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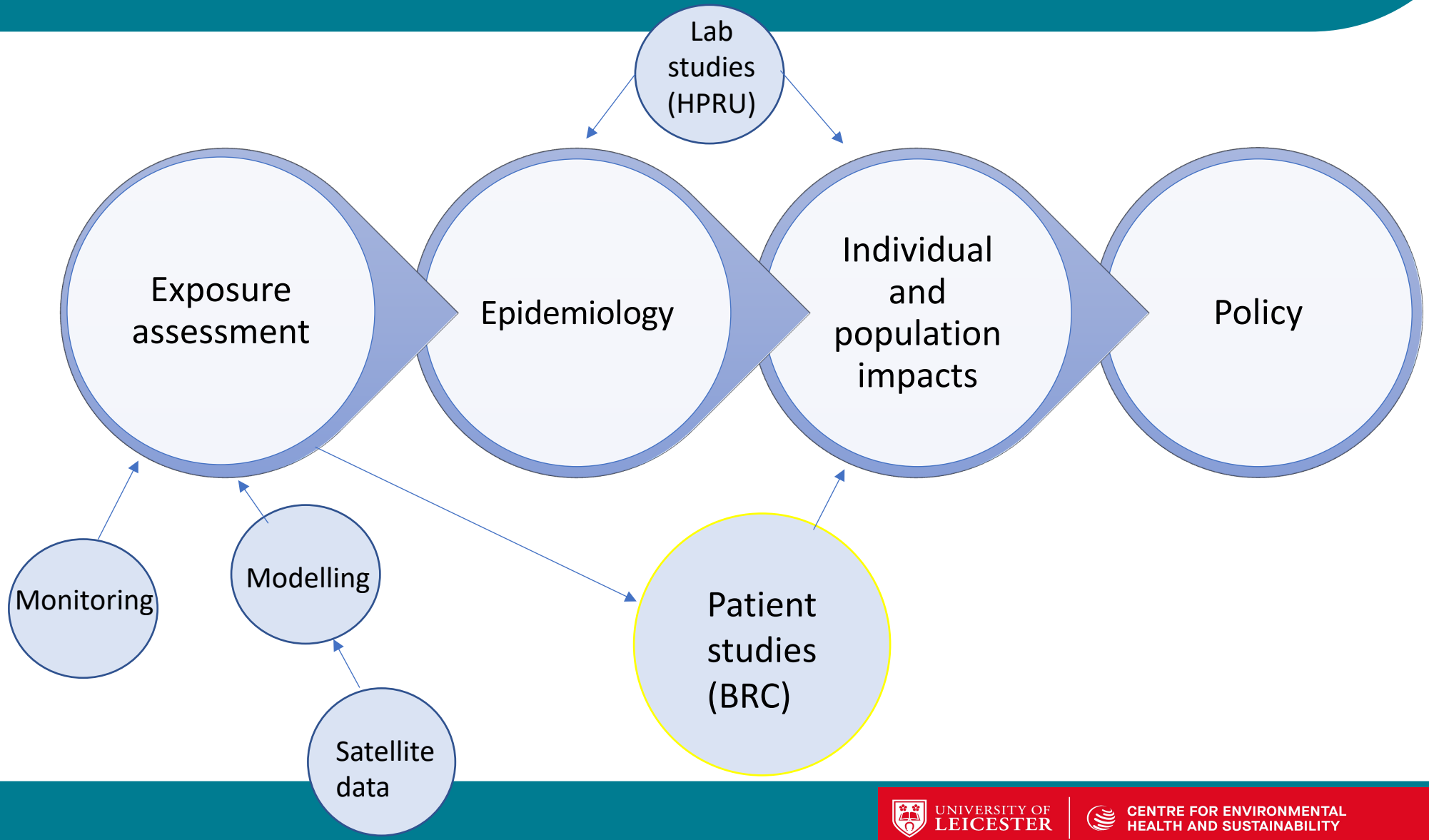
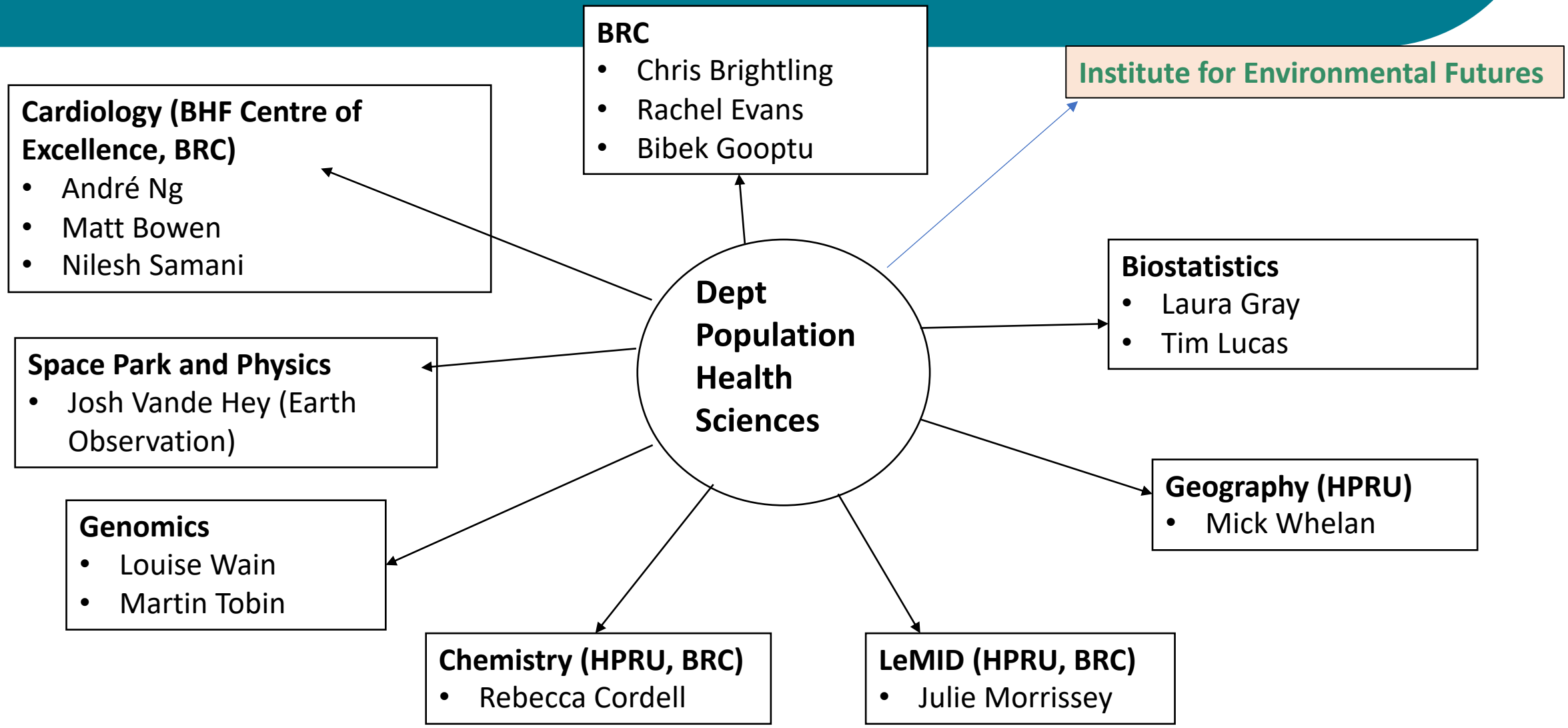
Vision: To improve human health and the health of the environment through cutting edge multidisciplinary research and training, in a changing world

