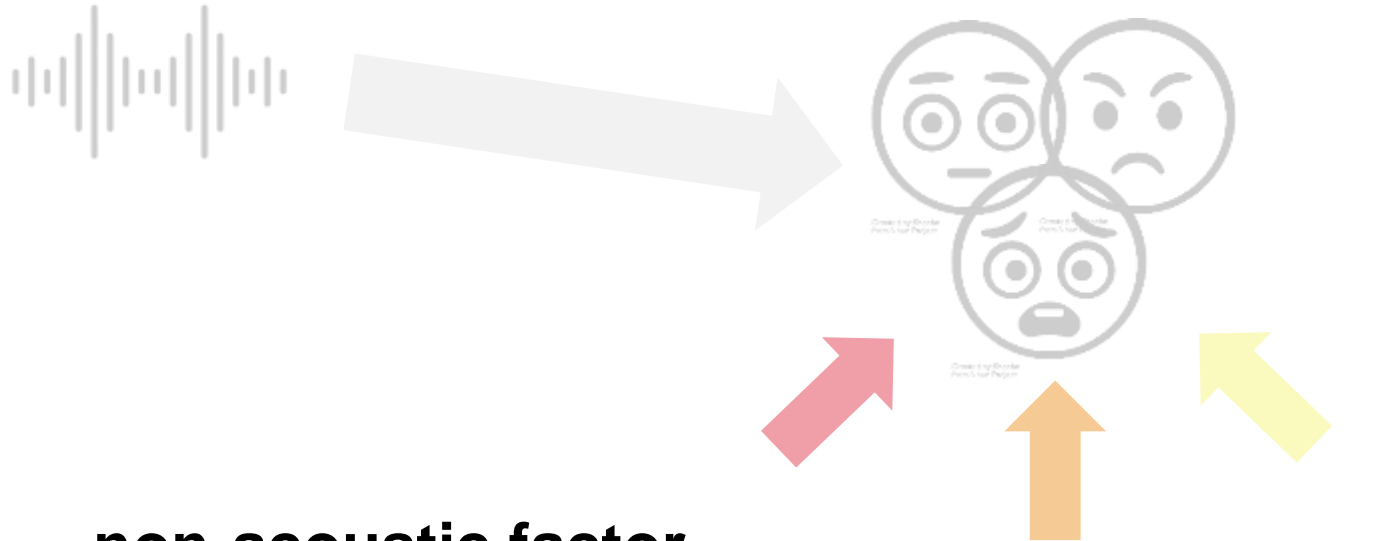
Our newly-formed Sustainability Team began work on the study in 2022.

The study builds on the [Survey of Noise Attitudes \(SoNA\), 2014](#).

The key outcome from ANAS 2023-24 will be new Exposure Response Relationships (ERRs) for UK aviation noise annoyance. An ERR is a relationship between a level of exposure, or 'dose', of aircraft noise and an average response to it, based on an ISO (International Organisation for Standardisation) standard question.

In simple terms, the study will be able to identify what proportion of a population exposed to specific levels of aviation noise, is 'highly annoyed' by it.

Non-acoustic factors



non-acoustic factor

specific factor, other than the objective, measured and/or modelled acoustic parameters, which influences the process of perceiving, experiencing, understanding and/or responding to an acoustic environment

benjamin.benach@bbsa.gov.uk - 2025-05-13
PD ISO/TS 16755-1:2025



BSI Standards Publication

Acoustics — Non-acoustic factors influencing the perception, interpretation and response to environmental sounds

Part 1: Definition and conceptual framework

bsi.

