

Long-term Nighttime Noise Exposure and Incident Hypertension in a National U.S. Cohort of Female Nurses

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ABSTRACT

There is growing interest in health impacts of nighttime noise, given that noise can disturb sleep and sleep disturbance increases hypertension risk. However, there has been little empirical research evaluating the association between nighttime noise and hypertension risk. In this study, we expand on previous work to evaluate associations between nighttime aircraft noise exposure and self-reported hypertension incidence in the Nurses' Health Studies (NHS/NHSII), two U.S.-wide cohorts of female nurses. Annual nighttime average aircraft sound levels (L_{night}) surrounding 90 airports for 1995-2015 (in 5-year intervals) were modeled using the Aviation Environmental Design Tool and assigned to participants' geocoded addresses over time. Hypertension risk was estimated using time-varying Cox proportional-hazards models for L_{night} dichotomized at 45 decibels (dB(A)), adjusting for individual risk factors, area-level socioeconomic status, region, and air pollution. Random effects meta-analysis was used to combine cohort results.

Among 63,600 NHS and 98,938 NHSII participants free of hypertension at study baseline (1994/1995), we observed 14,391 and 12,144 new hypertension cases by 2013, respectively. Less than 2% of participants were exposed to $L_{night} \geq 45$ dB(A). In NHS, we observed adjusted hazard ratio (HR) of 1.10 (95% CI: 0.95, 1.27), and for NHSII, adjusted HR of 1.13 (95% CI: 0.99, 1.30) comparing exposure to $L_{night} \geq 45$ versus <45 dB(A). In the meta-analysis, we observed adjusted HR of 1.12 (95% CI: 1.01, 1.23). Our findings support a positive association between nighttime aircraft noise and hypertension risk across NHS/NHSII, which may further reinforce the concept that sleep disturbance contributes to noise-related disease burden.

Keywords (**3-6 words**): Aircraft, Hypertension, Nighttime, Noise, Transportation