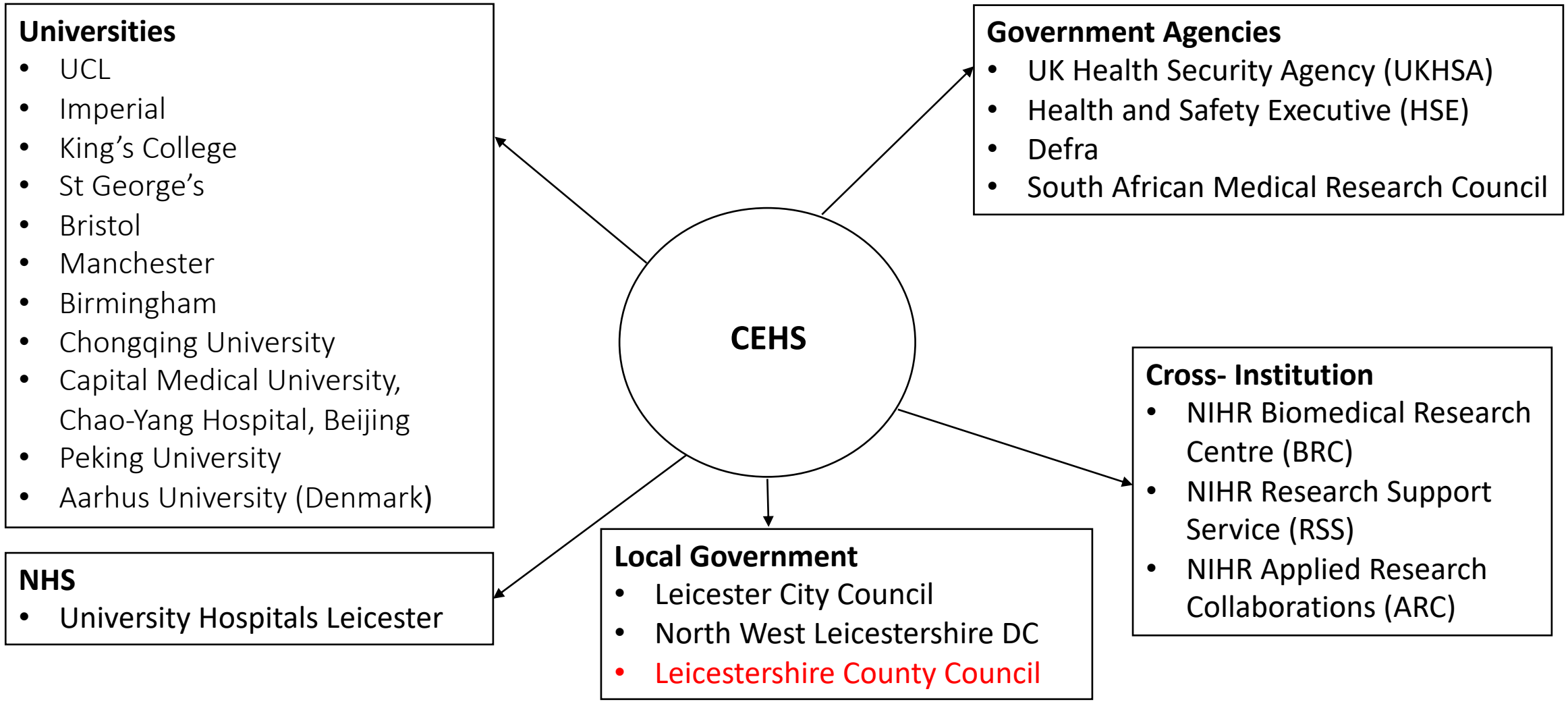
CEHS - our multidisciplinary approach



CEHS links across the University of Leicester



CEHS External Links



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UK Health Security Agency

Burden of disease from transport noise in England

Dr Calvin Jephcote
Centre for Environmental Health & Sustainability | University of Leicester

LLR Health Inequalities Workshop - 24th June 2025

Burden of disease from transport noise in England

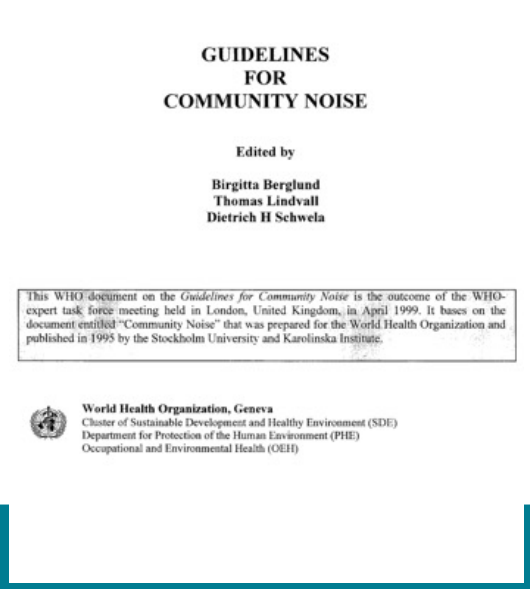
- Why
- How
- What
- So what

Background

"…. noise pollution is considered not only an environmental nuisance but also a threat to public health" (WHO 2011)

- Impacts sleep duration, patterns and quality.
- Impacts cognitive and emotional responses.
- Linked to Cardiovascular and metabolic diseases, such as Diabetes and Stroke.

WHO 1999


GUIDELINES
FOR
COMMUNITY NOISE

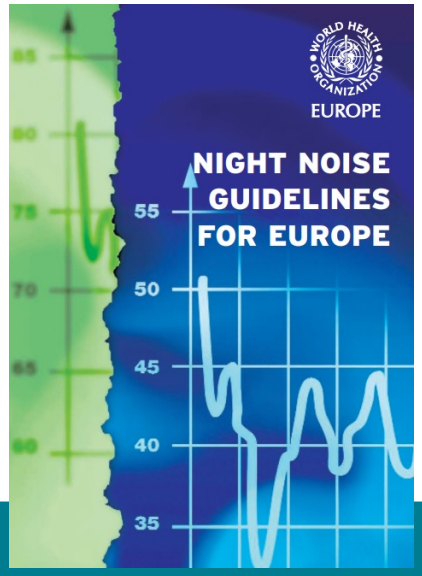
Edited by

Birgitta Berglund
Thomas Lindvall
Dietrich H Schwela

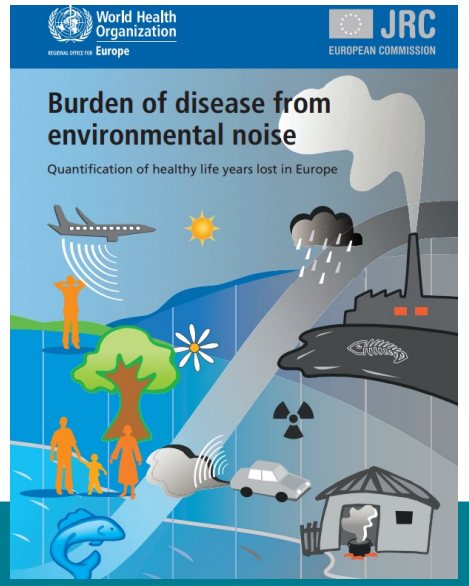
This WHO document on the *Guidelines for Community Noise* is the outcome of the WHO-expert task force meeting held in London, United Kingdom, in April 1999. It bases on the document entitled "Community Noise" that was prepared for the World Health Organization and published in 1995 by the Stockholm University and Karolinska Institute.

