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WindVOiCe, a Self-Reporting Survey: Adverse Health Effects, Industrial Wind Turbines, and the Need for Vigilance Monitoring

Carmen M.E. Krogh[1], Lorrie Gillis[2], Nicholas Kouwen[3], and Jeff Aramini[4]

Abstract

Industrial wind turbines have been operating in many parts of the globe. Anecdotal reports of perceived adverse health effects relating to industrial wind turbines have been published in the media and on the Internet. Based on these reports, indications were that some residents perceived they were experiencing adverse health effects. The purpose of the WindVOiCe health survey was to provide vigilance monitoring for those wishing to report their perceived adverse health effects. This article discusses the results of a self reporting health survey regarding perceived adverse health effects associated with industrial wind turbines.

Keywords

Self-reporting, adverse health effects, industrial wind turbines, health survey, vigilance monitoring

Introduction

Many Ontarians living close to industrial wind turbines (IWTs) who believe they are suffering adverse health effects are hesitant to report their symptoms. Individuals report that this hesitancy is because of the manner in which their claims have often been discounted or ignored by the wind energy industry and government officials (Hansard, 2009, pp. G-516, G-547). As a result of a limited number who first came forward to report their symptoms, WindVOiCe was established in March 2009.

WindVOiCe is a self-reporting health survey that collects data about adverse health effects being reported by families living near IWTs. The WindVOiCe health survey follows the principles of Health Canada's *Canada Vigilance Programs*, which encourages all consumers in Canada to self-report perceived adverse health effects from prescription and consumer products, vaccines and other. Medical and health care practitioners are encouraged to report perceived adverse health effects to the *Canada Vigilance*. Consumers do not have to prove the effect, only perceive it. The pharmaceutical industry is obligated by law to submit any reported adverse health effects it receives to Health Canada (Health Canada, n.d.).

The objectives of WindVOiCe are to

document any changes in health outcomes among individuals living near IWTs

if documented, provide information to assess the need for large-scale controlled epidemiological studies and to establish evidence-based and safe residence setback distances.

Methods

Study Design and Participant Recruitment

This is a self-reporting survey based on perceived adverse health effects occurring with the onset of an industrial wind turbine facility.

The WindVOiCe survey questionnaire reproduced that of Harry (2007). The questionnaire is designed to collect basic demographic information and information on any new adverse health outcomes and changes to quality of life since the start of the respective IWT project (Appendix A). Health outcome observations included headaches and migraines, heart

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palpitations, excessive tiredness and sleep disturbance, stress and anxiety, depression, tinnitus, and hearing problems.

A Health Survey Contact Flyer was distributed starting in March 2009 to residents in five project areas where adverse health effects had been anecdotally reported (Appendix B): Melancthon Phase 1 and 2 (Shelburne), Canadian Hydro Wind Developers (Shelburne), Kingsbridge 1 Wind Power (Goderich), Kruger Energy Port Alma (Port Alma), Ripley Wind Power (Ripley), Enbridge Ontario Wind Farm (Kincardine), and Erie Shores Wind Farm (Port Burwell).

The Health Survey Contact Flyer was distributed by Canada Post and in some cases by volunteers who hand-delivered it to mailboxes in the areas where IWTs were situated. The opportunity to participate in the WindVOiCe project also involved distributing notices at community information sessions, by word of mouth, and via the Internet (The Society for Wind Vigilance, n.d.).

A confidential toll free telephone number and e-mail address were provided. Those who contacted the WindVOiCe survey team were assured of total confidentiality and anonymity. There were no restrictions placed on the distribution or access to the survey in communities with IWTs. Individuals experiencing adverse health effects and those who were not were encouraged to fill out and submit a health survey. Both hard copy and rarely, electronic copies, were sent on request. Each interested adult in the home was asked to complete a separate survey, with a minimum age of 18 years and fluency in English specified as requirements. The WindVOiCe health survey could not be used by anyone with any cognitive impairment.

Those interested in participating in the study were provided with the survey, a cover page giving general instructions (Appendix C) and a cover note with mailing instructions (Appendix D). Surveys were typically mailed to those wishing to participate and were returned by Canada Post.

Questionnaire Processing

The WindVOiCe Scrutinizer validated each returned survey. The survey contact lead and scrutinizer transferred results into an electronic database (Microsoft Office Excel 2003). Respondents were given the opportunity to include additional comments and these were transcribed exactly as stated. A strict protocol was employed to protect confidentiality and data integrity of the returned surveys.

Data Analysis

All analyses were performed using SAS 9.22 (2008, SAS Institute Inc., Cary, NC).

Descriptive analyses were performed to investigate and describe participant demographics and frequency of health outcome responses. The association between health outcomes and distance to nearest IWT was also investigated. Distance to the nearest IWT was assessed both as a categorical and continuous variable. Significance of associations when distance to nearest IWT was assessed as a categorical variable involved using Proc FREQ (Fisher's exact test). Significance of associations when distance to nearest IWT was assessed as a continuous variable involved using Proc GENMOD (logit link; binomial distribution). Age and gender were included in the Proc GENMOD model if significant at $p < .05$.

For the purpose of interpreting statistical significance, the following parameters were used:

$p < .05$ = significant
p .1 to .05 = moderately significant
$p > .1$ = not significant

Results

Data Preparation for Analysis

- Number of Ontario WindVOiCe survey participants = 109
- Responses of "maybe," "unsure," or "left blank," were all set to "No"
- Those reporting either Altered Health or Altered Quality of Life included = 102
- Four (4) participants were younger than 18 years and were removed.
- Two (2) participants were much further away from IWTs compared with the rest (5 kilometers) and were removed from further analysis given the distance gap.
- Distance to nearest IWT was divided into four groups based on natural break-points among the participants: 350 to 499 meters, 500 to 699 meters, 700 to 899 meters, and 900 to 2400 meters.

Participant Comments

Survey participants were given the opportunity to volunteer comments. A representative selection of comments is provided in Appendix E.