Non-acoustic factors

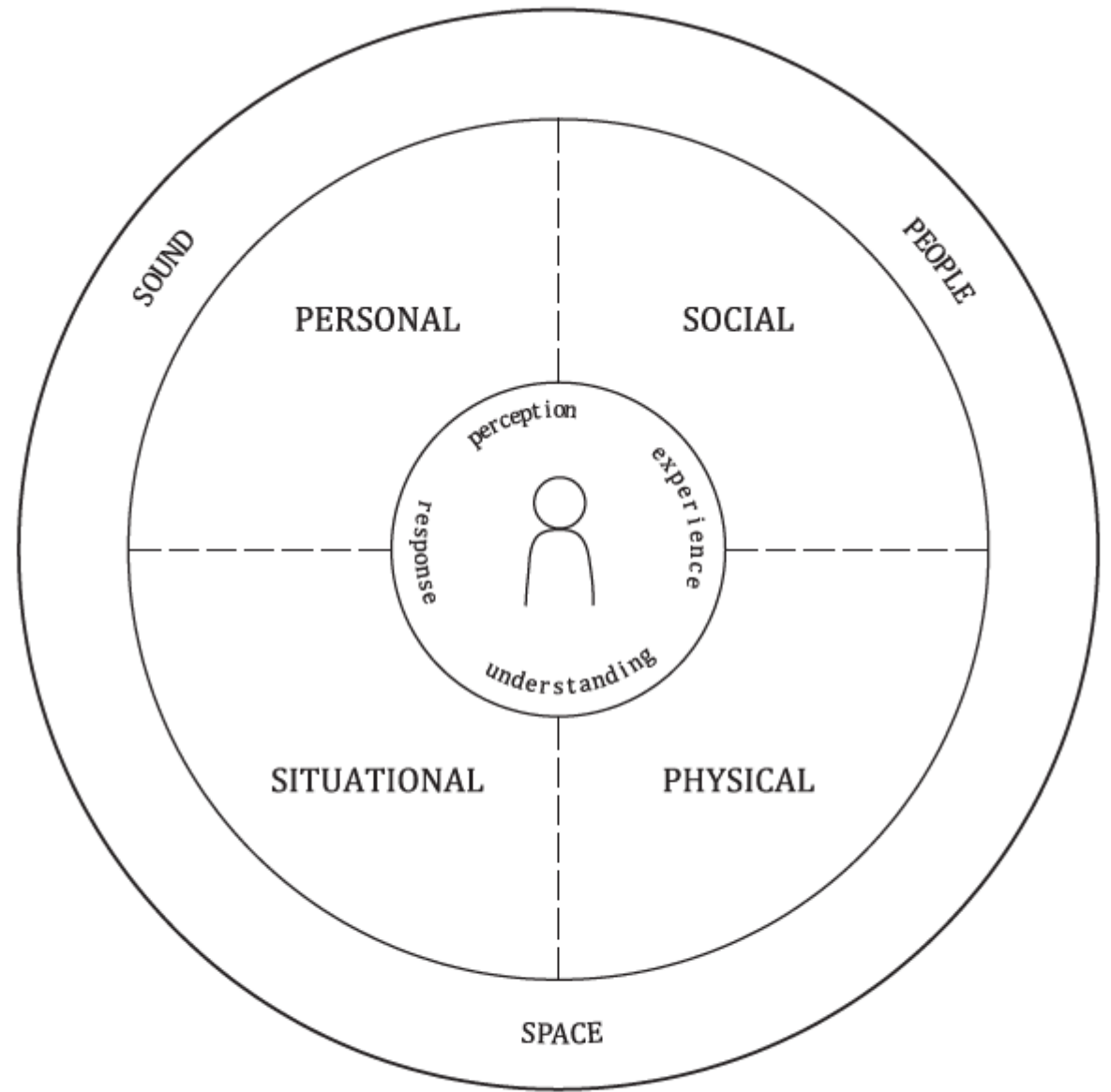


Figure 1 — Conceptual framework to show the four non-acoustic factor categories and their influence on how an individual perceives, experiences, understands and/or responds to an acoustic environment within a broader context (adapted from Reference [24] using some concepts from ISO 12913-1[11])

An example of the use of non-acoustic factors

<https://andersonacoustics.co.uk/resource-type/aviation/>



EXPLORING THE CONCEPT OF FAIR AND EQUITABLE DISTRIBUTION TO MINIMISE SOCIAL UNACCEPTABILITY OF AIRSPACE DESIGN OPTIONS – FINAL REPORT

PREPARED FOR GATWICK AIRPORT LTD

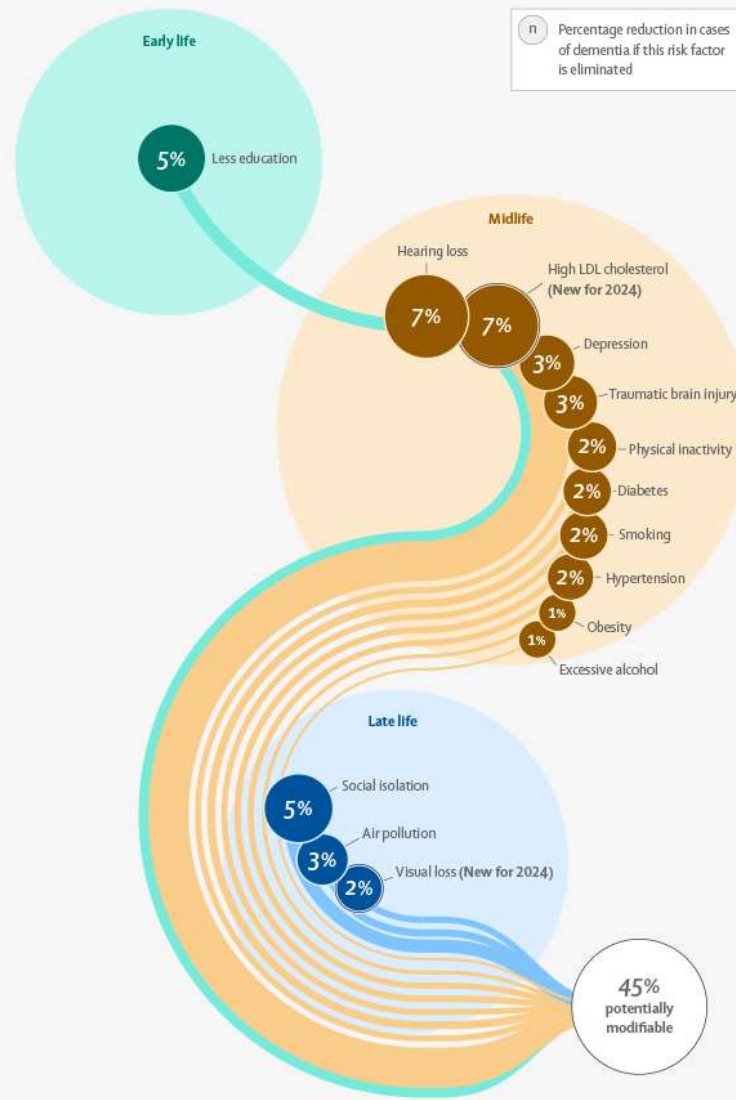
AUGUST 2024

CARDIOVASCULAR DISEASE

Understanding risk factors

Risk factors for dementia — 2024 update

The 2024 update to the standing Lancet Commission on dementia prevention, intervention, and care adds two new risk factors (high LDL cholesterol and vision loss) and indicates that nearly half of all dementia cases worldwide could be prevented or delayed by addressing 14 modifiable risk factors.