World Health Organization, Geneva
Cluster of Sustainable Development and Healthy Environment (SDE)
Department for Protection of the Human Environment (PHE)
Occupational and Environmental Health (OEH)

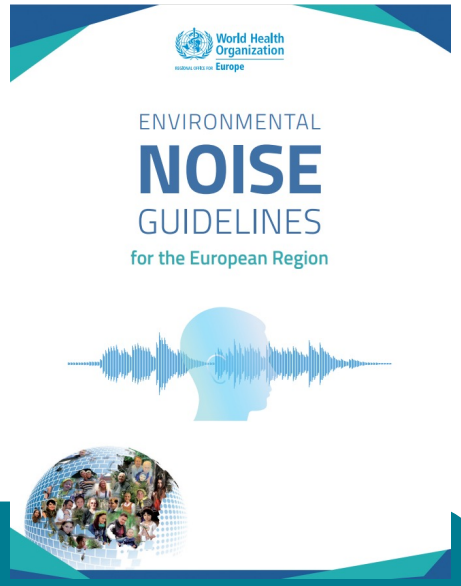
WHO 2009



WHO 2011



WHO 2018



Why

GOV.UK

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Guidance

Noise pollution: economic analysis

This guide explains how impacts on noise should be incorporated into a cost benefit analysis.

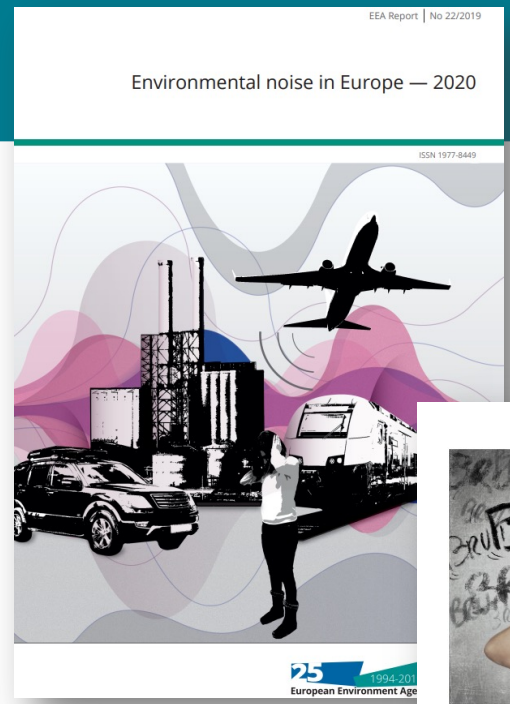
From: Department for Environment, Food & Rural Affairs
Published 9 April 2013
Last updated 19 December 2014 — See all updates

Overview

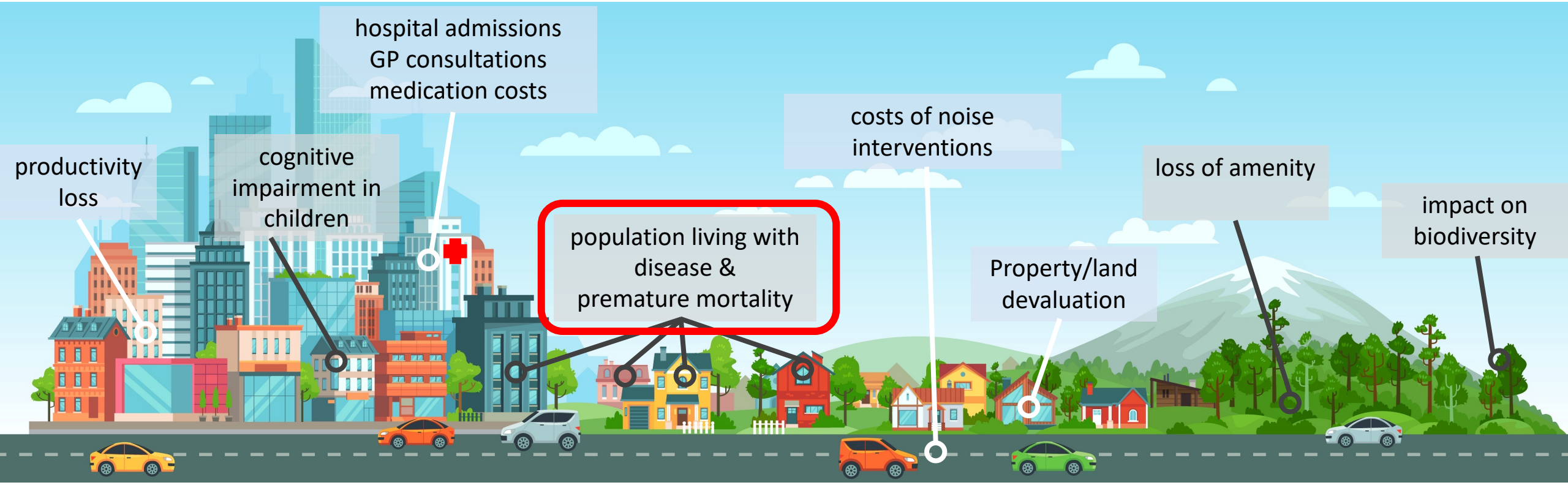
Noise can have an effect on health, wellbeing, productivity and the natural environment. The government's policy on noise is set out in the Noise policy statement for England.

It is estimated that the annual social cost of urban road noise in England is £7 billion to £10 billion. This places it at a similar magnitude to road accidents (£9 billion) and significantly greater than the impact on climate change (£1 to £4 billion). A report published by the World Health Organisation (WHO) in March 2011 identified environmental noise as the second largest environmental health risk in Western Europe.

It is important that the impacts on noise are fully considered in decision making for any policy, programme or project.

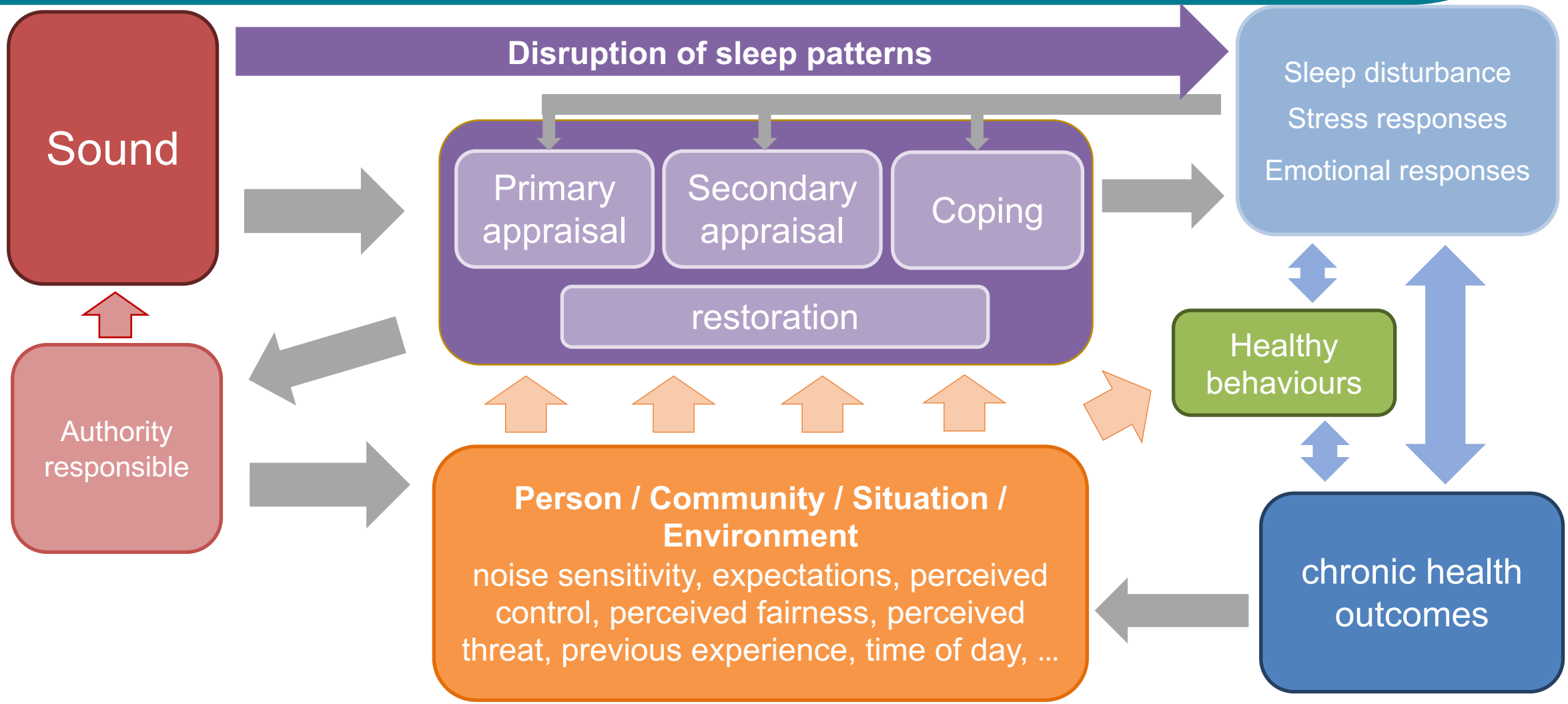


Context – costs associated with transport noise



background graphic by tartila at https://www.freepik.com/free-vector/urban-road-with-cars-landscape_10722640.htm

