

5es Assises Nationales de la Qualité de l'Environnement Sonore

Reims, 11 au 13 décembre 2007

Les Effects du Bruit des Transports sur la Santé de l'Homme

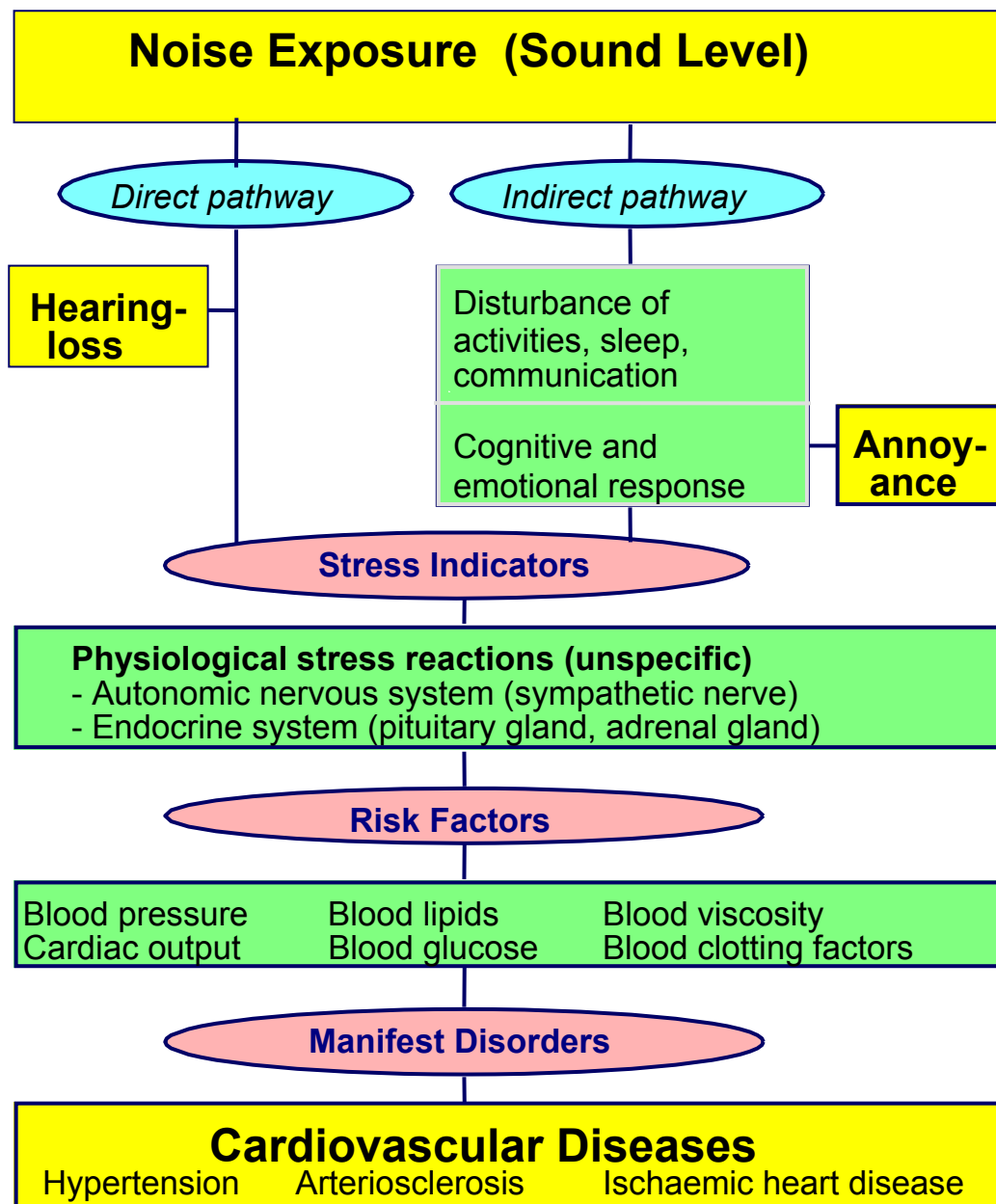
Health Effects of Traffic Noise

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www.umweltbundesamt.de

Reaction- scheme and Test- hypotheses



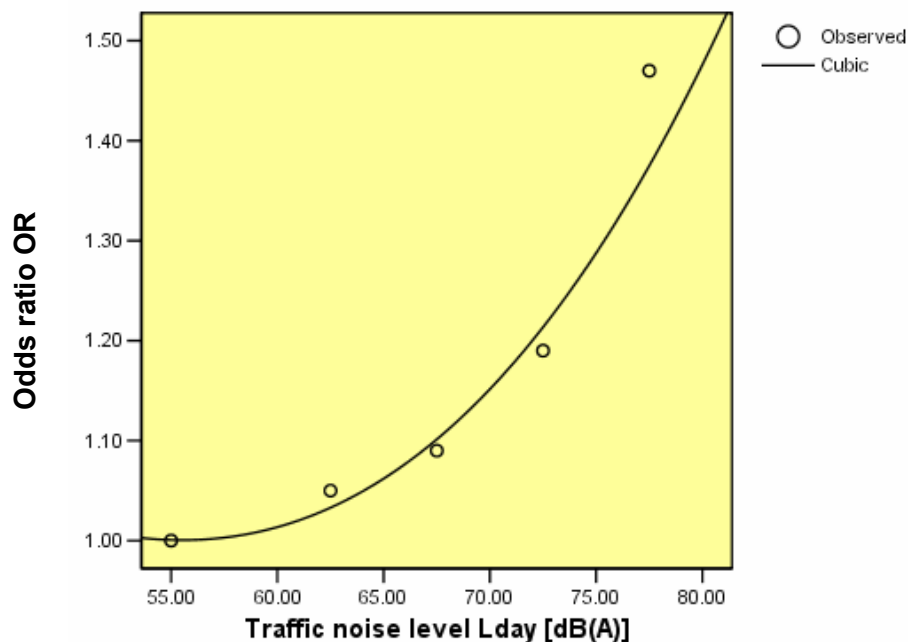
Exposure – Response Curve

Road traffic noise – Myocardial infarction

Exposure-response function:

$$\text{OR} = 1.629657 - 0.000613 \cdot (\text{Lday}, 16\text{h})^2 + 0.000007357 \cdot (\text{Lday}, 16\text{h})^3, R^2 = 0.96$$