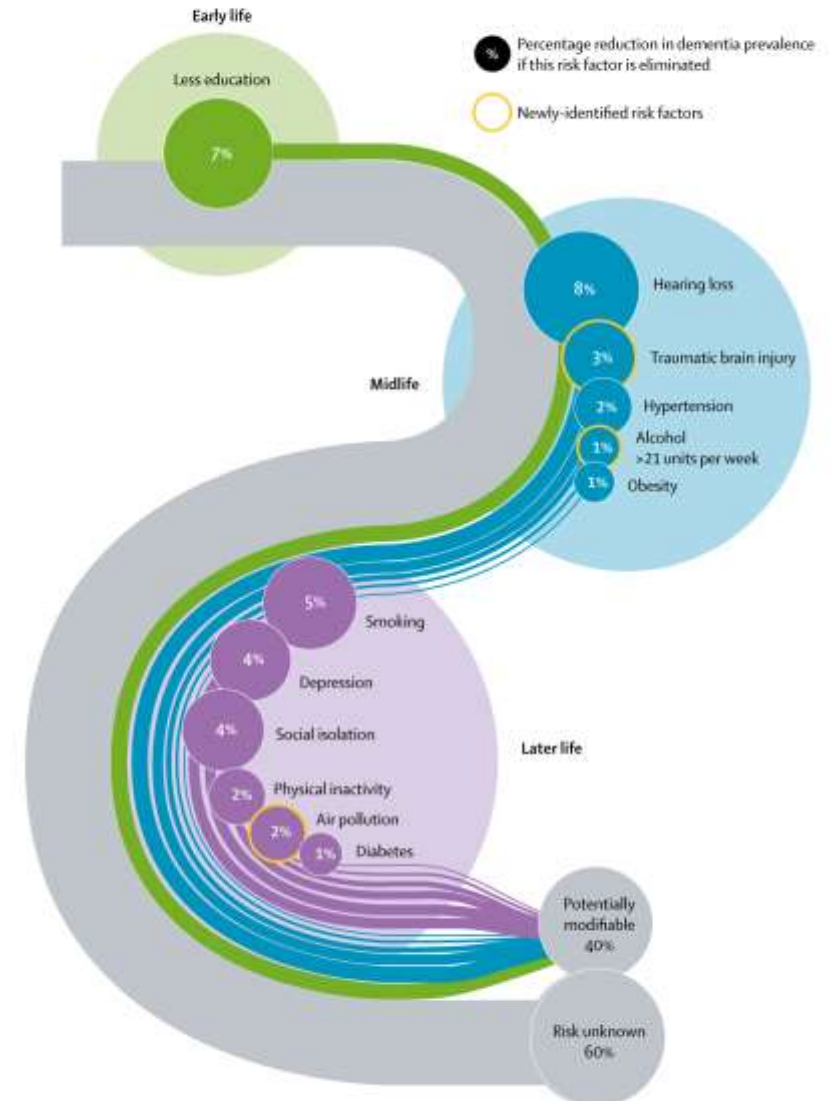


Read the full commission update at [thelancet.com/commissions/dementia-prevention-intervention-care](https://www.thelancet.com/commissions/dementia-prevention-intervention-care)

Livingston G, Huntley J, Liu KY, et al. Dementia prevention, intervention, and care: 2024 report of the Lancet standing Commission. *The Lancet* 2024; published online July 31. [https://doi.org/10.1016/S0140-6736\(24\)01296-0](https://doi.org/10.1016/S0140-6736(24)01296-0).

Risk factors for dementia

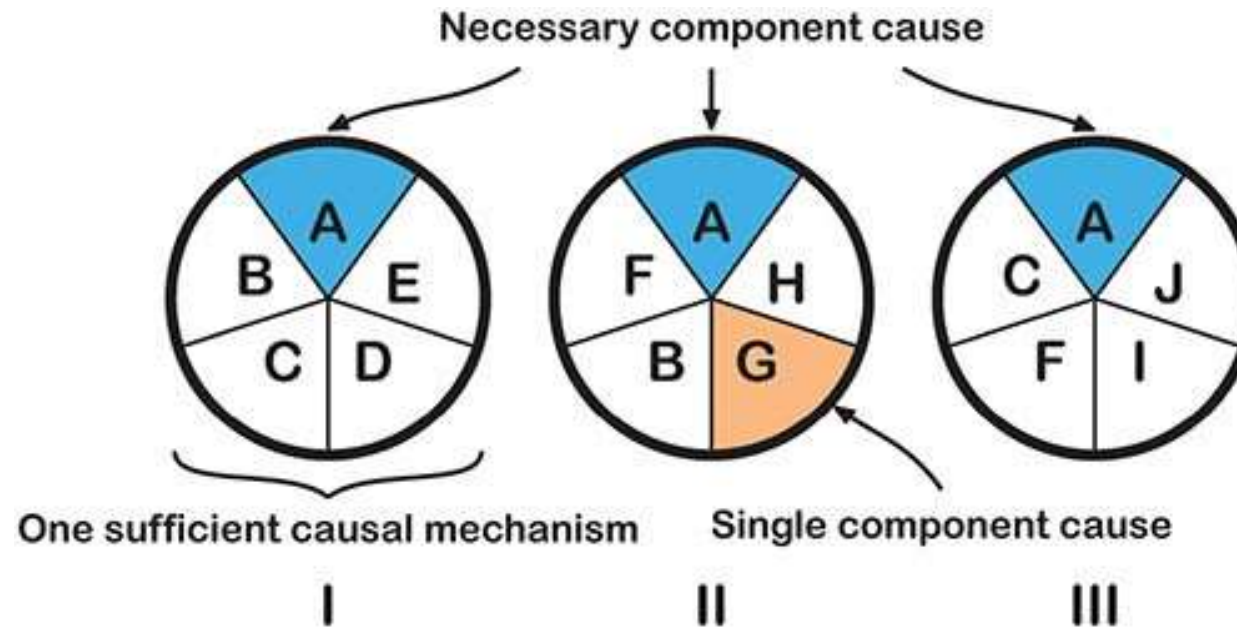
An update to the Lancet Commission on Dementia prevention, intervention, and care presents a life-course model showing that 12 potentially modifiable risk factors account for around 40% of worldwide dementias