How does noise affect health



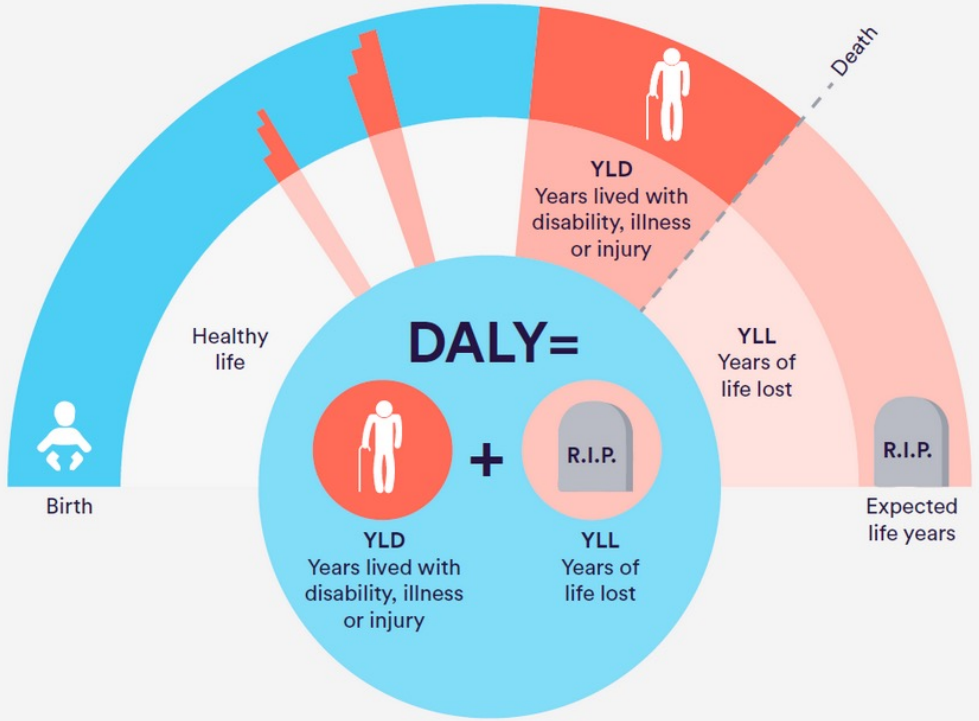
Conceptual model by B. Fenech. Model based on Lazarus' transactional stress model (Lazarus and Folkman 1984; Lercher 1996), the link between stress and restoration (Ulrich et al. 1991; von Lindern et al. 2016), the noise effects reaction scheme (Babisch 2014) and associations with the wider determinants of health (Peris and Fenech 2020).

How can we quantify “ill-health”?

Chart

Disability-adjusted life years

20/02/2019



Source: Public Health England (2015). Reproduced under Open Government Licence.

https://www.nuffieldtrust.org.uk/resource/using-dalys-to-understand-young-people-s-health

How did we do it?

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UK Health Security Agency

Extrium

Department for Environment Food & Rural Affairs

The work brought together established experts and early career researchers in the fields of:

acoustics, exposure modelling, evidence synthesis, epidemiology, burden of disease quantification, data science, visualisations, media and comms.

How did we do it?

SCAN ME

https://www.sciencedirect.com/science/article/pii/S0160412023002398?via%3Dihub

ScienceDirect

Journals & Book

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Outline

ELSEVIER

Environment International

Volume 178, August 2023, 107966

Full length article

Spatial assessment of the attributable burden of disease due to transportation noise in England

Calvin Jephcote [a 1], Sierra N. Clark [b 1], Anna L. Hansell [a c], Nigel Jones [d], Yingxin Chen [a], Claire Blackmore [a], Katie Eminson [a], Megan Evans [a], Xiangpu Gong [c], Kathryn Adams [a], Georgia Rodgers [b], Benjamin Fenech [b c 2], John Gulliver [a c 2]

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Environmental Noise Regulations (END)

Legal requirement for UK to publish noise maps and noise management action plans **every 5 years** for :

- Major noise sources
- Agglomerations with more than 100,000 inhabitants:

Noise exposures			
END Definition: Major sources	Roads that record >3,000,000 vehicle passages per year.	Railways that record >30,000 train passages per year.	Civil airports, which record >50,000 movements per year.

Sensitivity analyses: CNOSSOS-EU road-transport model

UK Health Security Agency

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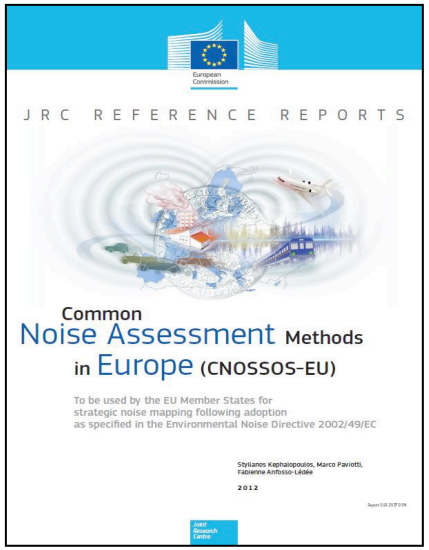
Main exposures from END II strategic mapping of noise > 50 dB from major road-sources.

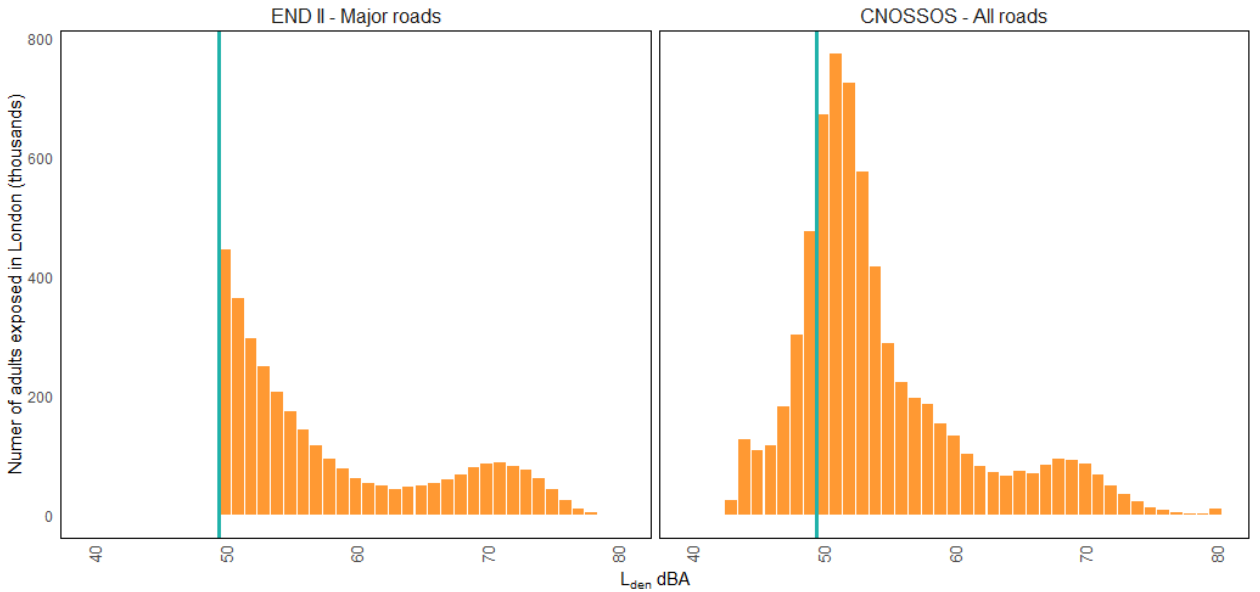
CNOSSOS-EU road-transport exposure estimates from major and minor roads implemented by the University of Leicester.