Analytic studies



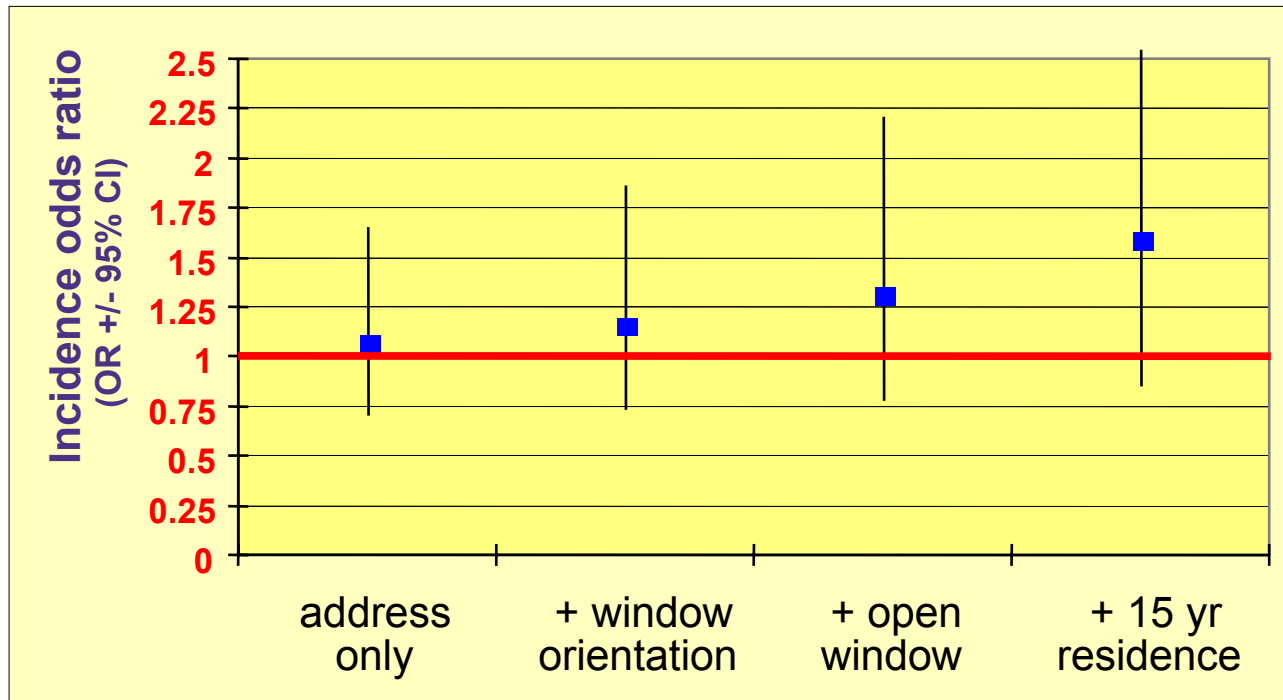
Cases weighted by n weight

Misclassification of Exposure

Incidence of Major Ischaemic Heart Diseases

Caerphilly & Speedwell Studies

Group comparison: $L_{\text{day,6-22 h}} = 