

Cardiovascular Disease and Airport Noise Exposure Project 03

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Linkage to AEE Roadmap

- Health Impacts of Aviation Noise
 - To investigate the risks of cardiovascular outcomes associated with noise-related exposures

Goal of the Project

- Aims to evaluate the relationship between aircraft noise exposure and cardiovascular health by linking with existing national longitudinal health cohorts – Nurses' Health Study (NHS)/Health Professional Follow-up Study (HPFS) – for which detailed individual data and high geographical resolution are available.

Schedule and Status



- March 2015: Obtain noise estimates
 - Received 2000, 2005, 2010, 2015 data
 - Awaiting 1995 data; resolving noise modeling-related issues
- November 2016: Link noise exposure with cohort data
 - New projected date: June 2017
- January 2017: Determine relevant cardiovascular outcomes
 - Completed
- March 2017: Determine number of participants residing near airports and develop analysis plan of noise-health
 - Determined based on 2009 noise data
 - Developed/presented/obtained approval for two analysis plans – (1) Noise-hypertension and (2) Noise-cardiovascular disease.
- March/April 2017 -Develop/select survey questions on environment, noise perception, sleep disturbance
 - In progress

Approach and Accomplishments



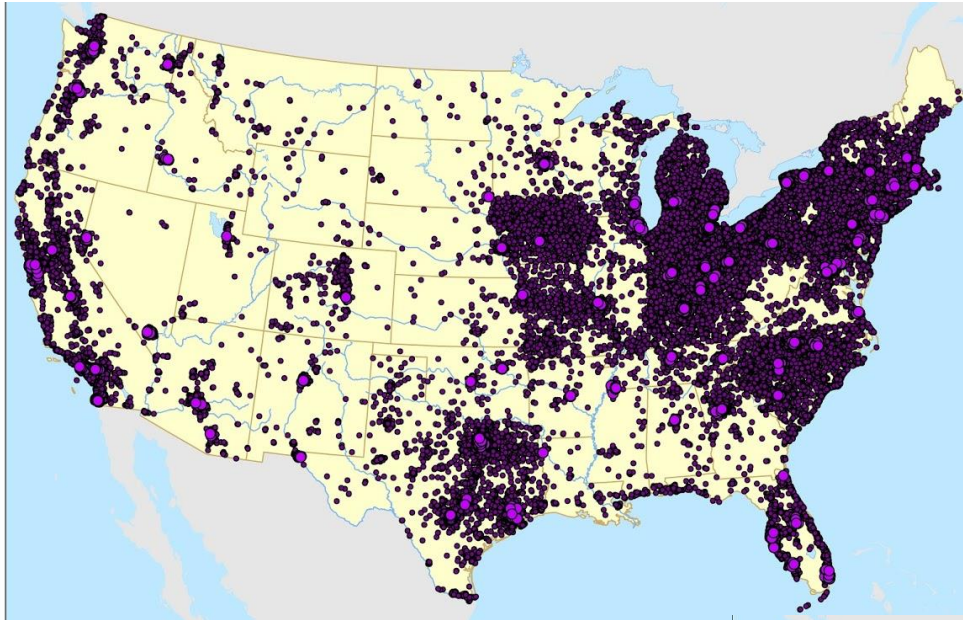
- Completed procedural steps related to accessing NHS/HPFS data for linkage with noise data
 - Obtained human subjects approvals from Boston University and Brigham & Women's (Harvard)
 - Developed/obtained approvals for noise-health analysis:
 - Relation of noise to hypertension
 - Relation of noise to cardiovascular disease (CVD)
 - Determined number of participants living near airports
 - Determined number of participants with cardiovascular outcomes
- Coordinated with FAA regarding noise data
 - Entered into a Data Use Agreement
 - Obtained and linked test noise data (2009)

Study Population: NHS, NHSII, HPFS



- **Nurses' Health Study**
 - Began 1976, includes 121,701 women, registered nurses living in 11 populous states at enrollment
 - At noise study baseline (1995) - 96,000 alive and free of CVD
- **Nurses' Health Study II**
 - Began 1989, includes 116,430 women, registered nurses living in 14 populous states at enrollment
 - At noise study baseline (1995) - 115,000 alive and free of CVD
- **Health Professional's Follow-Up Study**
 - Began 1986, includes 51,529 men
 - Dentists, pharmacists, optometrists, osteopath physicians, podiatrists, and veterinarians throughout the US
 - At noise study baseline (1995) - 50,000 alive and free of CVD
- **Biennial follow-up with mailed questionnaires**
 - Each collects information on risk factors (e.g. diet, physical activity, smoking, hormone use) and occurrence of diseases

