

Exploring the Impact of Wind Turbine Noise on Sleep Quality

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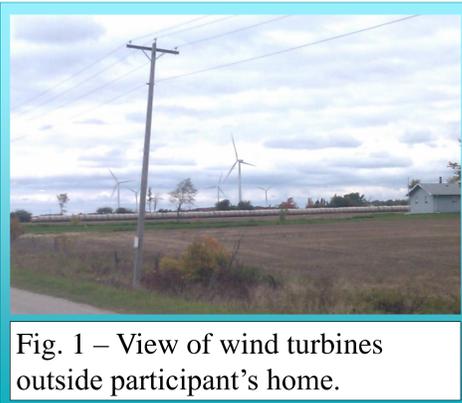


Fig. 1 – View of wind turbines outside participant's home.

Background

- Wind power represents 4.4% of Ontario's electricity production¹ and is expected to increase
- To date, health research has focused on sleep disturbance due to noise emissions
- No published studies have objectively measured the impact on sleep
- The goal of this research is to determine if wind turbines are a risk factor for poor sleep quality

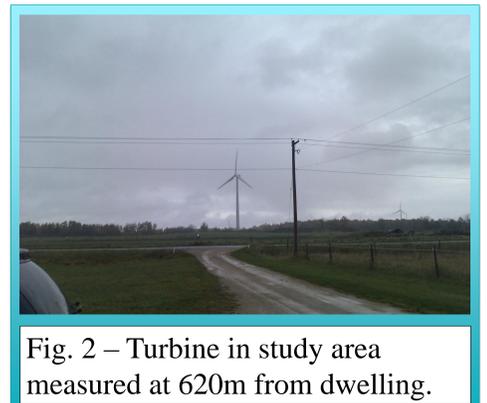


Fig. 2 – Turbine in study area measured at 620m from dwelling.

Methods

- Cohort study design
 - Exposed (Wind Turbines; n = 12)
 - Unexposed (No Wind Turbines; n = 12)
- 24 participants followed for 5 days each
- Sleep quality measured in two forms
 - Objective: actigraphy
 - Subjective: sleep diary
- Noise exposure measured inside the bedroom during sleep hours (2300 – 0700) using 8 hour equivalent (L_{Aeq}) and maximum sound pressure level (L_{Amax})



Fig. 3 – Actigraphs will be worn around the wrist for 5 nights.

Preliminary Results - Exposed

- 50 nights of data have been obtained from 11 participants
- Total Sleep Time was an average of 7.47 hours/person (95% CI [7.07,7.88])
- Mean Sleep Efficiency of 89.08% (95% CI [88.69,89.43])
- Mean Sleep Quality rated 3.4 on a 6-point scale
- L_{Aeq} did not exceed regulatory limits for any of the observation nights (Fig. 4)

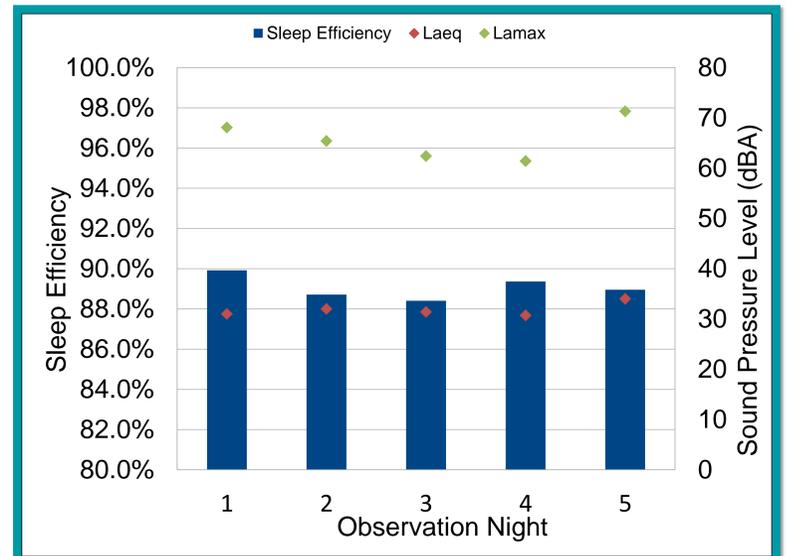


Fig. 4 – Sleep efficiency among exposed individuals for each night of observation showing measured sound pressure level during sleep hours.

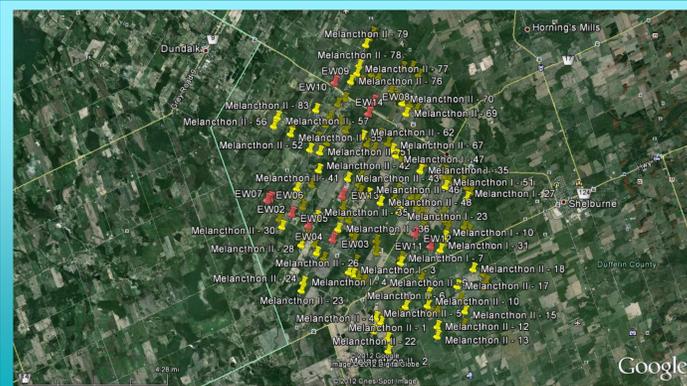


Fig. 5 – Satellite image of exposure area. Participant's homes are shown in red. Wind turbines are shown in yellow.

Future Work

- Continue data collection in unexposed group
- Perform more in-depth data analysis
- Expected completion December 2012

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