

## The impact of environmental noise on health

Over the years, research efforts, including large EU-funded projects, have been dedicated to the quantitative assessment of the relationship between environmental noise and its harmful effects. Several guidelines and position papers have been written reflecting the main findings, aimed at guiding environmental noise policy for the prevention of harmful effects and prioritizing between policy options. In the Guidelines for Community Noise, the World Health Organization (WHO) recognizes effects of environmental noise, including annoyance, as a serious health problem. In the guidelines, noise levels are presented above which negative effects on health are to be expected. Such values are given for specific environments (see Table 1). When multiple adverse health effects are identified for a given environment, the values are set at the level of the lowest adverse health effect (the “critical health effect”). In addition, the WHO Night Noise Guidelines for Europe (WHO, 2009), focusing on the health effects of nocturnal noise, indicate threshold levels for each effect and propose a guideline value for night-time levels see Table 2).

**Table 1:** Selected values from the WHO Guidelines for Community Noise

Specific environment	Critical health effect	Day: $L_{Aeq}$ (dB(A))	Time base (hours)
Outdoor living area	Serious annoyance, daytime and evening. Moderate annoyance, daytime and evening	55 50	16 16
Dwellings, indoor	Speech intelligibility and moderate annoyance, daytime and evening	35	
School class rooms, and pre-schools, indoors	Speech intelligibility, disturbance of information extraction, message communication	35	During class
School playground, outdoor	Annoyance	55	During play
Hospital ward rooms, indoor	Sleep disturbance, daytime and evenings	30	16
Hospital, treatment rooms, indoors	Interference with rest and recovery	As low as feasible	

**Table 2:** Summary of effects and threshold levels for effects of nocturnal noise where there is sufficient evidence available (taken from WHO Night Noise Guidelines for Europe, 2009)

Effect		Indicator	Threshold, dB
Biological effects	Change in cardiovascular activity	1	1
	EEG awakening	$L_{Amax}$ , inside	35
	Motility, onset of motility	$L_{Amax}$ , inside	32
	Changes in duration of various stages of sleep, in sleep structure and fragmentation of sleep	$L_{Amax}$ , inside	35
Sleep quality	Waking up in the night and/or too early in the morning	$L_{Amax}$ , inside	42
	Prolongation of the sleep inception period, difficulty in getting to sleep	1	1
	Sleep fragmentation, reduced sleeping time	1	1
	Increased average motility when sleeping	$L_{night}$ , outside	42
Well-being	Self-reported sleep disturbance	$L_{night}$ , outside	42
	Use of somnifacient drugs and sedatives	$L_{night}$ , outside	40
Medical conditions	Environmental insomnia <sup>2</sup>	$L_{night}$ , outside	42
<p><i>Notes:</i></p> <ol style="list-style-type: none"> <li>1. Although the effect has been shown to occur or a plausible biological pathway could be constructed, indicators or threshold levels could not be determined</li> <li>2. Environmental insomnia is the result of diagnosis by a medical professional whilst self-reported sleep disturbance is essentially the same, but reported in the context of a social survey</li> </ol>			

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