Discussion

A case report is a descriptive study of a single individual (case report) or small group (case series) in which the possibility of an association between an observed effect and a specific environmental exposure is based on clinical evaluations and histories of the individual(s). Because cases in a case series study are often self-identifying and population controls are lacking (as in this study), it is difficult to investigate and measure exposure–outcome relationships, and it is impossible

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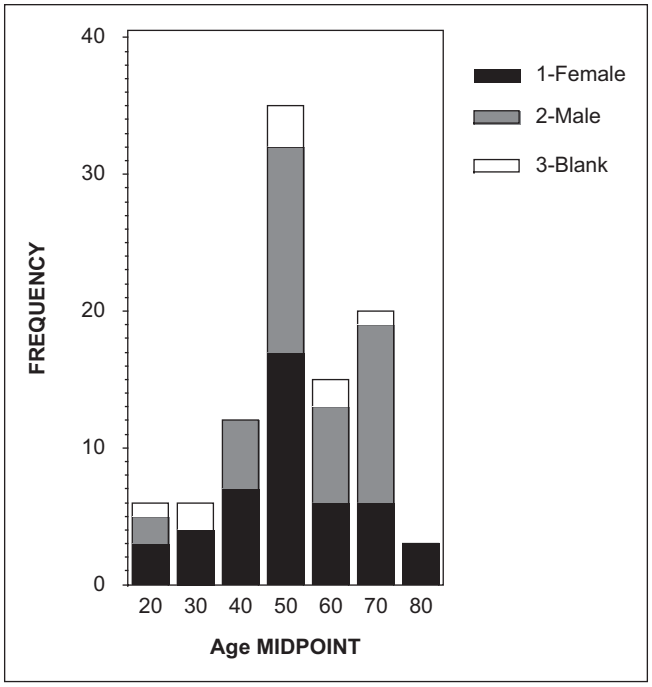

Figure 1. Age (years) and gender of participants
Age: mean = 52 years, range = 19-83 years. Gender: female = 52%, male = 48%.

to extrapolate results to the general population as selection bias is always a concern. That said, case reports (or case series) often provide the first indicators in identifying a new disease or adverse health effect from an exposure.

Study participants ranged in age from 19 to 83 years; there was approximately an equal number of males and females enrolled in the study (Figure 1); and the frequency of participants increased with closer distances to IWTs (Figure 2).

In total, 72% of participants reported increased symptoms of anxiety, stress, or depression since the start of their local wind project (Table 1), and not unexpectedly, mental distress was *not* associated with distance to nearest IWT. Distress likely played a major role in individuals self-identifying themselves for the study, and it is reasonable to assume that individuals experiencing distress because of IWTs for *whatever* reason (real or perceived adverse health effect, attitude, etc.) were more likely to participate in the study. Among study participants, the most common adverse health outcomes reported included sleep disturbance, excessive tiredness, and headaches.

Although it is not possible to compare participants to a control group in this study, it is possible to investigate relationships between exposure levels (as measured by distance to IWT) and outcomes *among* participants. Results suggest dose–response relationships between a number of adverse health outcomes and distance to IWTs, particularly sleep disturbance, excessive tiredness, and headaches (Figures 3-6). Modeling efforts suggested stronger relationships between adverse health events and log-distance to IWTs compared with linear distance. This mirrors the way in which sounds decays as it travels from source to receptor.

Discovering relationships between adverse health outcomes and log-distance (Figures 7-9) to IWTs among self-reported cases is a significant finding and supports the underlying hypothesis that living too close to IWTs can cause adverse health effects. If adverse effects were purely psychosomatic (i.e., the result of emotional distress and fear), one would expect the proportion of individuals self-reporting to increase closer to IWTs in this alternative hypothesis; but among those who did self-report, one would *not* expect dose–response relationships. Lack of a true cause–effect relationship should have resulted in relationships with distance to IWTs as seen with stress, anxiety, and depression (i.e., the primary drivers of self-reporting in this alternative hypothesis).

It is noted that the comments excerpted from the survey range from descriptions of altered quality of life and enjoyment of property, health issues related to noise, flicker and sleep disturbance, altered social and family interactions, concerns about property values and altered financial status, changes in pet and wildlife behavior, and concerns about the future. Some describe the impact on the family unit when a parent or spouse has been billeted at the developers' expense because of adverse health effects. These comments were voluntarily submitted by participants.

Conclusion

Self-reporting is an important research tool and frequently used by the research community. Examples of the use of self-reporting include peer-reviewed articles by Engstrom, Paterson, Doherty, Trabulsi, and Speer (2003), Meyer, McParlan, Sines, and Waller (2009), Zota, Aschengrau, Rudel, and Brody (2010), and Lim et al. (2010). In addition, self-reporting is encouraged with respect to breast cancer vigilance where women are encouraged to conduct routine breast examinations. This self-monitoring is used as an adjunct to other monitoring procedures such as mammograms and checkups by physicians.

It is important not to overinterpret results of a self-reporting case-series study. Outcome measures are crude, and the lack of a control group and potential selection bias prevents investigating traditional population-based epidemiological measures of association (e.g., odds rations, relative risk, etc.). Careful analysis of case-series data, however, can provide important initial indicators regarding underlying causal relationships, providing support for more thorough and larger scale epidemiology studies. Results of this study suggest an underlying relationship between IWTs and adverse health effects and support the need for additional studies.