- Lower threshold > 35 dB(A)
- Based on 2013 AADT counts, 2013 wind speed/direction profiles, and OS MasterMap land cover
- Exposures for individual postcodes across London

Road-traffic noise exposure levels (Lden) in London based on END-II mapping



Number of adults exposed to Lden road-traffic noise levels in London



Burden of disease toolkit design

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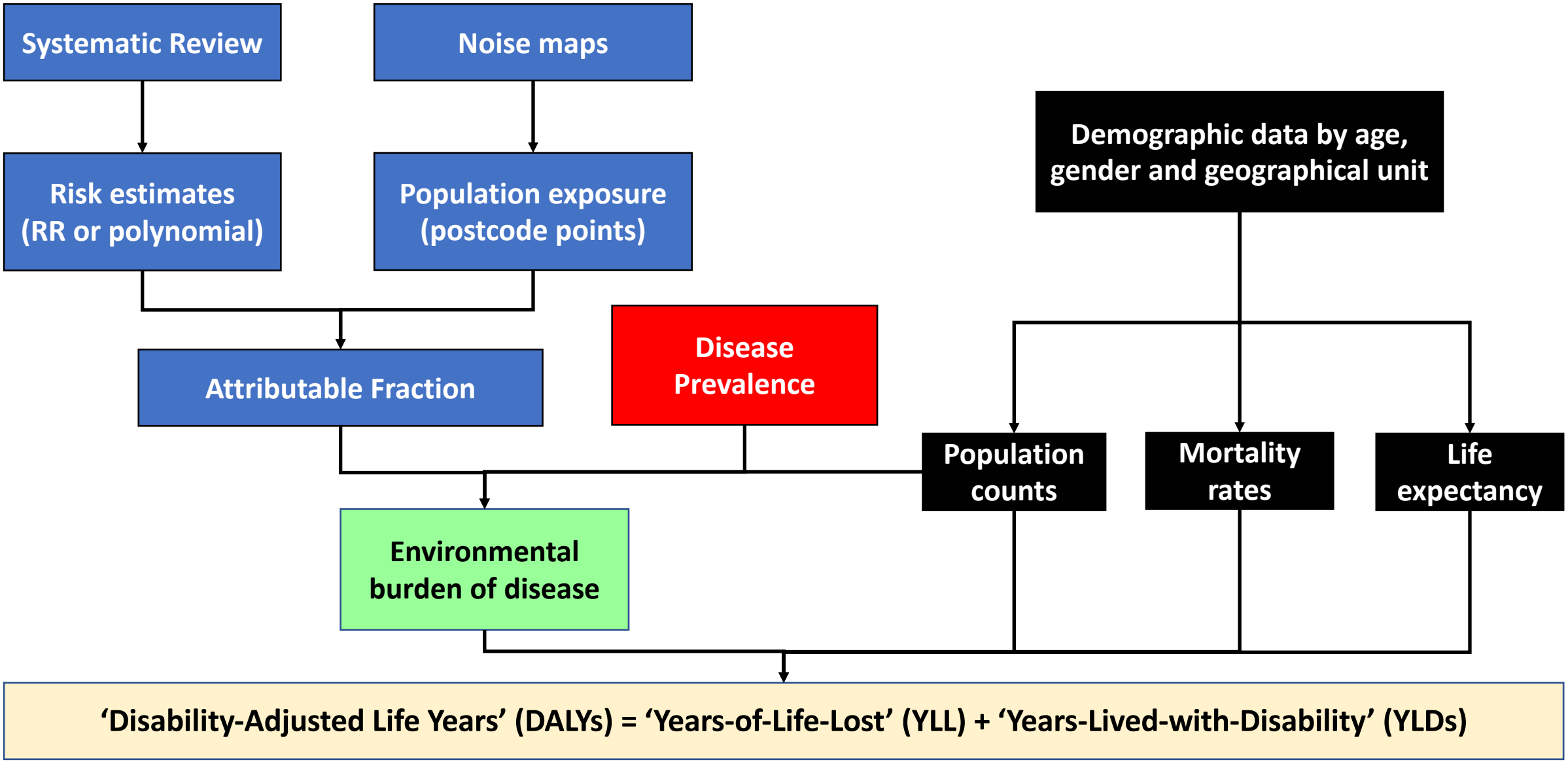
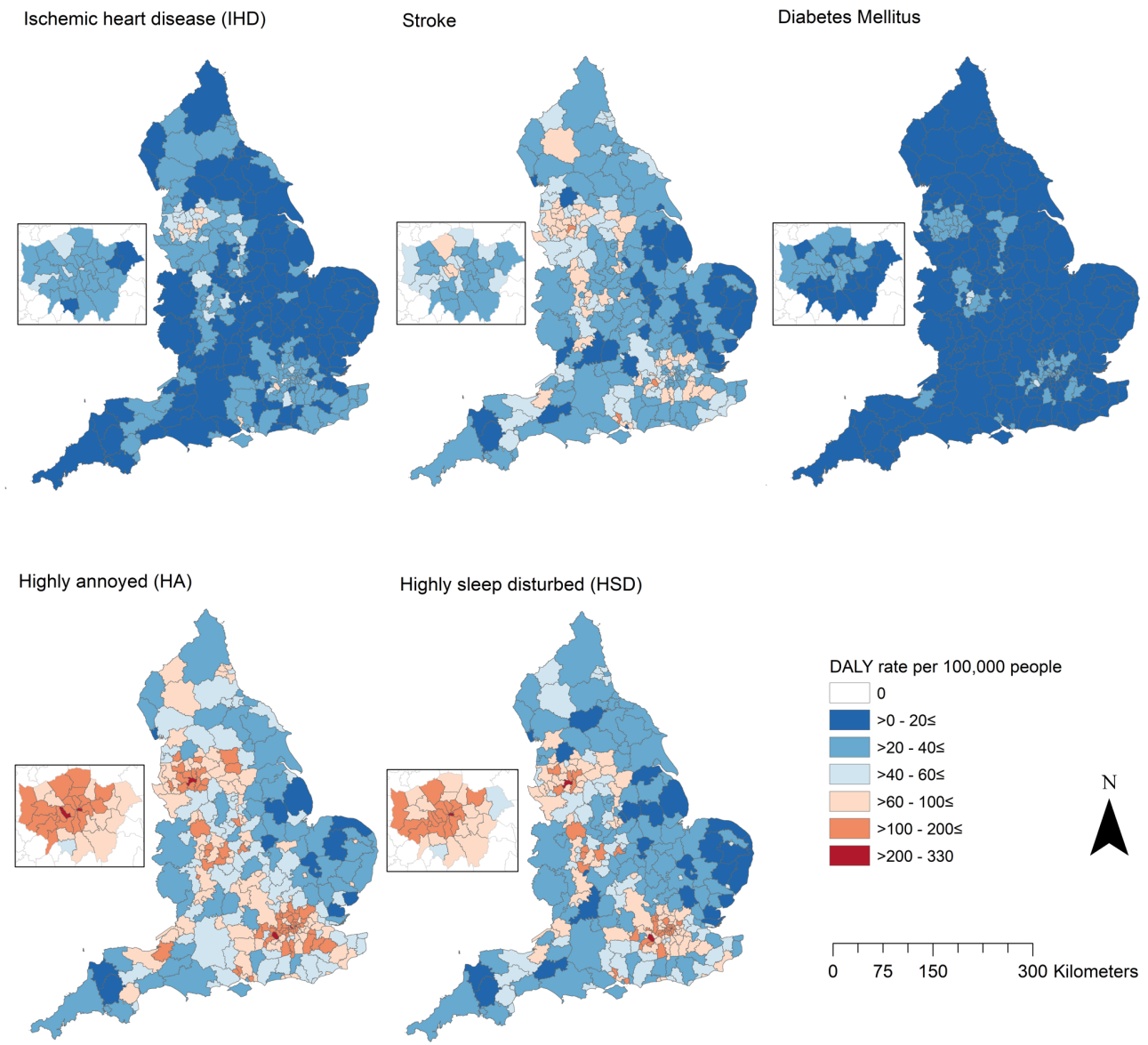