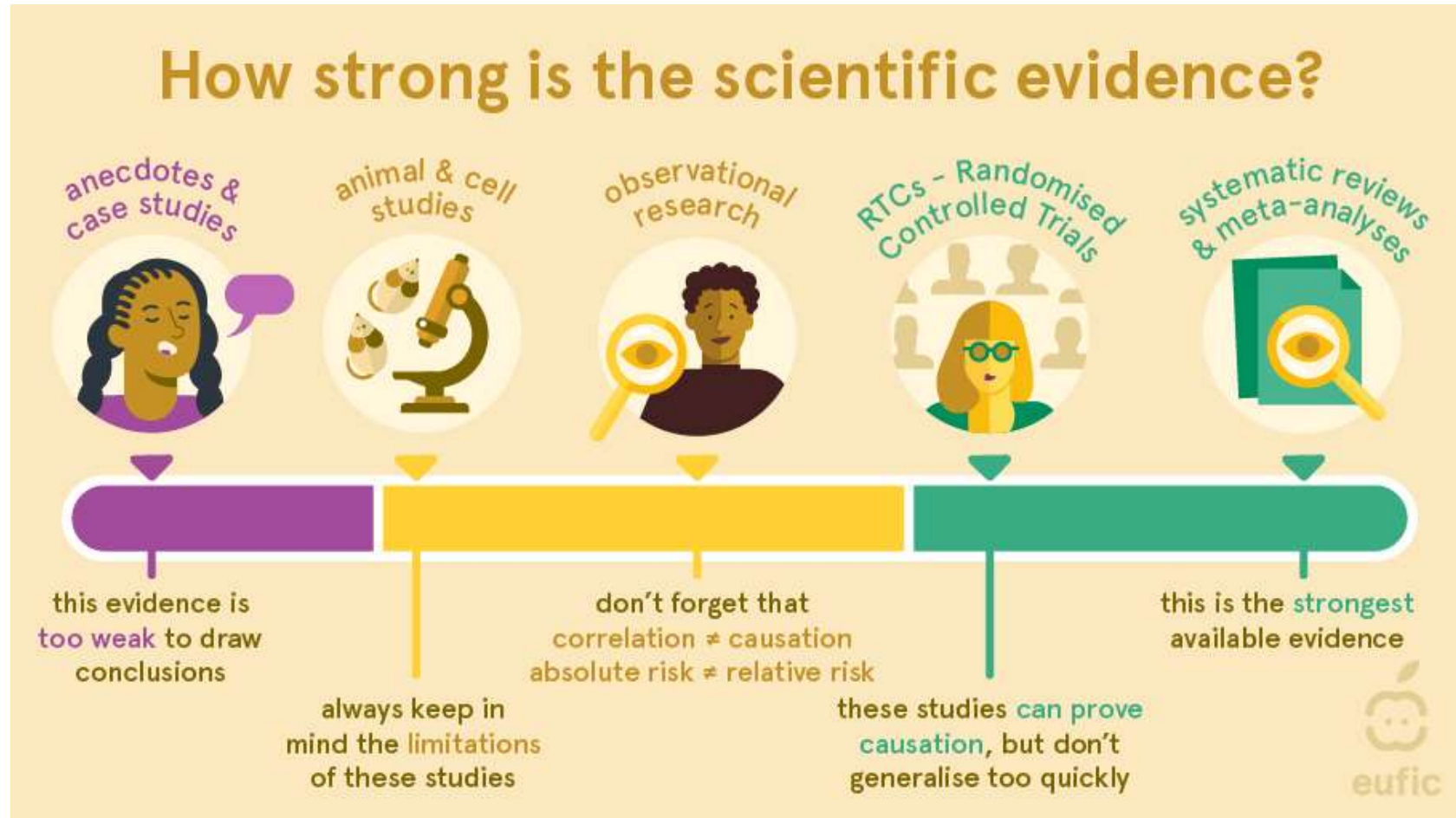
Livingston G, Huntley J, Sommerlad A, et al. Dementia prevention, intervention, and care: 2020 report of the Lancet Commission. *The Lancet* 2020.

<https://www.thelancet.com/infographics-do/dementia-risk>

Figure 3.1 Three sufficient causes of a disease.