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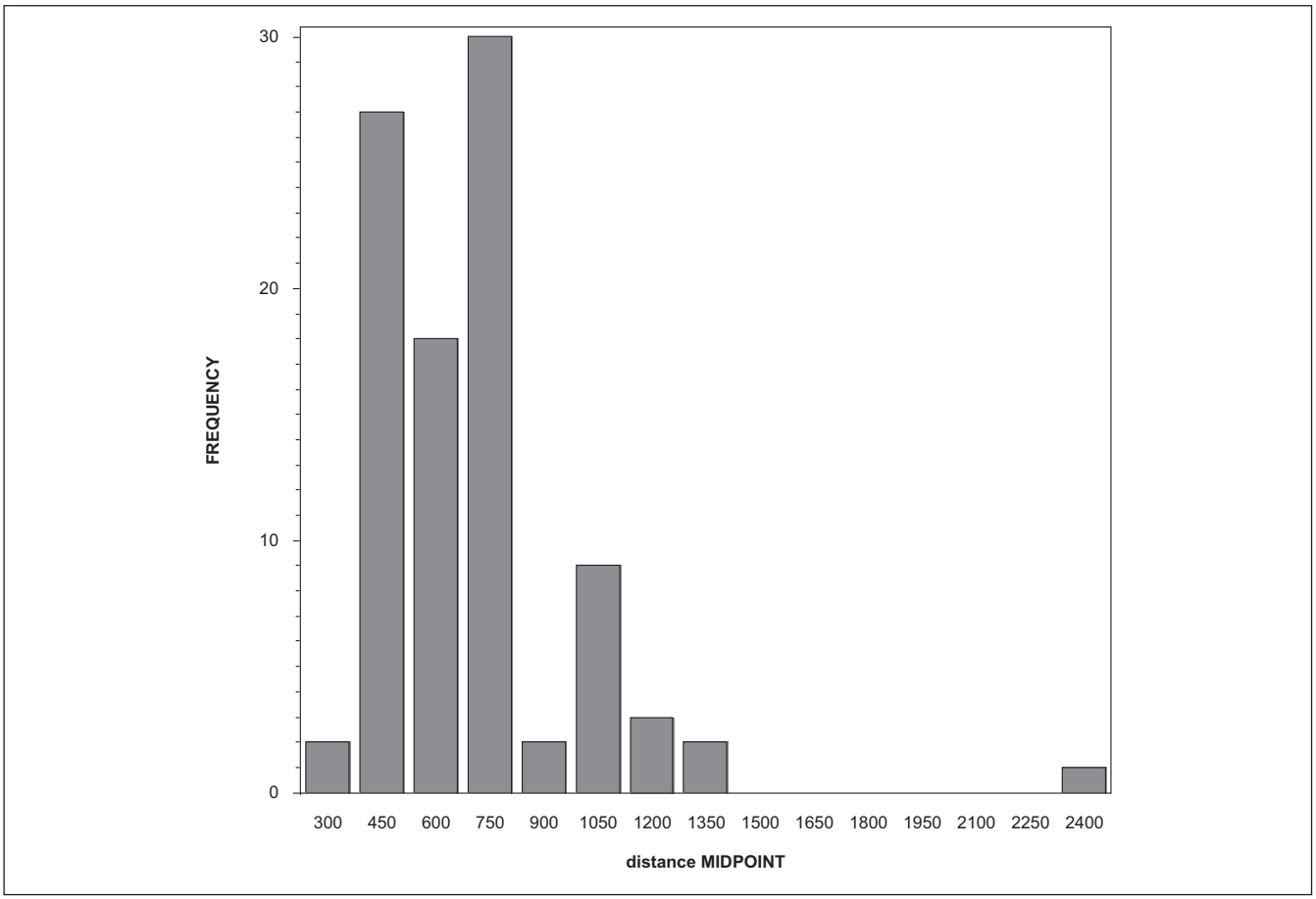

Figure 2. Distance of participants to nearest industrial wind turbine (meters)
Distance: mean = 707 meters, range = 350-2400 meters.

Table 1. Health Outcomes Results

		Distance Range From Residence to Nearest IWT in Meters (Mean)						
Parameter	All Participants	350-490 (428)	500-673 (587)	350-673 (506)	700-808 (769)	900-2400 (1154)	700-2400 (908)	p^a
Number of responses	97	24	23	47	30	17	47	
Altered quality of life (%)	97	96	96	96	100	94	98	1.0000
Altered health (%)	90	93	96	94	87	82	85	.1908
Disturbed sleep (%)	69	78	78	78	60	59	60	**.0778**
Excessive tiredness (%)	76	89	83	86	63	71	66	**.0307**
Headaches (%)	62	74	65	70	60	41	53	**.0990**
Migraines (%)	13	22	13	18	13	0	9	.2358
Hearing problems (%)	35	22	57	38	27	41	32	.6706
Tinnitus (%)	56	59	61	60	33	41	51	.4179
Heart palpitations (%)	34	26	39	32	33	37	36	.6750
Stress (%)	69	74	57	66	70	76	72	.5189
Anxiety (%)	52	52	57	54	40	65	49	.6864
Depression (%)	41	44	48	46	33	41	36	.4099
Distress[b] (%)	72	74	61	68	73	82	77	.3735
Approached doctor (%)	38	37	39	38	40	35	38	1.0000

Note: Significant or moderately significant *p* values are in the boldfaced.
[a]Fisher's exact test.
[b]Distress = "Yes" if at least one of stress, anxiety, or depression reported as "Yes."

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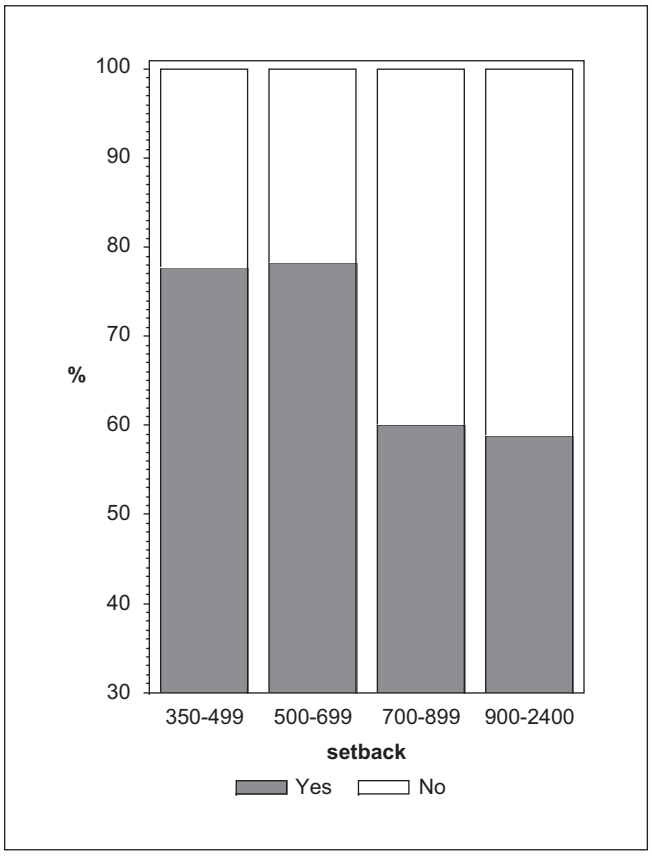