66\text{-}70 \text{ dB(A)}$ vs. $51\text{-}55 \text{ dB(A)}$

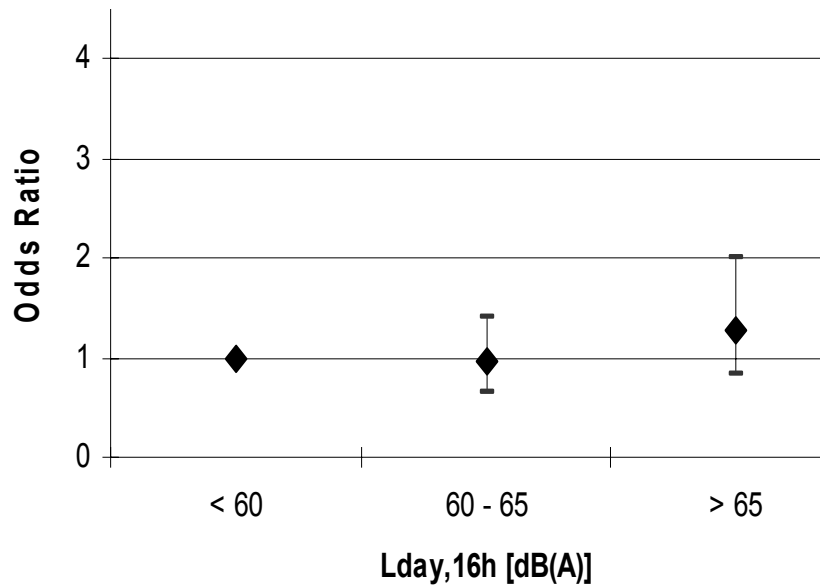


Day/Night Difference

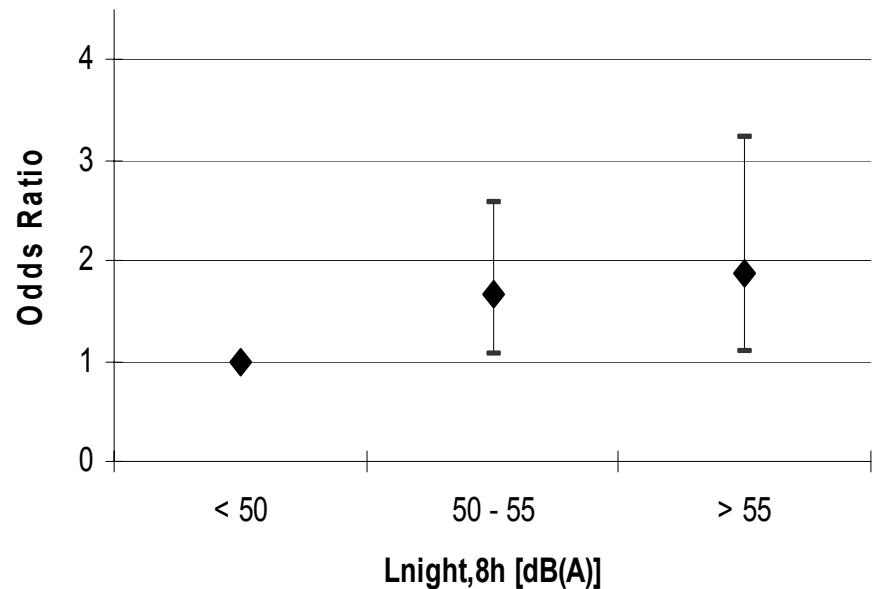
Prevalence of Hypertension

Spandau Health Survey

Day (Living room)

