

Motivation and Objectives

Motivation

- Studying health effects of aircraft noise is important in policy models, but limited U.S. studies exist.

Objectives

Long Term:

- Evaluate associations between aircraft noise and cardiovascular outcomes, in cross-section and over time.
- Estimate population attributable risk.

Short Term:

- Assign aircraft noise exposures over time to geocoded participant addresses.
- Develop models to investigate noise effects on cardiovascular outcome(s).
- Explore additional cohorts for analysis of the noise-cardiovascular disease (CVD) relationship.

Methods and Materials

Leverage data from the Women's Health Initiative (WHI) and other existing longitudinal cohorts. Key attributes:

- Large sample size and geographic distribution.
- Individual data on traditional CVD risk factors (e.g., age, smoking).
- Geocoded addresses over time.
- Systematically ascertained, physician-reviewed and adjudicated outcomes.
- Information on proximity to major roadways and air pollution exposure.

Assign noise exposure to geocoded address over time.

- Obtain noise levels in multiple metrics, out to DNL 45 dB.
- Interpolate noise estimates spatially and temporally

Develop survey questions on housing characteristics, noise perception and stress.

Summary

- Obtained National Institute of Health (NIH) funding to continue multi-year study of aircraft noise exposure and cardiovascular health in the WHI.
- Obtaining noise data for 2000-2015.
 - Operational data source: Enhanced Traffic Management System (ETMS) run through INM/AEDT
 - Noise estimates out to DNL 45 dB.
 - Noise estimates in multiple metrics.
- Assigning longitudinal aircraft noise exposure to geocoded addresses.
- Extending efforts to evaluate health effects of noise in the longitudinal Nurses' Health Studies (women) and companion Health Professional Follow-up Study (men) cohorts.
 - Will address NHS/HPFS processes.
 - Will assign noise exposure.
 - Will develop survey questions on housing characteristics, noise perception and stress.

Key Barriers

- Historical modelling - spatially and temporally interpolating noise exposure particularly prior to 2000.
- Procedures/applications involved in working with the NHS/HPFS.

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Results and Discussion

Completed procedural steps related to accessing WHI data for linkage with noise data:

- Obtained approval from BU and University of North Carolina Human Subjects Review Boards.
- Entered into Data Use Agreement with WHI.

Coordinated with FAA regarding noise data:

- Entered into Data Use Agreement.
- Linked 'test' noise data to find potential issues.
- Received 'final' noise data for:
 - Years: 2000, 2005, 2010, 2015.
 - Metrics: DNL, Leq Day, Leq Night, Leq.
- WHI participants resided near 77 airports, 40 of which had at least 100 subjects within the DNL 45 dB contour.

Number of WHI participants within the DNL 45 dB Contour (2000) by Region

Region	A	B	C	D	Total
N	8592	8107	7811	7293	31,515
<small>*masked WHI/census region (Northeast, South, Midwest, West)</small>					

Conclusions

Outcomes

- Improved understanding of how populations are exposed to aircraft noise over time.
- Estimate of risks of cardiovascular outcomes associated with noise-related exposures among adults.
- Evidence regarding pathways by which aircraft noise can influence cardiovascular disease.

Practical applications

- Could improve ability to quantify (and monetize) health outcomes rather than just focusing on property value as the only approach for valuation.