Figure 3. Sleep disturbance by distance (meters)

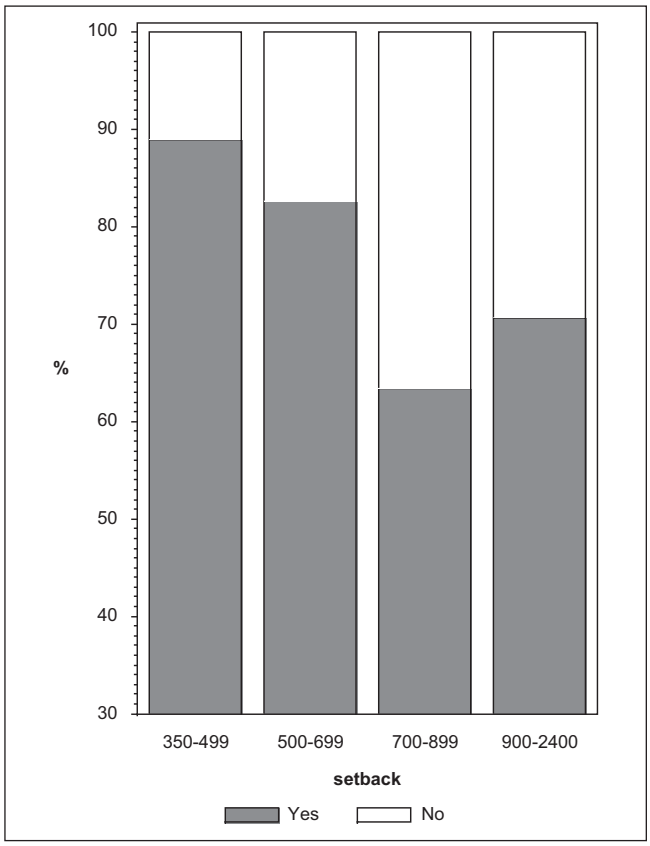

Figure 4. Excessive tiredness by distance (meters)

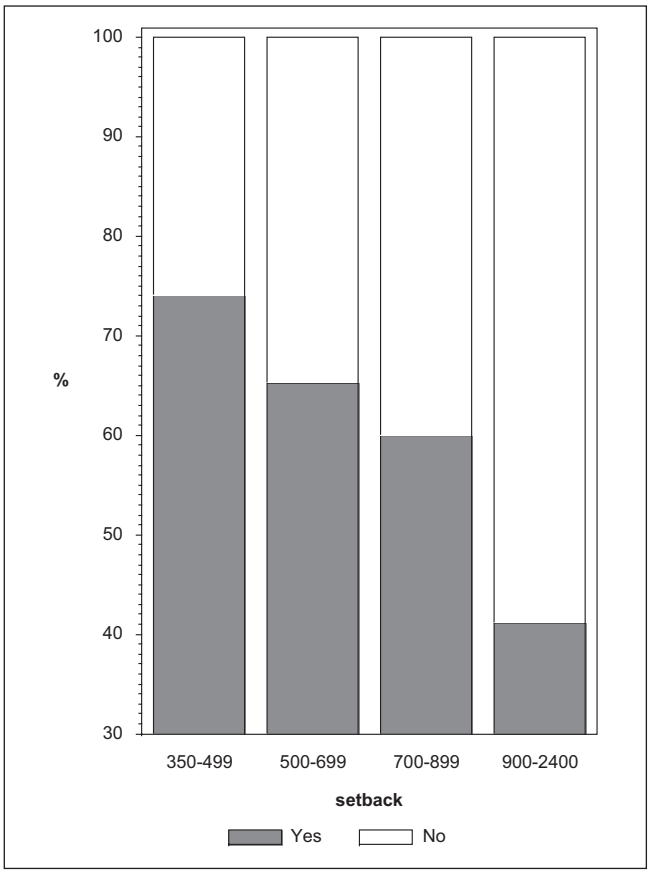

Figure 5. Headaches by distance (meters)

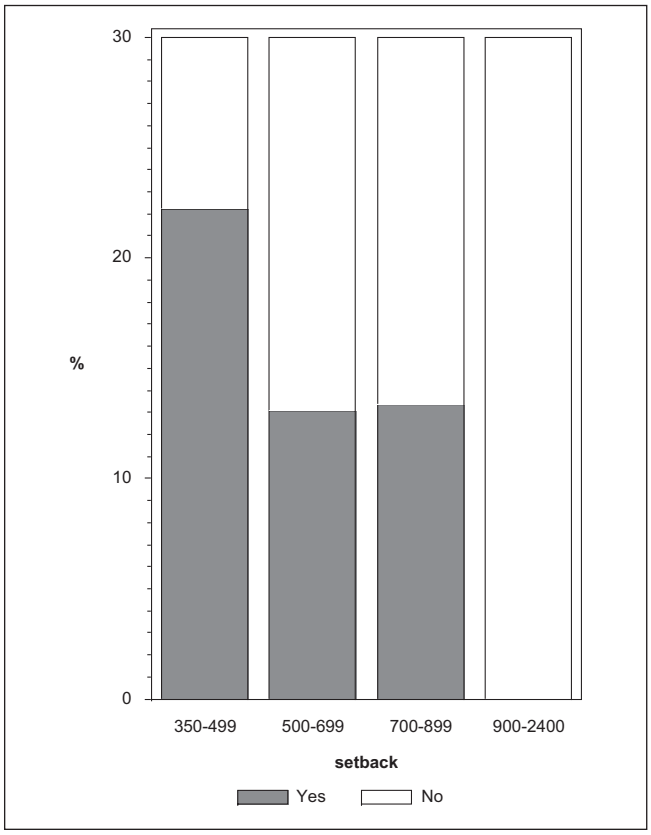

Figure 6. Migraines by distance (meters)

