

## **WHO Environmental Noise Guidelines for the European Region: A systematic review on environmental noise and effects on sleep**

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### **ABSTRACT**

To evaluate the strength of evidence on the effects of environmental noise on sleep, a systematic literature review was conducted. A meta-analysis of surveys and a pooled analysis of polysomnographic studies on the effects of transportation noise on sleep were conducted. A narrative review was conducted for motility, cardiac and blood pressure outcomes, and children's sleep. The effect of wind turbine and hospital noise on sleep was also assessed. The unadjusted odds ratio for the percent highly sleep disturbed for a 10 dB increase in  $L_{\text{night}}$  was significant for aircraft (1.936; 95% CI 1.608-2.332), road (2.126; 95%CI 1.820-2.483), and rail (3.058; 95%CI 2.378-3.933) noise. The unadjusted odds ratio for the probability of awakening for a 10 dB increase in the indoor  $L_{\text{max}}$  was significant for aircraft (1.351; 95%CI 1.218-1.499), road (1.360; 95%CI 1.192-1.550), and rail (1.354; 95% CI 1.209-1.515) noise. Based on the evidence, transportation noise affects objectively measured sleep physiology and subjectively assessed sleep disturbance. For other outcome measures and noise sources evidence was conflicting or only emerging.

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