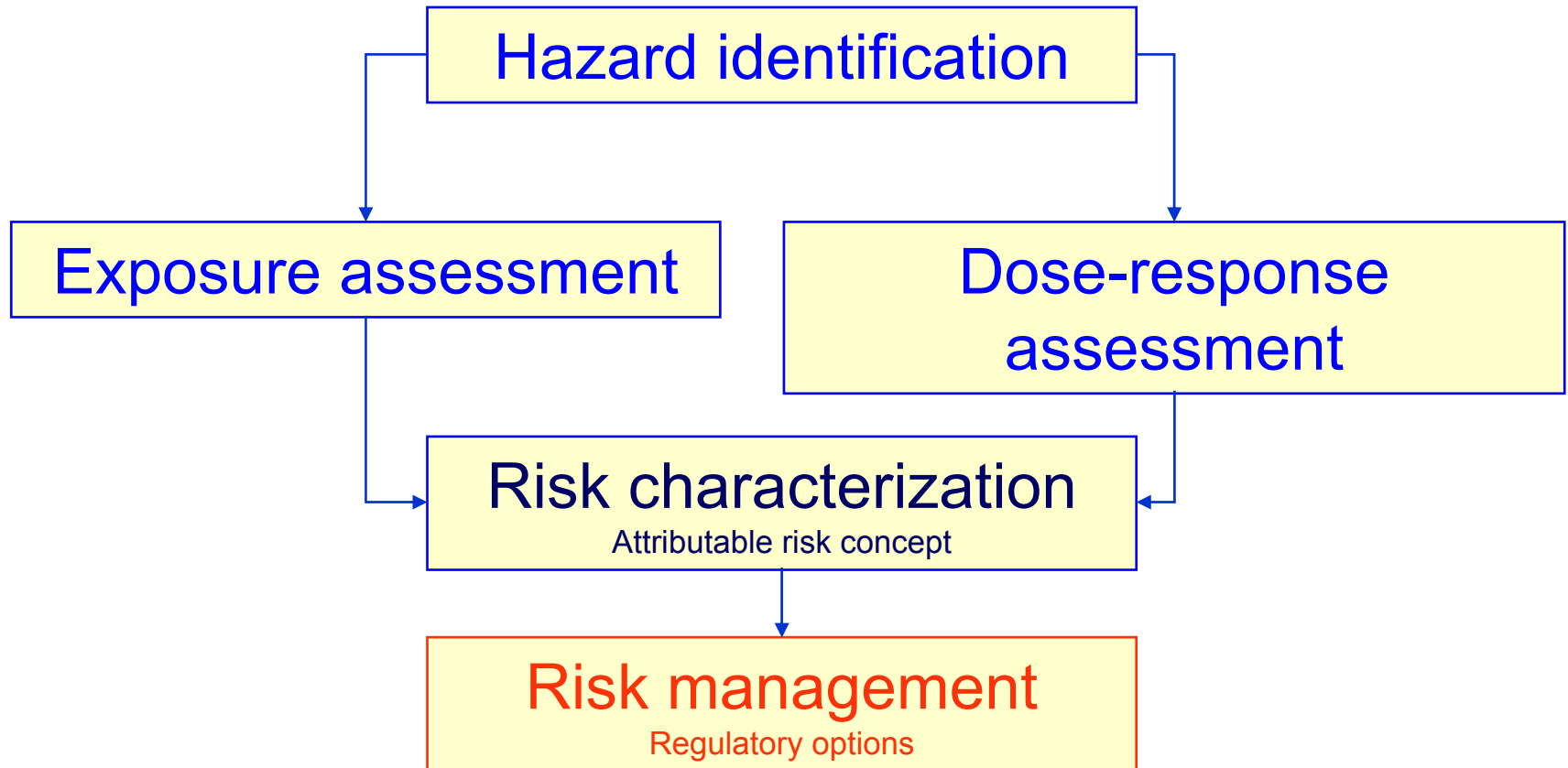


Night (Bedroom)



OR = 1.9

Risk Evaluation



Conclusion

Road Traffic Noise – Ischaemic Heart Diseases

Descriptive studies (cross-sectional)

Threshold: $L_{\text{day},16\text{h}} \approx 60 \text{ dB(A)}$

Analytic studies (case-control, cohort)

Dose-effect relationship: $L_{\text{day},16\text{h}} > 60 \text{ dB(A)}$

Nameable increase in risk

$L_{\text{day},16\text{h}} > 65 \text{ dB(A)} \approx L_{\text{night}} > 55 \text{ dB(A)}$