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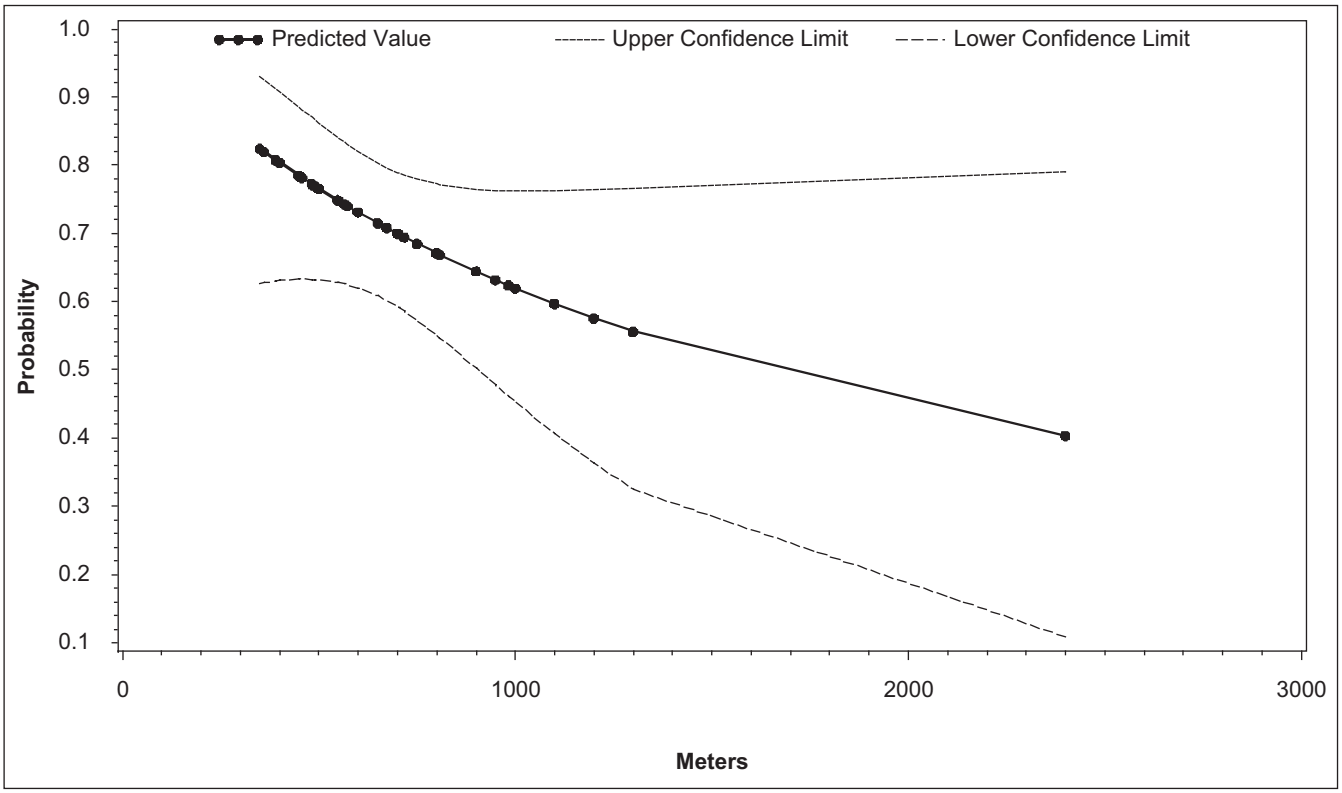

Figure 7. Predicted probability of sleep disturbance by distance to industrial wind turbine (95% upper and lower confidence limits) Proc Genmod (logit link; binimoial distribution). Sleep = ln(distance) + sex + intercept. *p*(ln distance) = .1015.