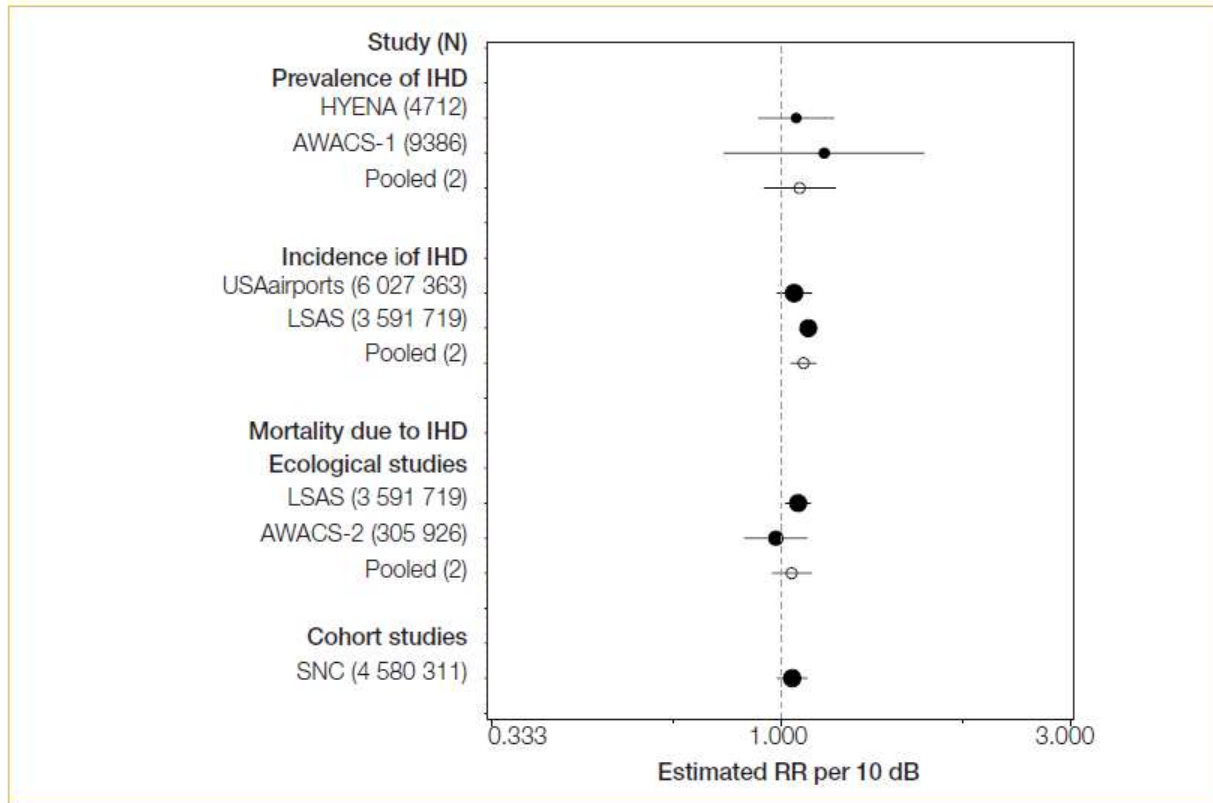
Types of evidence



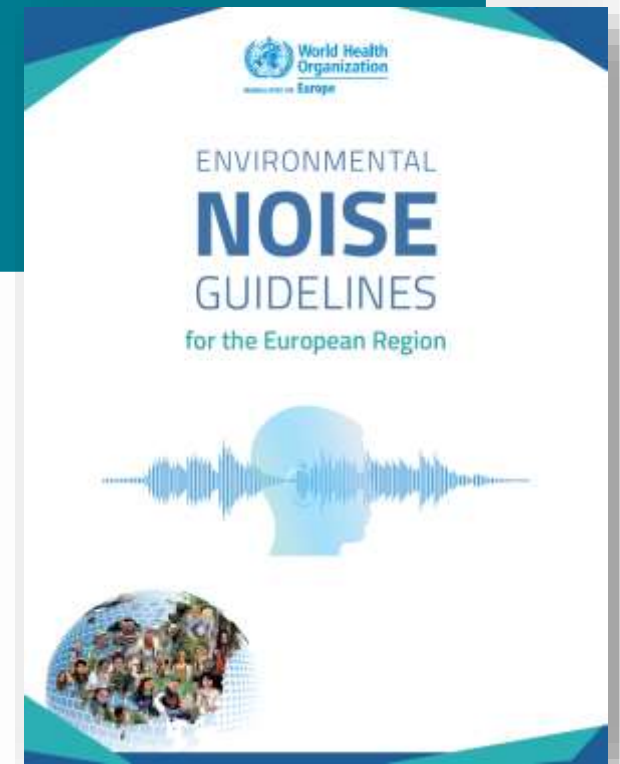
<https://www.eufic.org/en/understanding-science/article/the-levels-of-evidence-in-nutrition-research>

Cardiovascular

Fig. 10. The association between exposure to aircraft noise (L_{den}) and IHD





Notes: The dotted vertical line corresponds to no effect of exposure to aircraft noise. The black circles correspond to the estimated RR per 10 dB and 95% CI. The white circles represent the pooled random effect estimates and 95% CI. For further details on the studies included in the figure please refer to the systematic review on environmental noise and cardiovascular and metabolic effects (van Kempen et al., 2018).





Review article

Revisiting the association between transportation noise and heart disease reported in the World Health Organization Environmental Noise Guidelines for the European Region: a systematic review and *meta*-analysis

Michaela Minkin^{a,b,1}, Lisa Woodland^{a,b,1} , Owen A. Williams^{a,b}, Sophie Hamilton^{b,c}, Anna L. Hansell^{b,d,e}, Danielle Vienneau^{f,g}, Xiangpu Gong^{b,d,e}, Benjamin Fenech^{a,b,*} 

^a Environmental Hazards and Emergencies, Radiation, Chemical, Climate and Environmental Hazards, UK Health Security Agency (UKHSA), 10 South Colonnade, London E14 5EA, UK

^b The National Institute of Health Research (NIHR) Health Protection Research Unit (HPRU) in Chemical Threats and Hazards at the University of Leicester, Leicester, UK

^c Chemical and Environmental Effects, UK Health Security Agency (UKHSA), 10 South Colonnade, London E14 5EA, UK

^d Centre for Environmental Health and Sustainability, University of Leicester, Leicester, UK

^e National Institute for Health Research, Leicester Biomedical Research Centre (BRC), Leicester General Hospital, Leicester, UK

^f Swiss Tropical and Public Health Institute, Department of Epidemiology and Public Health, Kreuzstrasse 2, Allschwil CH-4123, Switzerland

^g University of Basel, Basel, Switzerland

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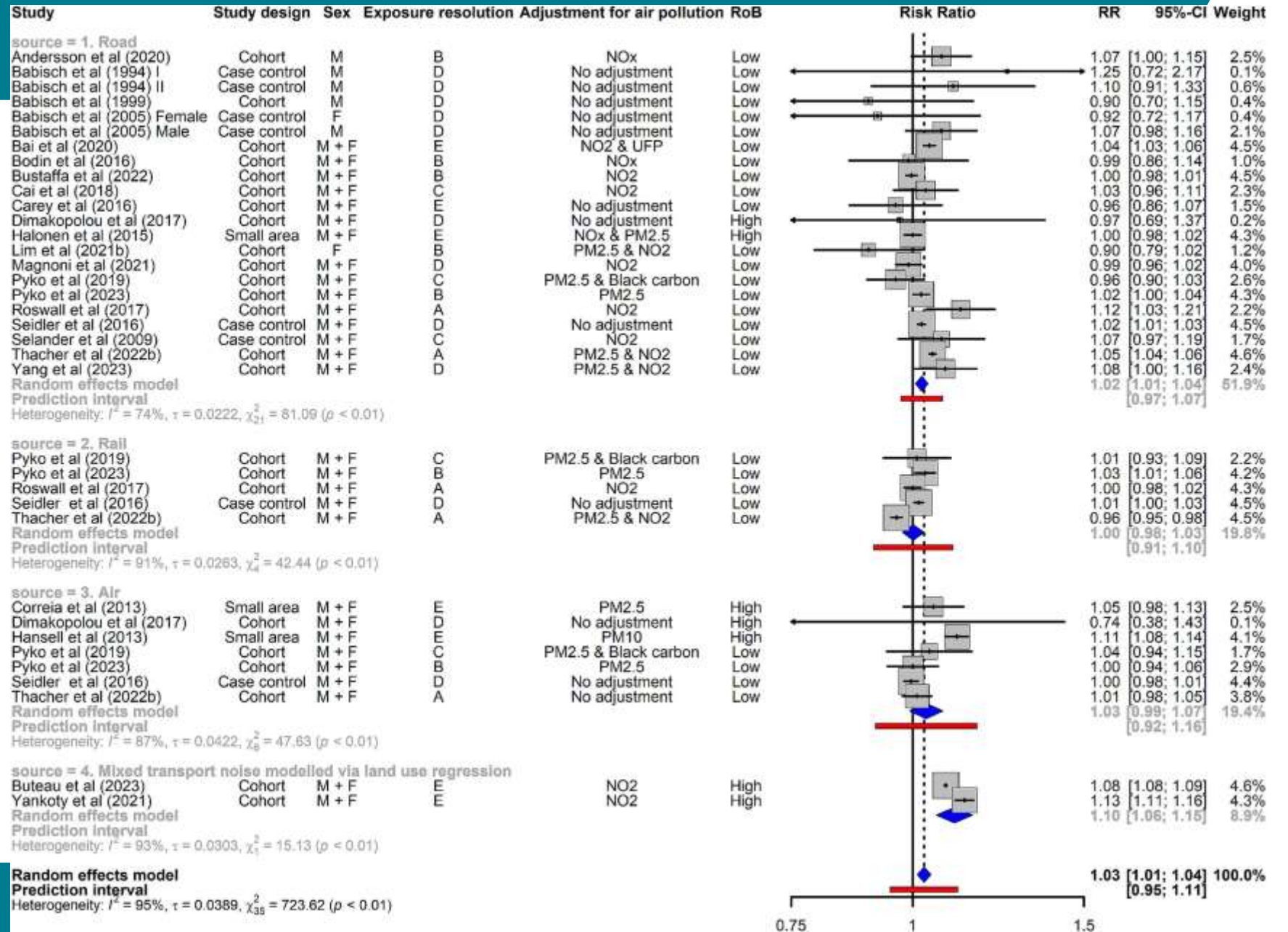
ABSTRACT