Population attributable fraction

Germany: (PAR% = 2.9)

approx. 4,000 MI cases/year

approx. 25,000 IHD cases/year

Environmental Quality Targets

Outdoors

Cardiovascular:	$L_{\text{day}} \leq 65 \text{ dB(A)}$
Serious annoyance:	$L_{\text{day}} \leq 55 \text{ dB(A)}$
Sleep disturbance:	$L_{\text{night}} \leq 45 \text{ dB(A)}$
Cognitive impairment:	$L_{\text{day}} \leq 55 \text{ dB(A)}$

Thank You

“Calling noise a nuisance is like calling smog an inconvenience”

(W. H. Steward, former Surgeon General of USA)

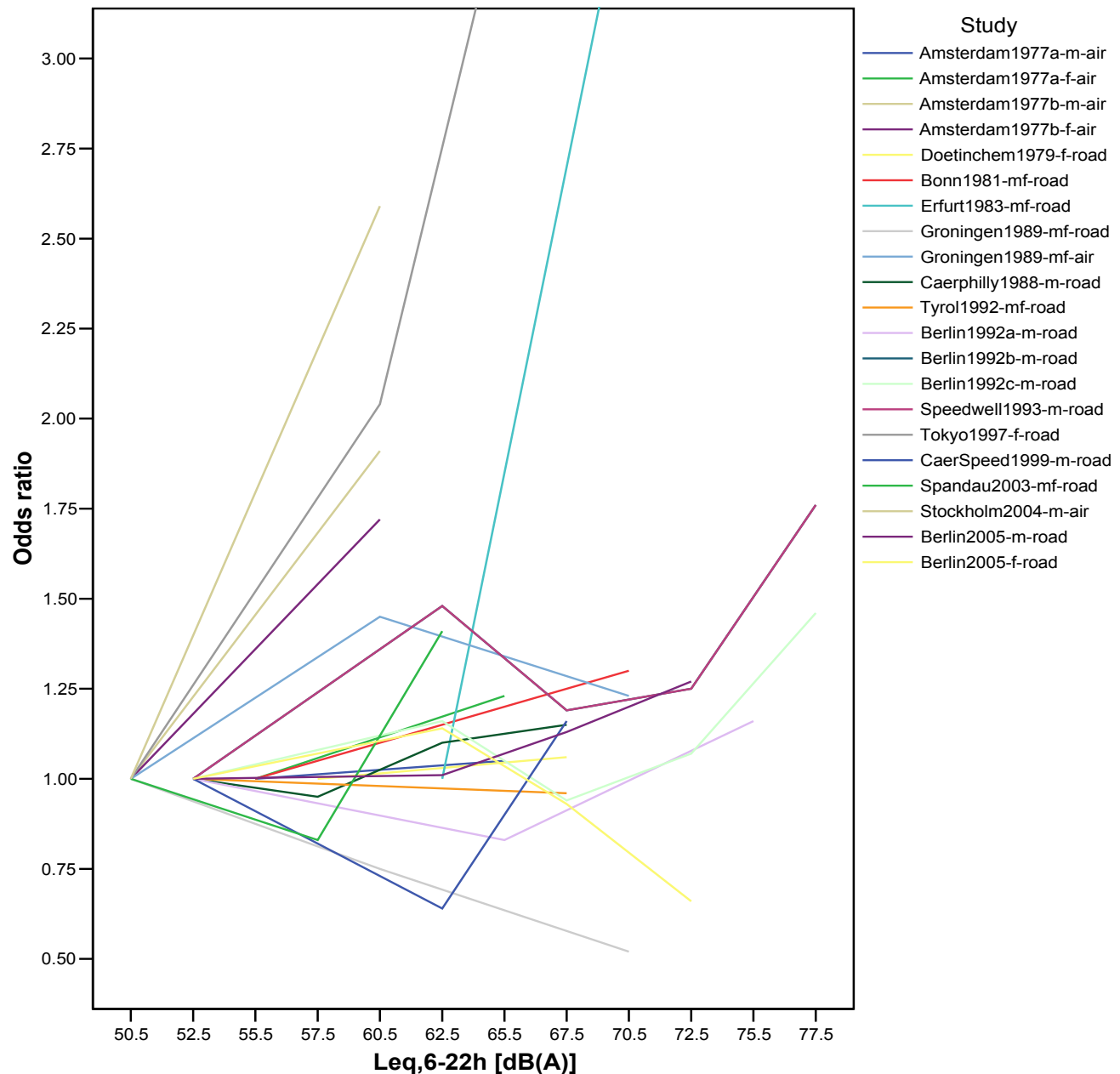


Epidemiological Reasoning

- Biological model
- Laboratory experiments on humans
(acute effects)
- Animal experiments
(long-term effects)
- Epidemiological studies
(long-term effects on humans)
 - Occupational (high exposures)
 - Environmental (moderate exposures)