Burden of disease due to traffic noise from major roads

- ✓ 40% of adults in England are exposed to high noise pollution from road-transport (on major roads).
- ✓ 97,000 DALYs lost due to road-transport, 17,000 due to aircraft, and 13,000 due to railway noise exposures in 2018.
- ✓ Spatial variation in disease from major road traffic noise across Local Authority Districts.
- ✓ Clustering of high DALYs generally in and around London and in the North West.



Attributable DALYs among adults in England due to exposures from major noise sources (2018)

UK Health Security Agency

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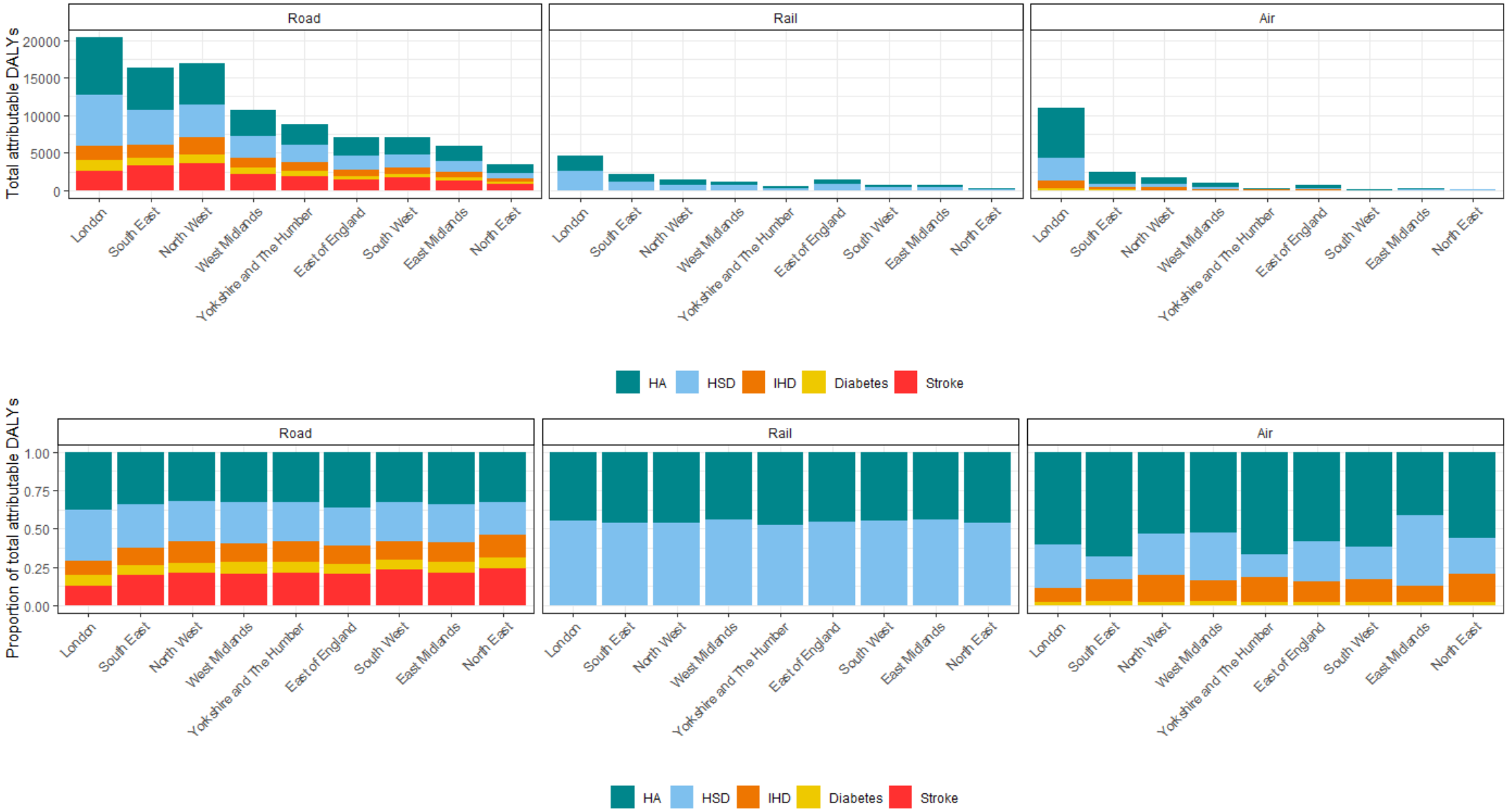

Blog

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Noise pollution: mapping the health impacts of transportation noise in England

Blog Editor, 29 June 2023 - Reducing the burden of disease

Noise can have a significant impact on our health, beyond just being annoying or disturbing sleep. The UK Health Security Agency (UKHSA) has conducted a new study to better understand how noise can affect health and wellbeing. The research builds on long established evidence that living in an area with higher noise levels from traffic can lead to stress and sleep disturbance, and