Background: Whilst the link between long-term exposure to transportation noise and cardiovascular disease has been discussed for several decades, there are still uncertainties in the exact quantitative relationship between the two. A systematic review and *meta*-analysis that informed recommendations in the World Health Organization Environmental Noise Guidelines for the European Region included studies published up to 2015. Since then, there has been a rapid increase in publications from epidemiological studies exploring the risk over a larger noise exposure range, and with more precise exposure assignment. Given the influential nature of the WHO Guidelines, we investigated whether the inclusion of studies published up to December 2023 changes the quantitative relationship.

Methods: We carried out a systematic review and *meta*-analysis on the association between transportation noise (road, rail, and air) and heart disease, specifically ischaemic heart disease (ICD-10 I20-25), and stroke (ICD-10 I60-69).

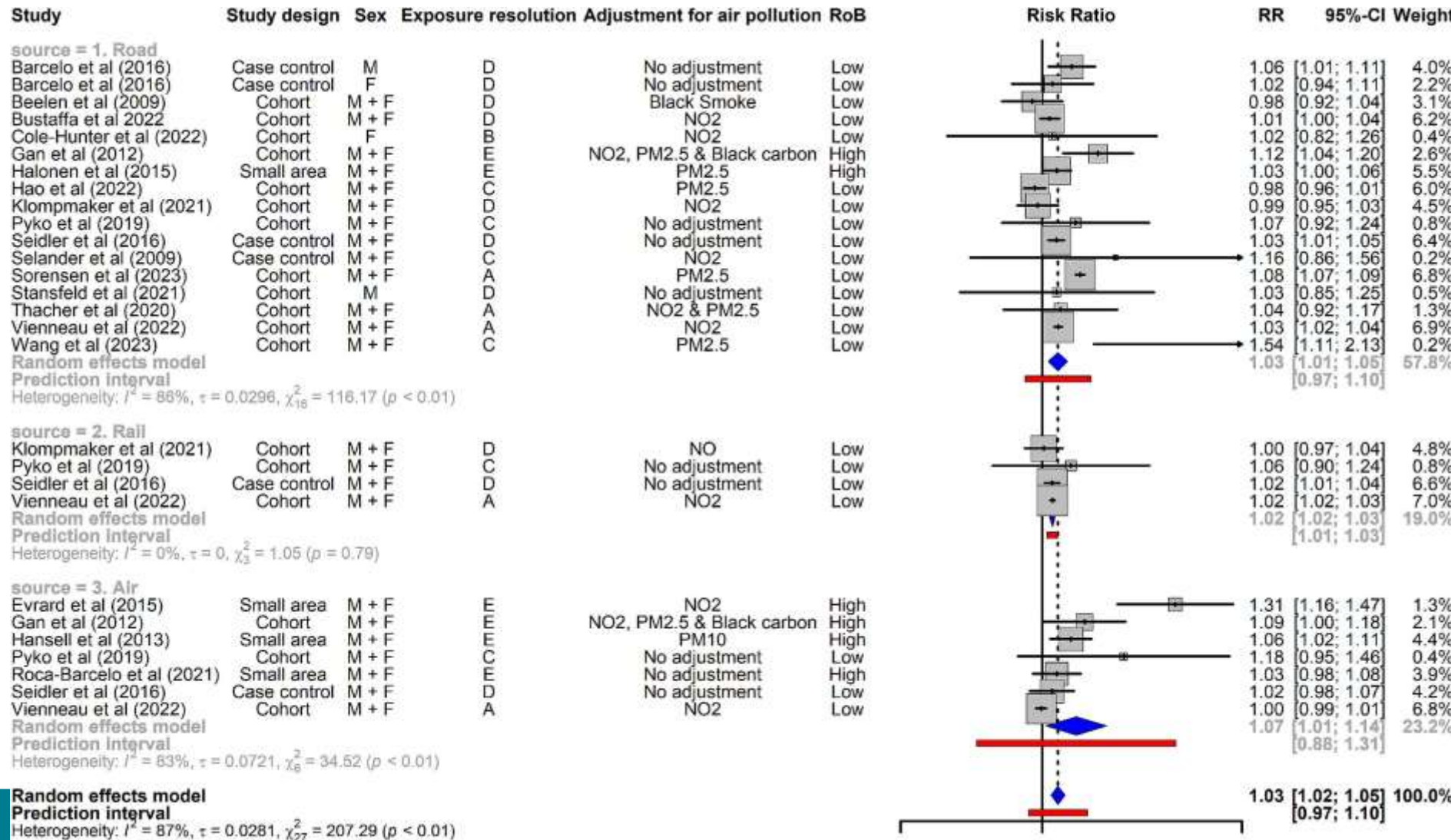
<https://doi.org/10.1016/j.envint.2025.109667>

Incidence



<https://doi.org/10.1016/j.envint.2025.109667>

Mortality



<https://doi.org/10.1016/j.envint.2025.109667>

Quality of evidence

Table 3

A summary of all pooled estimates by transportation type and outcome. Relative risk (RR) is presented per 10 dB increase in L_{den} .

