

# Science for Environment Policy

## What makes railway noise annoying? Research investigates

**A new study into the impact of railway noise** has revealed that it is not just the level of noise that contributes to annoyance for local residents, but also the number of trains and the vibrations they cause. As railway transport is likely to increase in coming years, plans are needed to reduce these effects.

**A recent report by the World Health Organization (WHO)** estimated that one in three individuals in Europe is annoyed by environmental noise during the daytime and one in five suffers disturbed sleep at night as a result of traffic noise. Although railway traffic noise disturbs fewer people than road traffic noise, rail transport is increasing. To mitigate any negative noise-related impacts, it is important to gain a clearer understanding of what influences people's reaction to noise.

The study was conducted in Sweden and aimed to investigate the effects of train numbers and ground vibrations on the relationship between railway noise levels and annoyance for local residents. Several sites in Sweden were studied that varied in the intensity of rail traffic and level of vibrations experienced. The researchers calculated the average noise levels caused by railway traffic over 24 hours and conducted a survey amongst local residents on their level of annoyance caused by the railway noise. They also calculated the number of trains for each site and estimated the level of ground vibrations caused by each train.

The results indicated that both the number of trains and ground vibrations are influential in the annoyance experienced by people exposed to railway traffic. Ratings of annoyance were significantly higher in areas with a very large number of trains and areas that experienced ground vibrations.

Further analysis indicates an interactive effect, whereby stressors, such as vibrations or train frequency, enhance the negative effect of noise exposure on health and well-being. A possible reason for this could be that information from other senses, for example, the sight of several trains passing or the sensation of ground vibrations, changes the auditory experience, increasing the perception of noise and making it difficult to ignore. It was estimated that, in this case, very high numbers of trains (in the range of about 500 per day) and the presence of vibrations enhanced the perception of noise by about 5 to 7 decibels.

The study also investigated the effect of balconies and bedroom windows. The results indicated that noise annoyance was about twice as high for residents in houses with balconies facing the railway line and about 1.5 times higher for residents with bedroom windows facing the railway line.

In summary, the study suggests that if changes in railway transport are due to increase the number of trains and/or the vibration levels in an area, then attempts should be made to mitigate increases in annoyance. This could be achieved by reducing noise levels through technology, such as quieter engines, or careful land planning, or by avoiding the building of new railway lines on land that is sensitive to vibrations, such as clay. In addition, windows and balconies should be on the opposite side of a building to the railway. If this is not possible, sound insulation on windows facing railways may help.



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