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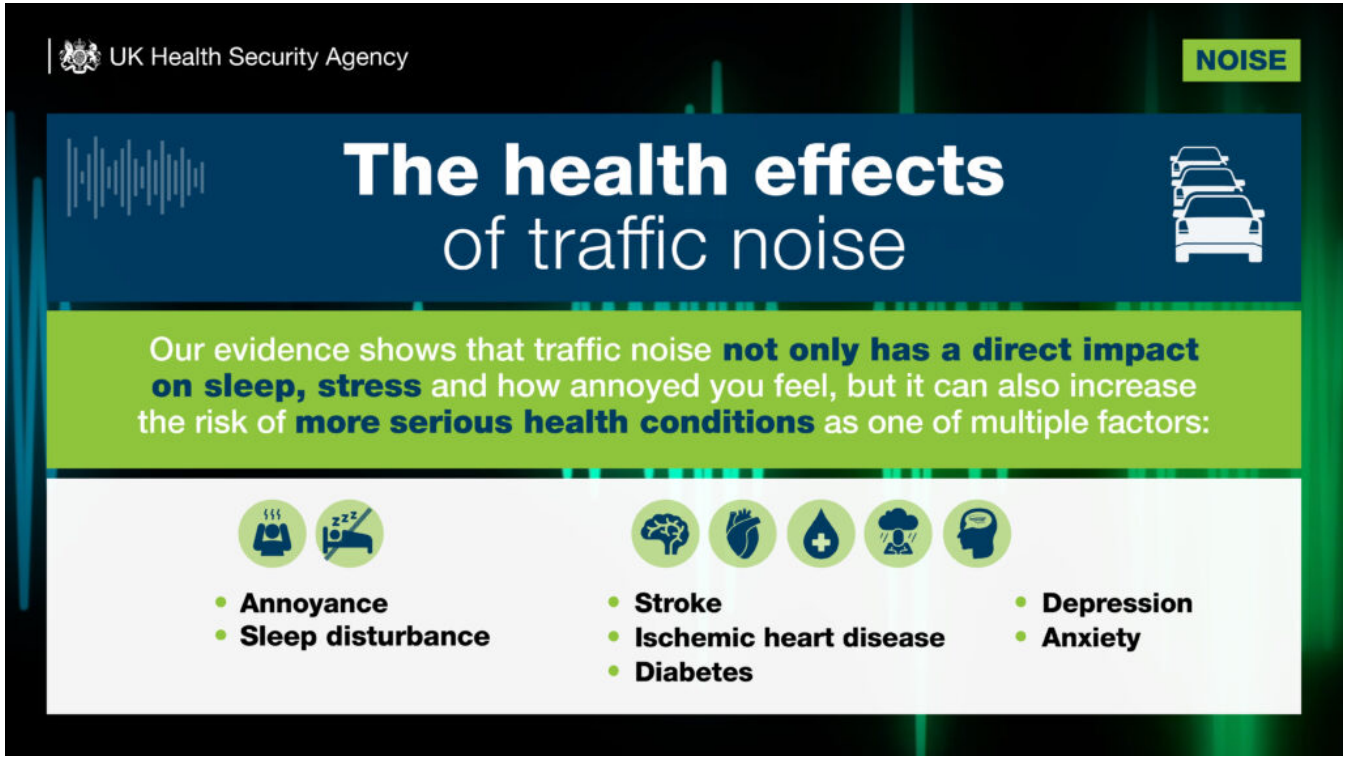
Get Winter Strong: revisiting respiratory infection guidance for a safer season, 19 September 2023

https://ukhsa.blog.gov.uk/2023/06/29/noise-pollution-mapping-the-health-impacts-of-transportation-noise-in-england/



Media coverage

Noise pollution from cars, trains and planes can takes years off your life, study warns

- Research by the UKHSA looked at the impact of noise levels on health
- In 2018, around 100,000 years of good health were lost due to road traffic noise

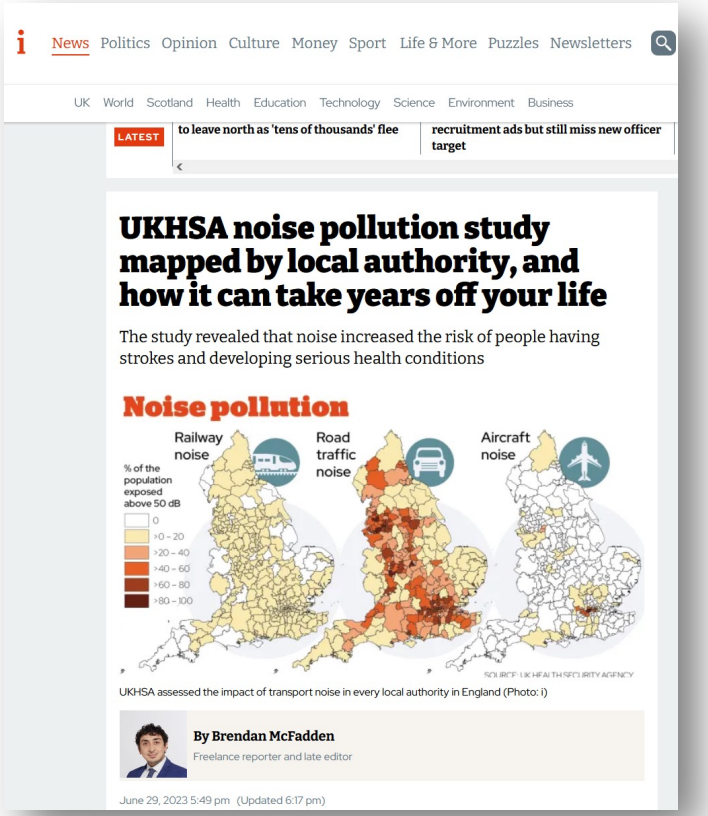
By COLIN FERNANDEZ ENVIRONMENT EDITOR FOR THE DAILY MAIL
PUBLISHED: 14:54, 30 June 2023 | UPDATED: 14:54, 30 June 2023

Noise pollution is cutting short the lives of people who suffer it – with road traffic causing the biggest harm according to a study by the UK Health Security Agency.

Research by the UKHSA looked at the impact of noise levels on health – disturbing people's sleep, causing stress, depression and anxiety, and increasing the likelihood of diabetes and heart disease.

As part of the new study, the UKHSA assessed the impact of transport noise in every local authority in England - and found it can have a 'significant impact on our health'.

https://www.dailymail.co.uk/health/article-12251355/Noise-pollution-cars-trains-planes-takes-years-life-study-warns.html



UKHSA noise pollution study mapped by local authority, and how it can take years off your life

The study revealed that noise increased the risk of people having strokes and developing serious health conditions

Noise pollution

Railway noise
Road traffic noise
Aircraft noise
% of the population exposed above 50 dB
0
>0 - 20
>20 - 40
>40 - 60
>60 - 80
>80 - 100

UKHSA assessed the impact of transport noise in every local authority in England (Photo: i)

By Brendan McFadden
Freelance reporter and late editor

June 29, 2023 5:49 pm (Updated 6:17 pm)

https://inews.co.uk/news/ukhsa-noise-pollution-study-local-authority-life-2443221

Urban planning needs to consider transport noise, says UKHSA

Study shows 40% of adults in England are exposed to long-term average road-traffic noise levels exceeding 50 decibels (dB)

20 July 2023 , Steve Smethurst

Expert says the results underline the significant role played by EH professionals in land-use planning to protect public health

The impact of noise on public health goes beyond annoyance or disturbed sleep, concludes a new study from the UK Health Security Agency (UKHSA). The findings add to existing evidence that living in an area with higher noise levels from traffic can lead to stress and sleep disturbance, which in turn can lead to an increase in heart disease or diabetes.

The study found that 40% of all adults in England were exposed to long-term average road-traffic noise levels exceeding 50 decibels (dB) – the point at which health effects are more likely to be detected.

Around 5% of the population in England experience aircraft noise above 50 dB, with the highest concentrations in and around London. Approximately 5% are exposed to railway noise exceeding 50 dB.

https://www.cieh.org/ehn/housing-and-community/2023/july/urban-planning-needs-to-consider-transport-noise-says-ukhsa/?query=noise+ukhsa

Dissemination – presentations

- Environmental Public Health Practice Network
- International conferences – 4th ICBEN Congress on Noise as a Public Health Problem
- Annual national professional conferences – UKHSA, Chartered Institute of Environmental Health, Institute of Acoustics
- Government Stakeholder groups: Airspace and Noise Engagement Group
- Industry – RSSB Noise Working Group, Sustainable Aviation Council
- Communities – Heathrow Noise and Airspace Community Forum

Impact

UK Parliament

Committees

UK Parliament > Business > Committees > Science and Technology Committee (Lords) > The effects of ar

The effects of artificial light and noise on human health

Inquiry

The House of Lords Science and Technology Committee is conducting an inquiry into the effects of a and noise on human health. The committee will explore the strength of the evidence for claims mad effects on human health, the adequacy of the existing policy and regulatory framework for address noise pollution in the UK and options for reform to address any harmful effects identified. The comm a call for written evidence and will be taking oral evidence from February 2023.

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The neglected pollutants: the effects of artificial light and noise on human health Contents

Summary

Environmental noise and light pollution contribute to a range of adverse health outcomes including heart disease and premature death. Yet light and noise remain neglected pollutants, poorly understood and poorly regulated.

Both noise and light pollution can impact negatively on human health through disrupting sleep and circadian rhythms, which leads to negative social and economic impacts.