Noise source (k)	RR (95 % CIs)	Exposure starting point (L_{den})	GRADE rating
Incidence			
Road (22)	1.02 (1.01–1.04)	42	3 – moderate
Rail (5)	1.00 (0.98–1.03)	42	3 – moderate
Aircraft (7)	1.03 (0.99–1.07)	45	2 – low
Mixed transport (2)	Insufficient number of studies*		
Mortality			
Road (17)	1.03 (1.01–1.05)	41	4 – high
Rail (4)	1.02 (1.02–1.03)	32	4 – high
Aircraft (7)	1.07 (1.01–1.14)	42	1 – very low
Prevalence			
Road (3)	1.09 (0.95–1.26)	49	1 – very low
Rail (1)	Insufficient number of studies*		
Aircraft (1)	Insufficient number of studies*		

* Results have not been shown as less than three studies were available.

<https://doi.org/10.1016/j.envint.2025.109667>

Strength of evidence

- Sufficient** evidence of a harmful effect
- Limited** evidence of a harmful effect
- Inadequate** evidence of a harmful effect
- Evidence of lack of a harmful effect

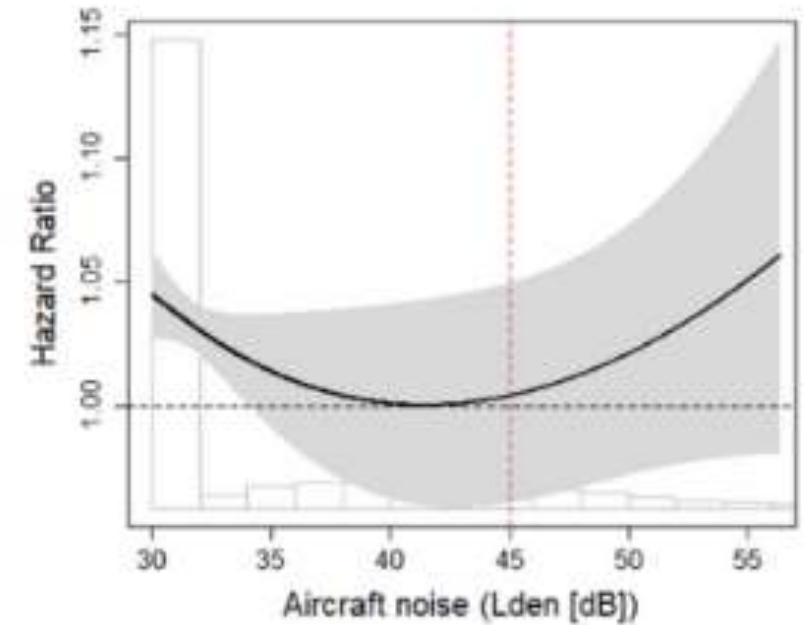
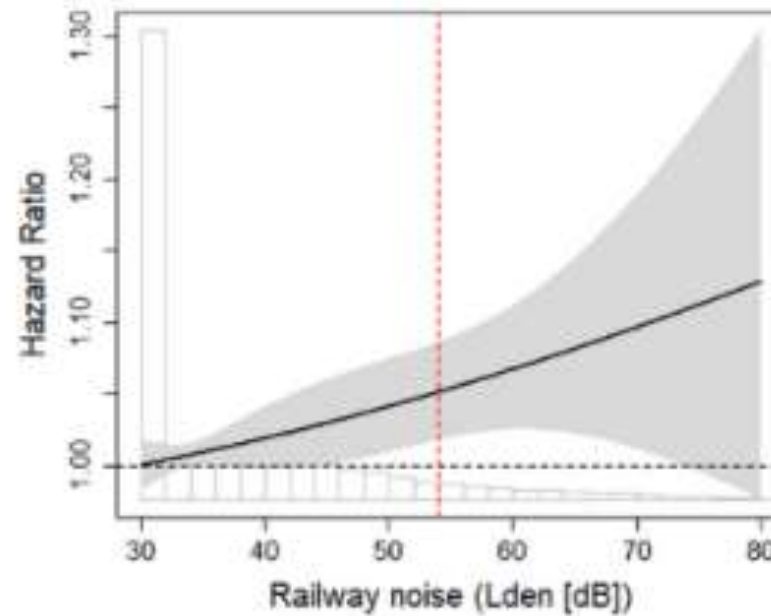
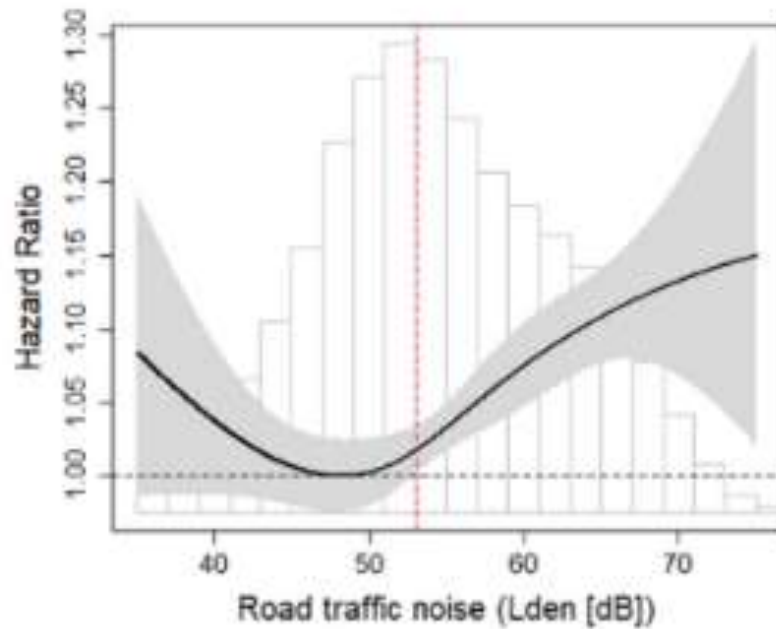
<https://doi.org/10.1016/j.envint.2025.109667>

Table 6

Summary of strength of evidence conclusions. See [Supplementary Table 23](#) for a detailed explanation of the strength of evidence ratings.