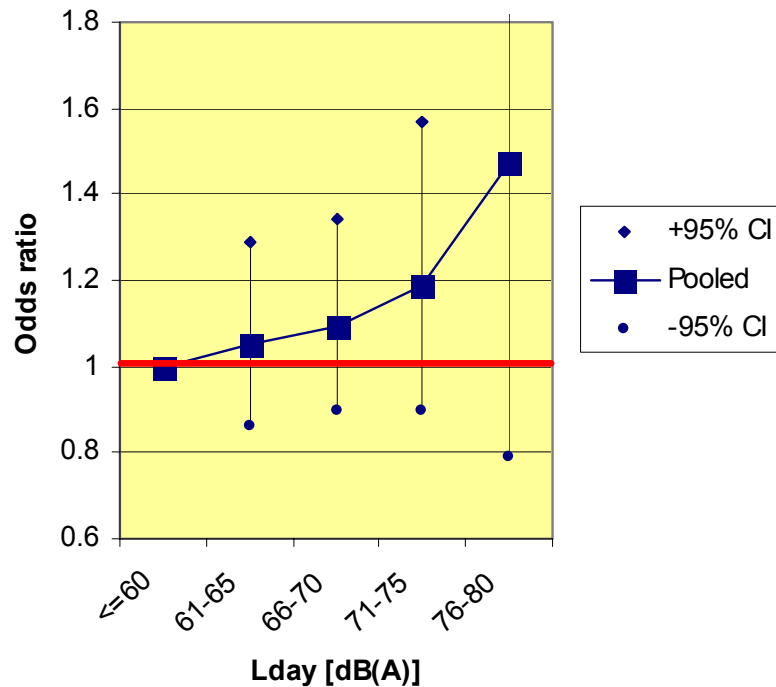
Prevalence and Incidence of Ischaemic Heart Diseases