Results: Participants



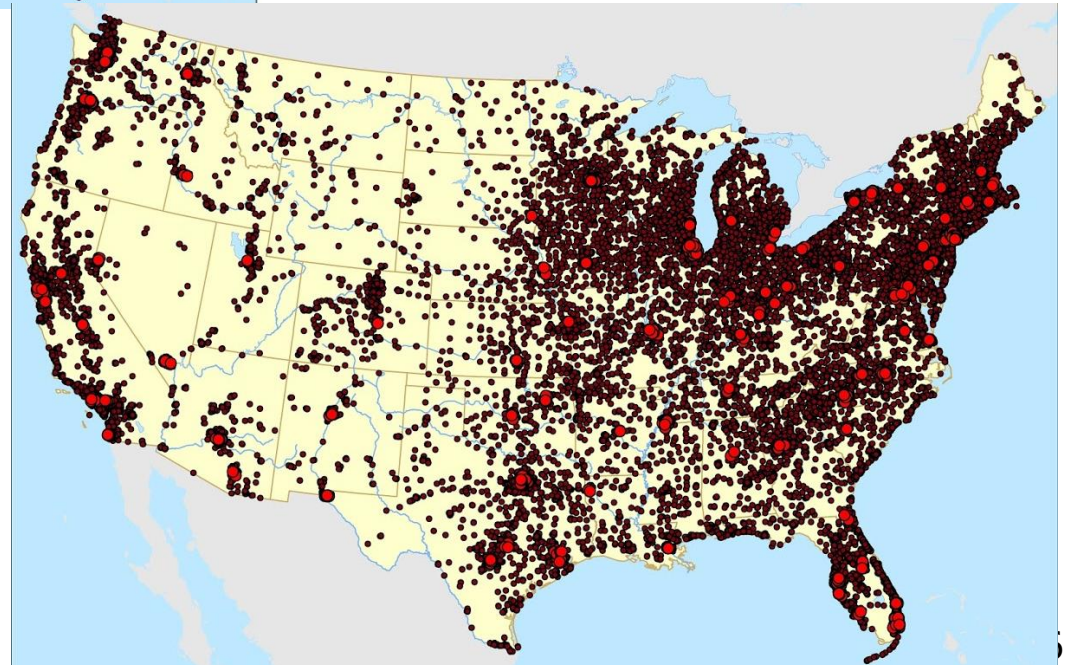
Exposed to \geq DNL 45 dB
(2009)

NHS: 5,666

NHS II: 5,802

Exposed to \geq DNL 45 dB
(2009)

HPFS: 2952

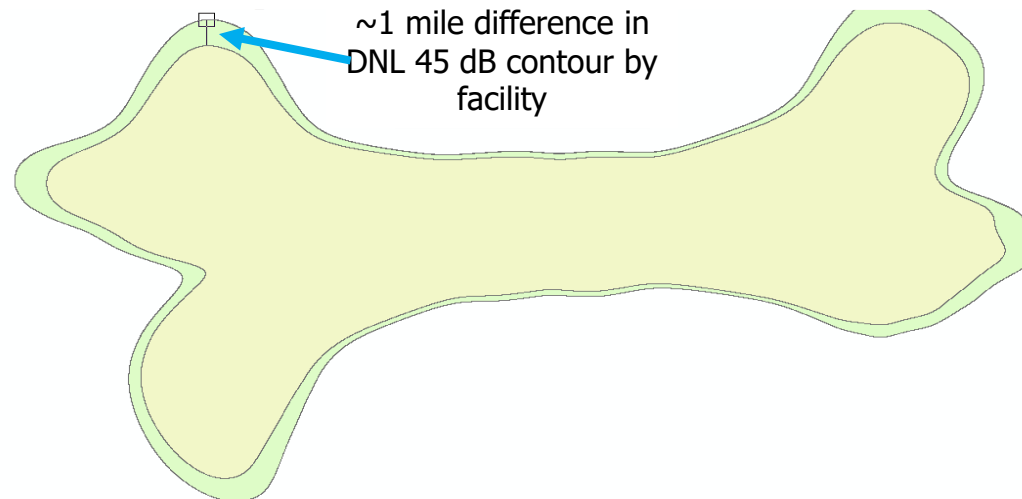


Results: Noise Modeling

- Differences in AEDT modeling procedures by Volpe and Wyle

AEDT Modeling Procedures with Differences
Operation Records (cut off procedures)
Meteorological Conditions (airport-specific vs. standard atmosphere)
Grid Size (dynamic vs. manual)
Grid Resolution

- If high correlations between estimates at an address that has systematic bias - easy to address.
- Bias that differs by location - more problematic.



Summary



- Summary statement
 - We will evaluate the health effects of aircraft noise exposure in two companion cohorts with 1) participant-level exposures, 2) systematically ascertained, physician-reviewed outcomes, and 3) individual-level risk factors.
- Next steps
 - Obtaining 1995 noise data and resolving issues related to differences in model parameters selected by Volpe vs. Wyle
 - Linking noise exposure with cohort data
 - Performing analysis to evaluate associations between noise and health
- Key challenges/barriers
 - Obtaining 1995 noise data.
 - Creating correction factor to address differences in noise modeling output by facility (Volpe vs. Wyle).

Publications

- N/A

Contributors

- BUSPH: Junenette Peters, Jonathan Levy
- Harvard: Francine Laden, Jamie Hart

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- Colditz GA. Nurses' Health Study: demonstrating the impact of research, and adapting new measures and approaches to increase relevance and effect of cohort studies. *Public Health Res Pract*. 2016;26(3):e2631628.
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Collaboration



- Between Noise PIs
 - Pennsylvania State University with NIH funding

- With Advisory Board
 - Wyle

- Other
 - Volpe Transportation Center
 - *Potential*: Project 17 (Aircraft Noise and Sleep Disturbance)