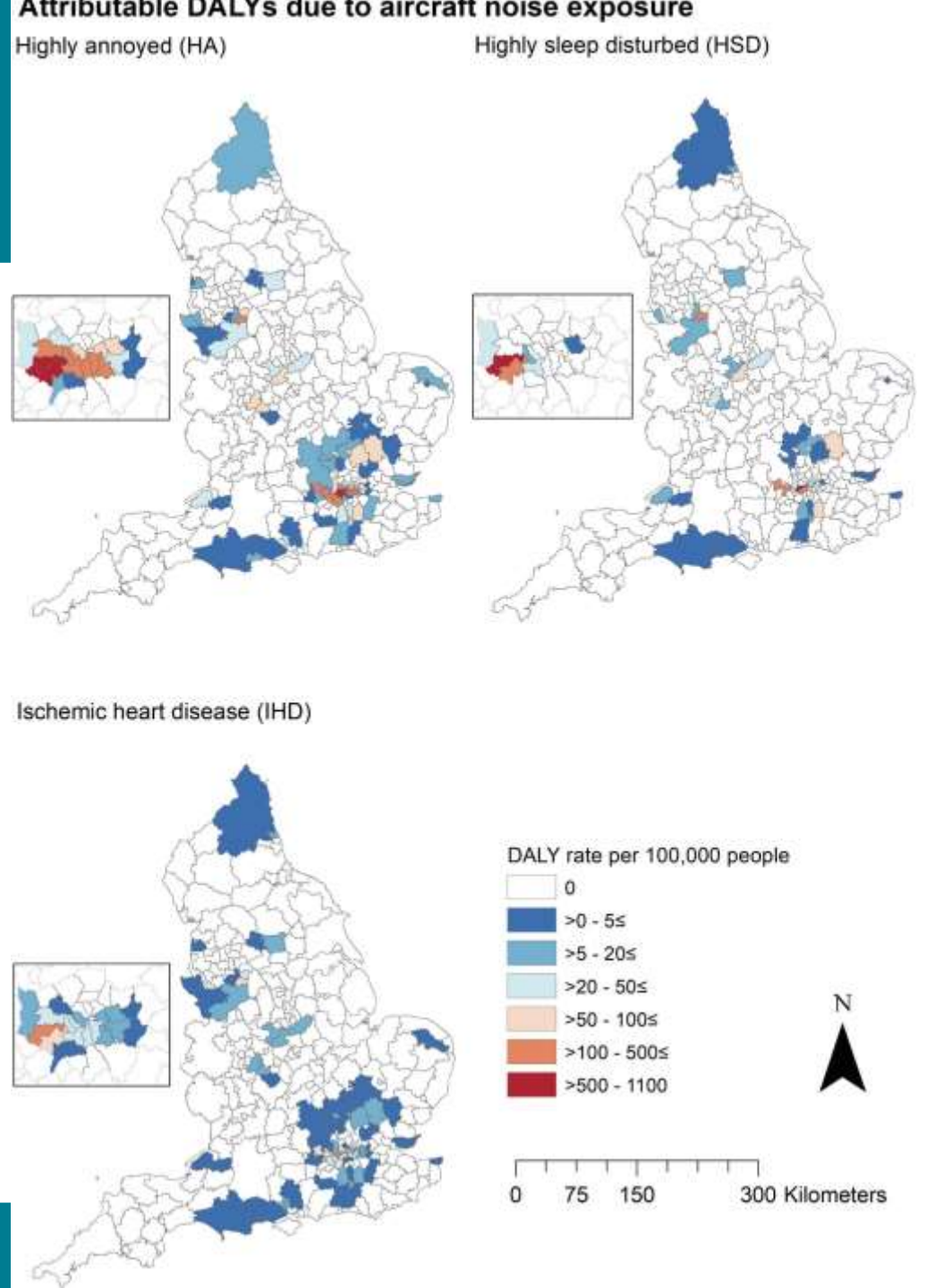
Source and outcome	Quality of evidence rating ^a	Direction of effect estimates	Confidence in effect estimates	Other compelling attributes	Strength of evidence rating
Incidence					
Road	Moderate	Adverse effect	Moderate ^e	Biological plausibility, mechanistic evidence	Sufficient
Rail	Moderate	Nil	Low ^f		Limited
Air	Low	Adverse effect	Low ^f		Limited
Mortality					
Road	High	Adverse effect	Moderate ^e	Biological plausibility, mechanistic evidence, case-crossover studies	Sufficient
Rail	High	Adverse effect	Limited ^d		Limited
Air	Very Low	Adverse effect	Low ^f		Limited
Prevalence					
Road	Very low	Adverse effect	Low ^f	Biological plausibility, mechanistic evidence	Limited
Rail	n/a ^b	Positive effect	Low ^f		Inadequate
Air	n/a ^b	Adverse effect	Low ^f		Inadequate

Understanding differences observed across transport sources



<https://doi.org/10.1289/EHP11587>

How we use this information at a population level



<https://doi.org/10.1016/j.envint.2023.107966>

ALL CAUSE MORTALITY

All-cause mortality



<https://www.eea.europa.eu/en/analysis/publications/environmental-noise-in-europe-2025>

<https://www.eionet.europa.eu/etcs/etc-he/products/etc-he-products/etc-he-reports/etc-he-report-2023-11-environmental-noise-health-risk-assessment-methodology-for-assessing-health-risks-using-data-reported-under-the-environmental-noise-directive>



Environmental noise in Europe 2025

EEA Report 05/2025

All-cause mortality

Table 3.11 Estimated number of DALYs due to road, rail and aircraft in areas covered under the END based on WHO recommendations, EEA-32 (excluding Turkiye)

	Health effect	Road	Rail	Aircraft	Total per health outcome ^(a)
YLD	High annoyance	168,800	33,600	25,400	227,800
	High sleep disturbance	47,100	16,100	7,200	70,400
	CVD	33,400	5,700	1,700	40,800
	Type 2 diabetes	41,900	7,200	2,100	51,200
YLL	Premature mortality ^(a)	1,091,700	187,800	53,300	1,332,800
DALYs	YLD+YLL	1,382,900	250,400	89,600	1,724,000

Notes: ^(a) Refers to all-cause natural mortality.
^(b) There may be some double counting mainly for high annoyance and high sleep disturbance due to combined effects of multiple sources.
 CVD, cardiovascular disease. YLD, years lived with disability. YLL, years of life lost. DALYs, disability-adjusted life years.

Source: EEA, calculated using the methodology from ETC HE, 2024b.

<https://www.eea.europa.eu/en/analysis/publications/environmental-noise-in-europe-2025>

Health equity & interventions

HOW EVIDENCE FEEDS INTO POLICY