Epidemiological evidence suggests that noise pollution can both cause annoyance and increase the risk of stroke and heart disease. Whilst the increased risk to an individual may be low, the exposure of millions of people results in a significant aggregate health burden. The World Health Organization estimates that noise pollution from traffic results in one million healthy life years lost in Western Europe every year; research from the UK Health Security Agency suggests that in 2018, 130,000 healthy life years were lost in the UK and that 40% of the British population are exposed to harmful noise levels from road traffic.

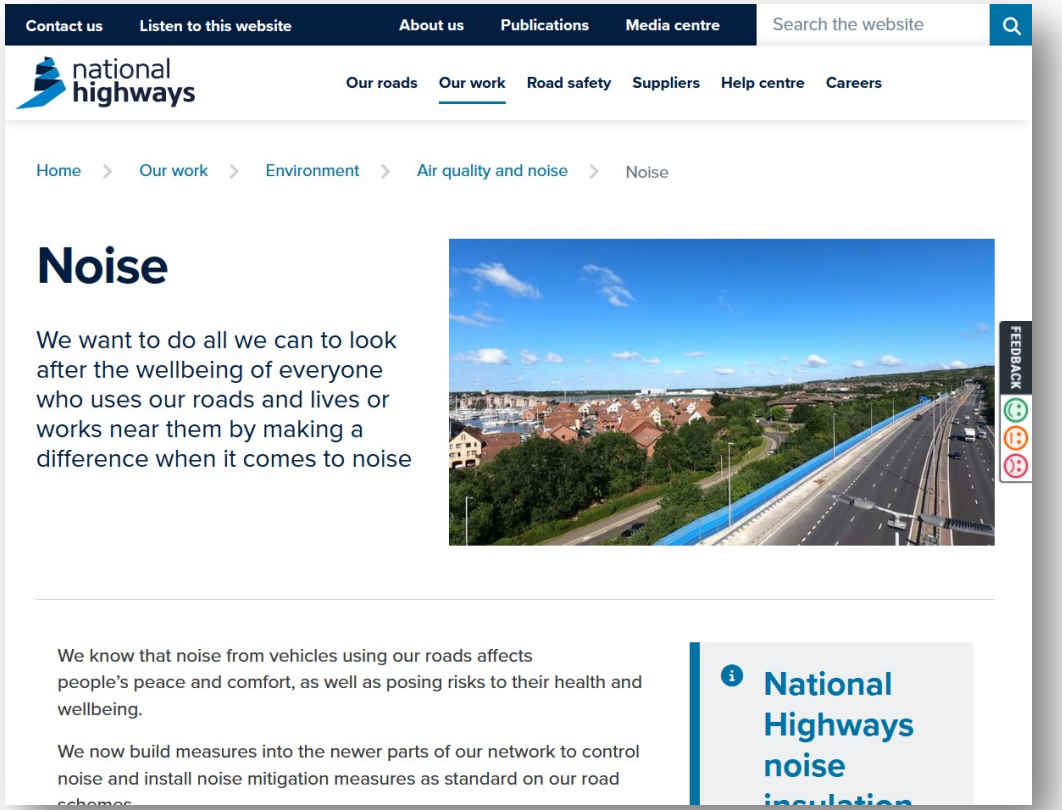
Although there is a growing body of evidence that indicates adverse health impacts of noise and light pollution, there are still significant gaps. In the case of noise pollution, research to fill these gaps should include:

- larger scale epidemiological studies, supported by laboratory research to determine the mechanisms of harm;
- updating burden-of-disease calculations with emerging evidence;
- new metrics: we do not know the importance of pitch, peak volume and intermittency in terms of health impacts because current metrics are based on average volume of noise over a defined time period such as 24 hours;
- the subjective experience of noise, particularly in indoor environments; and
- the efficacy of interventions to reduce noise pollution on health.

The Government should establish an expert advisory group on noise pollution, as exists for air pollution, to assess new evidence for health effects and advise the Government accordingly.

https://committees.parliament.uk/work/7256/the-effects-of-artificial-light-and-noise-on-human-health/publications/

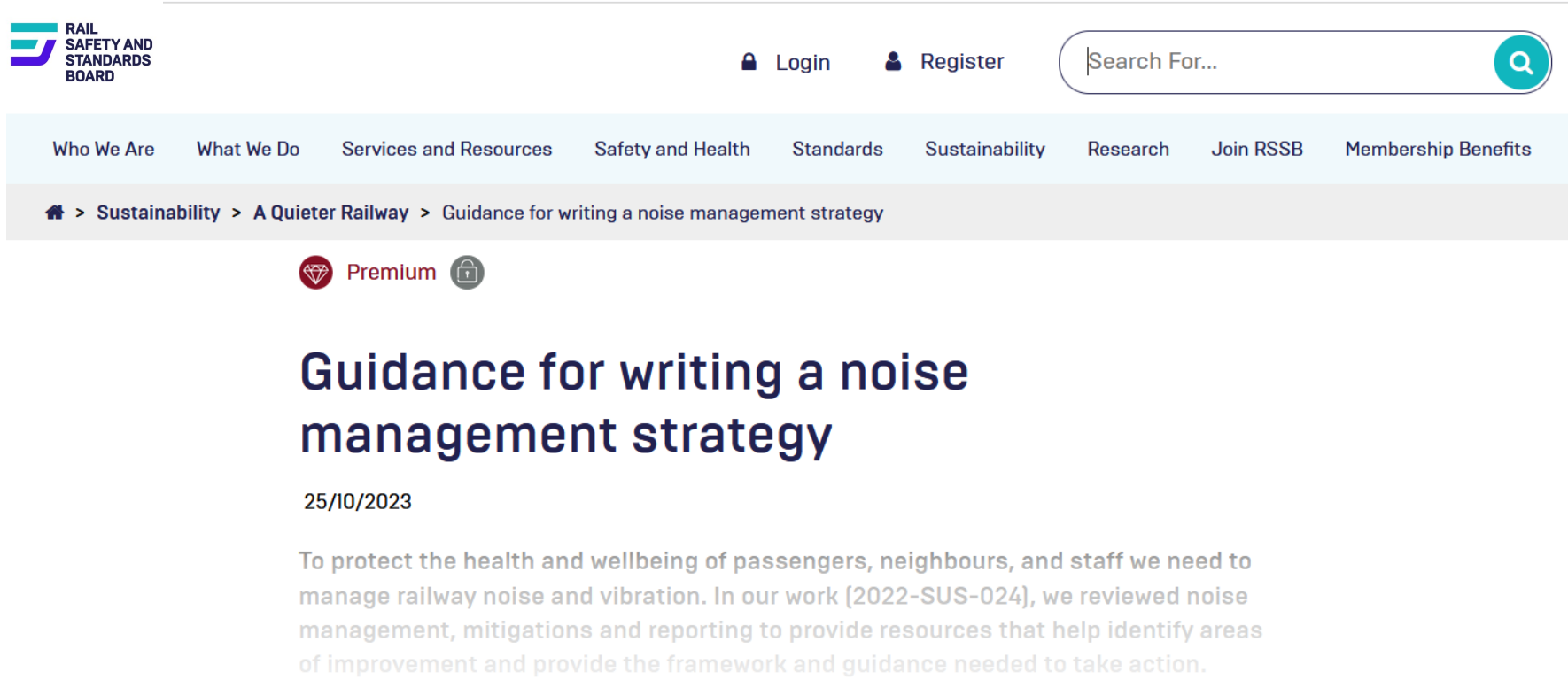
Impact



https://nationalhighways.co.uk/our-work/environment/air-quality-and-noise/noise/

https://www.orr.gov.uk/search-news/mitigating-noise-near-strategic-road-network

Impact



https://www.rssb.co.uk/sustainability/a-quieter-railway/guidance-for-writing-a-noise-management-strategy