14th ICBEN 2023 18 - 22 JUNE BELGRADE

14th ICBEN Congress on Noise as a Public Health Problem

Exposure-response relationships for air traffic noise annoyance and sleep disturbance in the Netherlands

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ABSTRACT

The aim of this study was to investigate the association between aircraft noise exposure and the probability to be highly annoyed or sleep disturbed among residents living in the vicinity of 14 airports in the Netherlands. We used data from the Municipal Public Health Service Health Monitor 2020, a nationwide survey among 530.248 participants of which 252.418 were included. Annoyance and sleep disturbance were measured using an 11-point scale question and dichotomized. Aircraft noise levels from civil and military aviation were modelled at the grid-point (100x100 meters) closest to the home address by the Netherlands Aerospace Centre. Besides logistic regression analyses with a linear exposure effect on the logit-scale, we also conducted analyses using a natural cubic spline to account for possible non-linear effects. For most airports it was possible to derive an exposure-response relationship. Our findings show that the derived relations are airport specific. In 2020, more residents were highly annoyed and sleep disturbed at the same noise levels than in 2002 (Amsterdam Schiphol Airport). Our study demonstrated that using a spline resulted in more accurate results for most airports, however more research on the application of this method is needed. The survey was conducted during the coronavirus pandemic, which may have influenced the results, for example more people might have worked at home. Further research is needed to understand differences found between the airports such as the possible role of co-determinants. This research shows that the application of airport specific and recent non-linear exposure-response relationships are recommended.

Keywords (3-6): Noise, Sleep disturbance, Annoyance, Air traffic noise, exposure-response relationship.