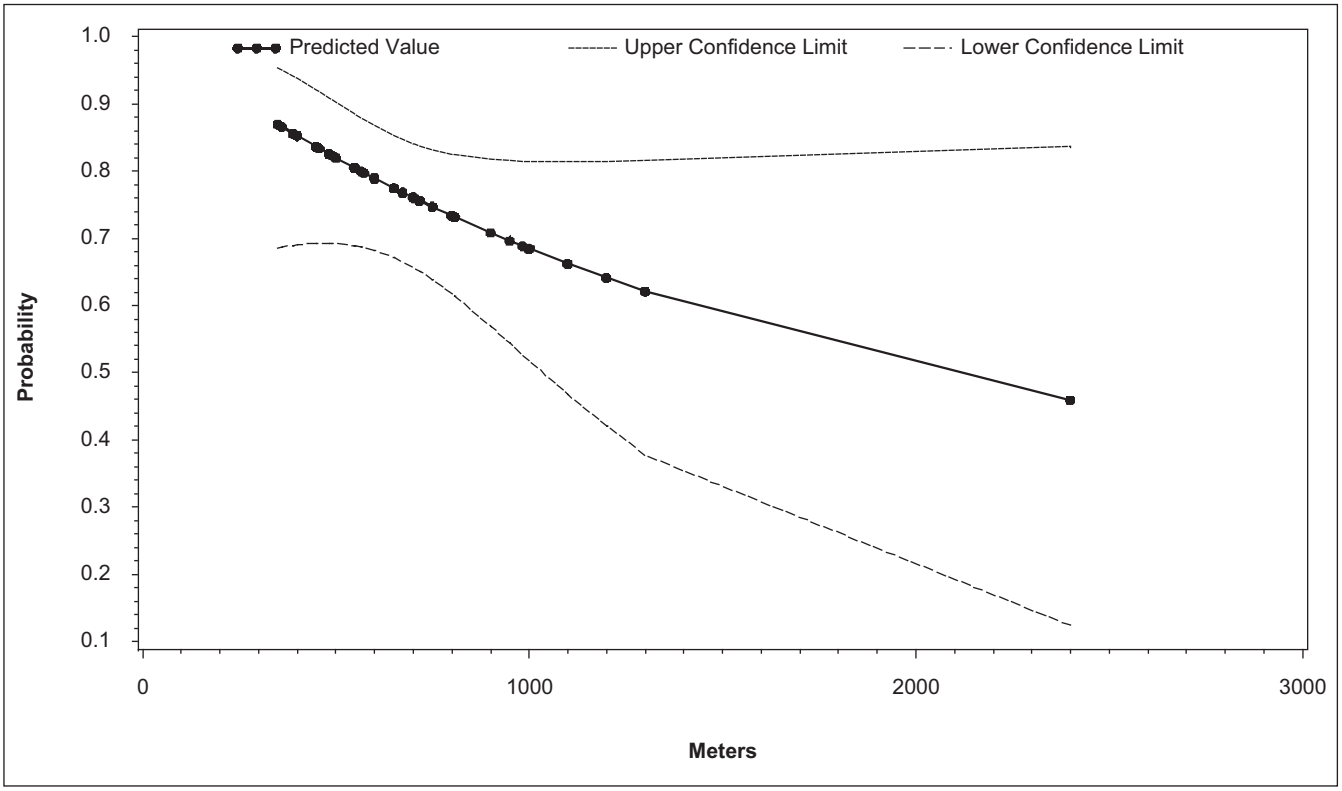

Figure 8. Predicted probability of excessive tiredness by distance to industrial wind turbine (95% upper and lower confidence limits) Proc Genmod (logit link; binimoial distribution). Excessive tiredness = ln(distance) + sex + intercept. *p*(ln distance) = .1005.

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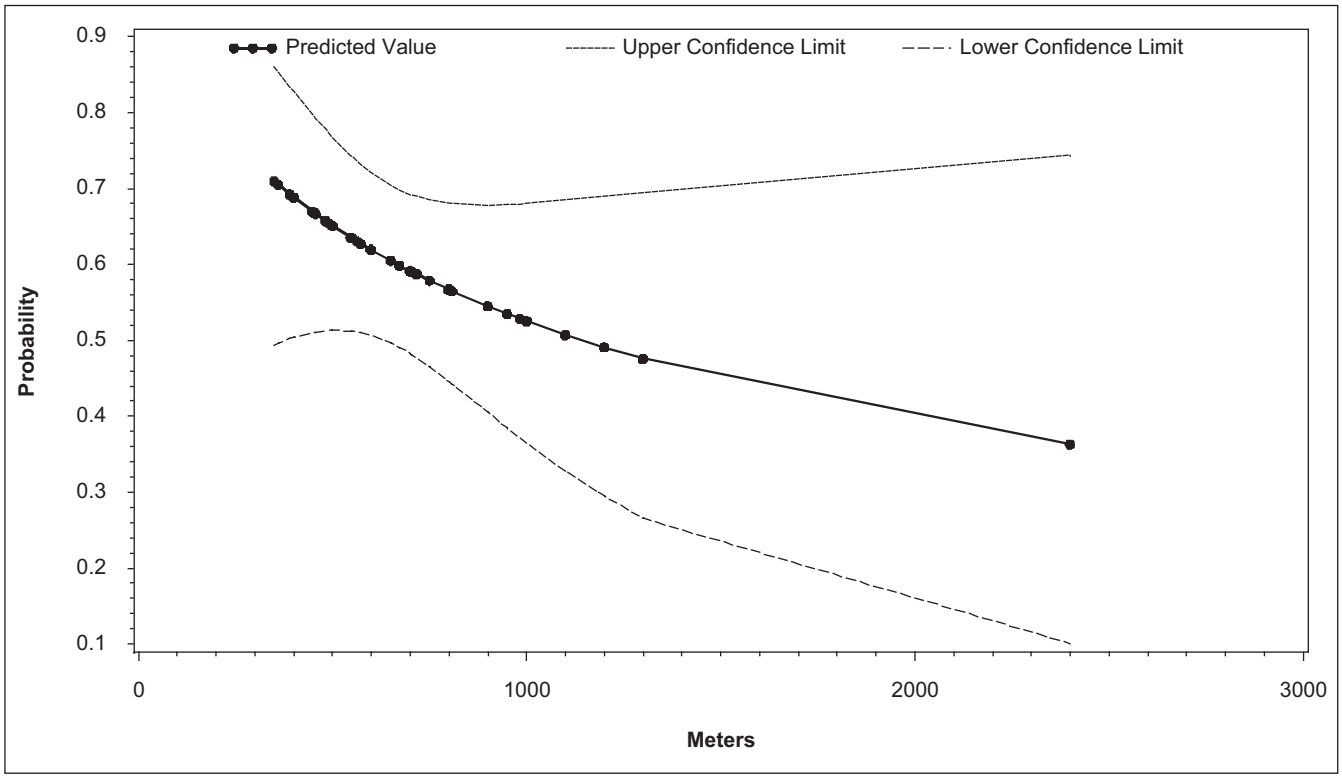

Figure 9. Predicted probability of headaches by distance to industrial wind turbine (95% upper and lower confidence limits)
Proc Genmod (logit link; binimoial distribution). Headaches = ln(distance) + sex + intercept. *p*(ln distance) = .1837.

Appendix A

WindVOiCe Survey Questionnaire

Adult survey questionnaire:
WindVoiCe (Wind Vigilance for Ontario Communities)

1) Name (preferred but optional)

2) Date of birth

Day _____ Month _____ Year _____

3) Occupation _____
4) Address and/or postal code

_____
_____
_____
_____

5) Which wind farm is near your property?

_____
_____

6) How far away from your property is the nearest turbine?

_____

7) How long have you been living at this property?

_____

8) Do you feel that your health has in any way been affected since the erection of these turbines?

_____

If yes, please answer the following
Do you feel that since living near a wind turbine/turbines you have experienced excess of the following symptoms (i.e., more than you did prior to living near these structures)?

Headaches	yes _____	no _____
Palpitations	yes _____	no _____
Excessive tiredness	yes _____	no _____
Stress	yes _____	no _____
Anxiety	yes _____	no _____
Tinnitus (ringing in ears)	yes _____	no _____
Hearing problems	yes _____	no _____

(continued)

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Appendix A (continued)

Sleep disturbance yes_____ no _____
Migraines yes_____ no _____
Depression yes _____ no _____
Other—please specify

_____
_____
_____
_____

If you have answered yes to any of the above questions, have you approached your doctor regarding these symptoms?

yes _____ no _____
If yes, please state any tests and/or treatment initiated

_____
_____
_____
_____

9) Do you feel that your quality of life has in any way altered since living near wind turbines?

yes_____ no _____

10) If yes, could you please explain in what way you feel your life has been altered?