Review



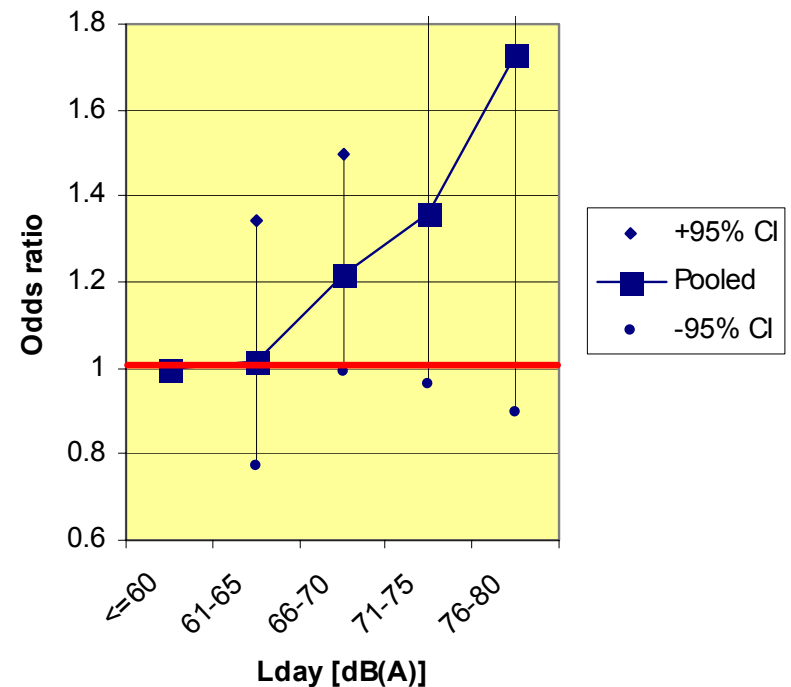
Lengths of Residence

Total sample



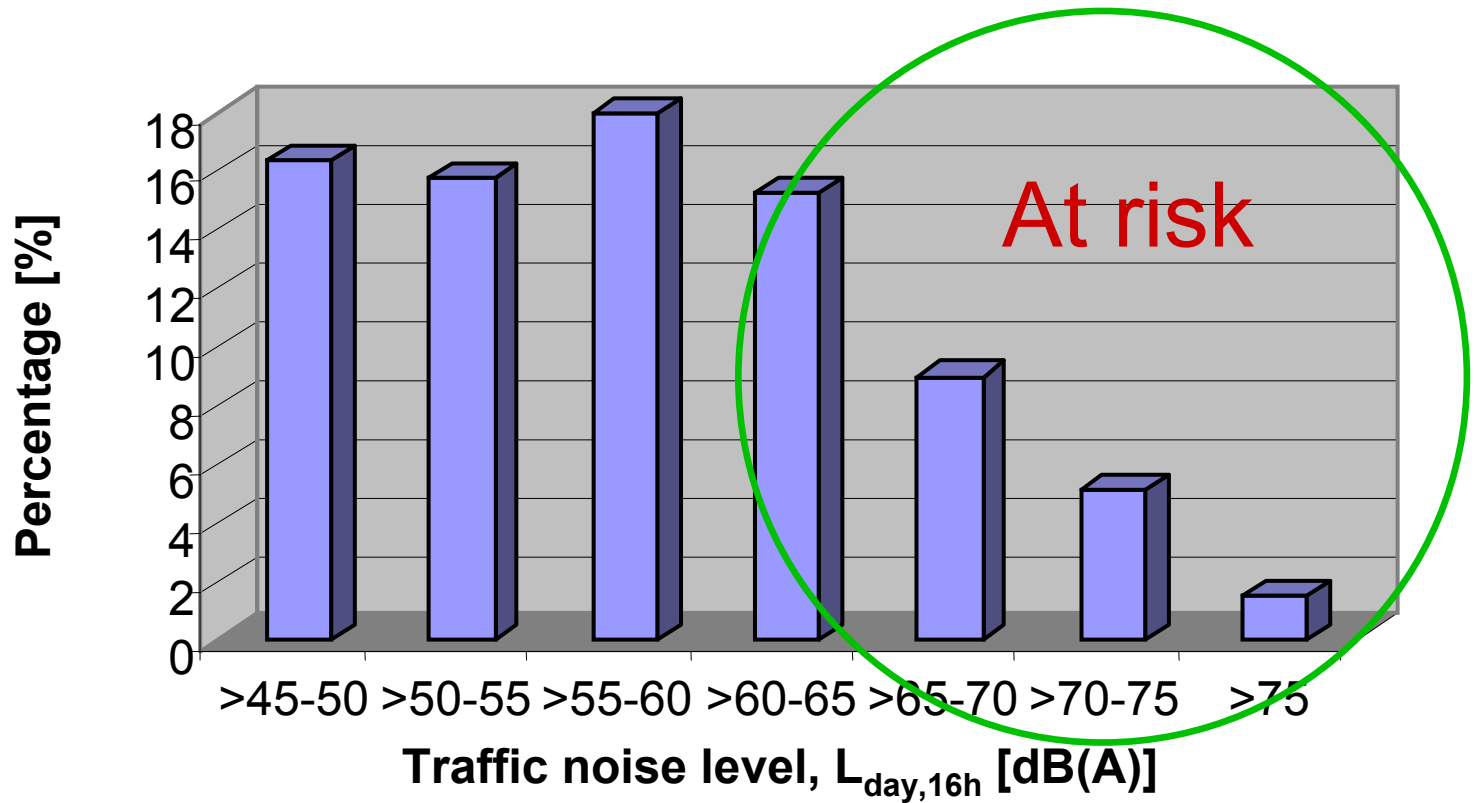
>70 dB(A): OR = 1.25, p = 0.086

Sub-sample >10/15 years of residence



>70 dB(A): OR = 1.44, p = 0.020

Road Traffic Noise Exposure in Germany



EU Environmental Noise Directive

2002/49/EC

- Noise mapping

Until 2007 for communities > 250,000 inhabitants

Until 2012 for communities < 250,000 inhabitants

Noise metrics: L_{den} (L_{day} , L_{eve} , L_{night}), L_{night}

National calculation methods (road, rail, air, industry)

Harmonisation

- Informing the public

- Action plans

Until 2008 for communities > 250,000 inhabitants

Until 2013 for communities < 250,000 inhabitants

- Reporting to the EU Commission
(number of people affected)