_____
_____
_____
_____

11) If you have any pets or livestock and have seen any changes in their behaviour since turbines have been erected, please describe

_____
_____
_____
_____

Appendix B
Health Survey Contact Flyer

WIND ENERGY CONCERNS?

Industrial wind turbine installations are becoming one of the most prolific forms of energy being put into use today.

Some residents living in the vicinity of a wind farm are suffering from adverse health effects and disturbed living conditions.

People from across Ontario who welcomed wind turbines into their community are now coming forward with questions and concerns and may not know where to turn.

If you, or anyone you know is having difficulty, please call *toll free 1-888-700-5655* or email *windaffects@gmail.com* Others are facing similar concerns.

Your call will be kept totally confidential.

Appendix C
Health Survey Cover Page

WindVOiCe (Wind Vigilance for Ontario Communities)

Questionnaire on Health/Disturbed Living Conditions

Some residents living in the vicinity of wind turbines are suffering from adverse health effects and disturbed living conditions.

Currently, there are no authoritative guidelines about how far away turbines should be placed from residences. We are collecting information so that we can advise those in authority about the impact wind turbines have had on some of our population.

Your name will be kept totally confidential.

How to use the questionnaire:

1. If more than 1 adult in the home is affected please have each adult fill out a separate questionnaire.
2. This questionnaire may be filled out by a person 18 years of age or older who is fluent in English. This questionnaire will NOT be used by anyone with any cognitive impairment.
3. Question 5)—please answer with project name and/or wind company name. Question 6)—please give estimate if exact number is unknown. Question 10)—open to any other life alterations you've noticed for yourself. Please, worried parents, use this space to describe any symptoms your children may show.

Lorrie Gillis
Health Survey
R.R. #4
Flesherton, Ontario N0C 1E0

Thank you for taking the time to fill out this questionnaire.

Appendix D
Health Survey Cover Note

Cover Note accompanying the survey with mailing instructions

Thank you for being part of this survey. Your participation gives voice to adverse health and living conditions to people living in close proximity to industrial wind turbines. Confidentiality of your personal information is assured. Results will go forward with no disclosure of any personal or identifying information. All surveys will be kept in locked storage at all times with extremely limited

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access for tabulation of data. Please return your completed survey to:

Lorrie Gillis
Health Survey
R.R. #4
Flesherton, Ontario N0C 1E0

Appendix E

Sample WindVOiCe Participant Comments

 # 3

9) [other] High blood pressure 217/124

Had a foot that don't heal until I moved out of the house

Yes [contact doctor] Blood pressure, urine test, Doppler test, heart machine, on blood pressure pills now (Mavik 1 mg) Trandolapril [sp?]

10) [quality of life altered]

1. Had to move out of my home, just come home now to feed the cattle.
2. Our home can't be sold due to the problem per real estate agent.
3. Family events can't take place at home
4. Financial problems due to keeping two homes
5. Always sick, depressed and bad tempered when at home but when away for a short time feel much better. (Much better in the second house which I had to buy)
6. Had family problems until we moved out.
7. Feel no cares or believes us.

Bottom line:

They took life away as we knew it before the wind farm, same house value 0 sick all the time, financial stress now, world turned upside down.

11) 2 house dogs always sleeping, ear problems itching all the time. Moved the dogs out of house, now they are fine.

 # 13

10) [quality of life altered] Everything in my life has changes since the town_x Wind Turbine Project company_x has been in operation. I feel my health has been compromised. I have felt generally unwell physically and mentally since March 24/08. Also sensitivity to white noise and sounds has increased. My ears are either humming or feeling pressure on them/heart palpitations continue usually while sleeping. My anxiety and stress levels continue to be high. We have discouraged our two daughters and son-in-law from visiting. They have also experienced health issues when visiting. The damage that has been done to my body—scares me what will happen in the future. At 60—I wanted to enjoy my retirement with reasonable good health and now everything has blown up in our faces. We spent 5 weeks in Florida Jan 26—March/09 improvement in health. Loss of enjoyment of working outside with flower beds and yard. Our property value has been greatly decreased. We are still having problems with electrical pollution. Constant reminder in every direction of our property—turbines. A very uncertain future!!

#18

8) [health affected] Yes—whenever I am there!

9) [other] [other] Pressure in my ears or ear aches tightness feeling in my head

[doctor visit] Not at this time, these symptoms only occur around the Wind Project and not at my own residence.

10) [quality of life altered] As a teacher who spends most of my summer relaxing at home& was disrupted in July/Aug 2008 when I would leave each night with my mother to drive 10 min to a hotel town z in because of the above symptoms. This is something she did for months, it was disruptful for the few weeks I did it, not a peaceful relaxing environment. In December 2008 when I arrived home to my parents on the first night for Christmas the pressure in my head and ears hurt so bad that I had difficulty sleeping and considered spending the rest of the week at a relative's home away from the wind turbines. These are regular occurrences when I visit, and now sometimes think twice before going as I don't know how bad it will be this time, which makes going home no longer relaxing and peaceful like it once was. I also worry on a daily basis for the health and well being of my parents who live through this daily and the negative health impacts and stress worries me greatly. It also causes me stress that the value of my family farm has dramatically been reduced due to these wind turbines.

11) Thank you for organizing this health survey. My family greatly appreciates it.

#34

[palpitations] pressure in chest, dull and stabbing pain in chest

9) [other] joint pain, numb face, dizziness, feeling cold a lot.

Yes, doctor is aware and looking for a referral to an environmental specialist—so far no luck—not sure what next step will be.

10) [quality of life altered] Along with the above symptoms—experiencing a general lack of wellness.

#40

Struck/heart palpitations

9) [other] Stress tests/blood tests too numerous to count.

10) [quality of life altered] I now live on drugs that don't seem to help.

11) Livestock were all sold off due to problems that could not be explained. (Nervousness)

(continued)

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Appendix E (continued)

#41

10) [quality of life altered] Forced to sell our property, take less than what it was really worth!! This was due to health problems caused by the wind turbines.

11) Our dogs were nervous, as well as our four (4) ponies. We ended up taking our ponies to the auction barns and had them sold. Two of our dogs had to be put down!!

#46

9) [other] No. Problems with the above go away when I leave the (wind project) home.

10) [quality of life altered] I feel wound up when at home. I just cannot settle. Because of this I do not want to stay in our home or for that matter come home. The biggest change has been the effect on my Mom, sister and Dad's health, especially Mom. To see her suffering from health problems, getting sicker and sicker just pisses me off. It really bothers me a lot.

#50

9) [other] [tinnitus] pop when turbines come on and off.

[sleep disturbance] Do not sleep a full night. Wake up quite often.

[other] nasal cavity felt like I had allergies, but no mucus, irritable.

10) [quality of life altered] Personal—have found the changes in sleep patterns reduced energy levels, levels of patience and very frustrating and draining. Dec. on there were serious, angry arguments we normally do not have. I am *very worried* about my partner's, [wife], reduced sleep/rest, humming/ringing in her ears and continued deterioration of health. When [wife] had to live away from home it was hard. She is my partner and my love. We would always chat on family plans from food to finances. Our lives were upside down at all family levels when she was billeted by the windmill company wind_co_x from May 2008 to July 17th and AGAIN now. She is living at her Mom's in town_y a 30-minute drive away (on Dr. orders). On a very personal level I am like a widower and sad and lonely.

Generally—Our financial outlook for our property has changed. At present we cannot sell knowing the possible harm that someone may experience. This is a stressor we did not have prior to the turbines. I can't sleep with the bedroom window open in the summer for a cool breeze due to the roaring jet sound. (This was pleasant and cooling too.) I can't have a quiet sit on the deck without the jet or swoosh sound. And our phone has static on it which is not there when turbine were not here. CKNX am channel is staticy or weaker in the project area.

#58

10) The flicker from the turbines can be very annoying in the mornings. When I'm training horses for 3 to 4 hours the noise gets to you and you have to stop for awhile and go to the house. In the summer when windows are open you can hear them in the house. There is also some problems with some of the neighbours around me because of stray electricity. I have not had mine checked.

When the turbines are noisy, the horses always go to the far side of the barn.

#61

9) [other] Yes, doctor did blood tests, oral scope, prescribed sleeping pills, referred me to therapist and a nutritionist, sent me to a sleep clinic, I was vomiting blood.

10) [quality of life altered] We lived in this house for twenty years with the plan that we would pay it off, borrow money to purchase our retirement home and then sell the house to pay for the retirement home. We put the house up for sale the year before the turbines were built and real estate agents told us, people were worried about where the turbines would be placed and the house did not sell. Now the turbines are up and I can count 30 of them from my property. My wife and I can hear them when we are outside and we experience flicker when we are inside. We can see them through every window in the house in the daytime and we see the sea of red flashing lights every night. We live in a school house we took from being vacant for twenty years to a beautiful open concept home in a quiet country setting. Our friends and family have loved our home for years but now just shake their heads when they [see] what has happened here. Don't know what's going to happen to me in five years when I'm ready to retire if I can't sell my house.

#69

10) [quality of life altered] We bought this property to be away from the noise of the city and road traffic now all I hear is the windmills. I love to be outside, walking, hunting in our bush. Now all I hear is the windmills. Peace and quiet no longer exists. The rear of our house is all windows, at night all you see is the warning lights. It is driving me crazy. We had no say in the mills because we weren't getting one. The persons that got them get paid and don't live near them. I'm sure our property value has went down because of them. This summer will be the first time we can lay by our pool and I'm sure they will drive me.

#78

9) [other] [Doctor] Discussed symptoms with doctor twice. At this point we will further monitor my symptoms and discuss possible actions (tests, etc.)

10) [quality of life altered]This previously peaceful/quiet area was to be our retirement home. We are now considering changing our plans. Any further improvement to this property is on hold.

Depending on wind direction there is a loud pulsating, intrusive swooshing noise. I seem to sense a vibration in the air and at times I seem to sense the changing air pressure (like descending in an airplane.)

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I spend 80% of my time in [turbine town x] and 20% in [town y]. When in [town y] I sleep better, less headaches and more relaxed.

#83

9) [other] nausea, muscle pain, irritability

10) [quality of life altered] To avoid morning flicker must have blinds or avoid rooms until it passes. When warm weather arrives noise from turbines will limit opening of windows especially at night for sleeping.

Will not enjoy evenings out of doors on decks due to all the Red Flashing lights and noise.

#88

9) [other] Have no family doctor. Went to emerg currently awaiting a CT scan.

10) [quality of life altered] Constant noise, constant headaches. Sleep disturbance since the wind towers have started.

We have recently put a 500′ addition on our home with large windows all around. Not only we get flickering from the towers we cannot open any windows due to the constant noise of the blades.

My occupation is a bookkeeper. These constant headaches are affecting my concentration, especially working with numbers. I work from my home. I simply cannot afford to be in ill health.

I can no longer sit on my back porch enjoying the beautiful sunsets. This was so relaxing to me. Now all I see is flickering blades and blinding red lights. The sunsets have disappeared into money hungry pockets of our government.

This area was once known as having the most beautiful sunsets in the world, now gone!

I now am a prisoner in my own home of 23 years.

This is not the future I wanted! That is why I bought this property 23 years ago. Now I am going to sell and start all over again. Extremely depressing!

11) My horses are nervous of the noise and do not focus on what they are doing. Instead they watch the windmills making this a danger when riding or training them. My dogs and cats want to stay in the house more now. This is very unusual for them.

#107

8) Biggest factor is the noise.

Unable to sleep with windows open at night and I'm a poor sleeper under good conditions. Find when I'm outside gardening or reading, the constant noise from the blades turning very irritating and I find I have a pressure in my ears that wasn't there prior to the last few months.

#110

8) [health affected] yes, (mostly mental health)

9) [other symptoms] cannot deal with noise

10) [quality of life altered]—cannot enjoy the outdoors and sounds of nature because of noise

hesitate to invite friends over

feel upset that we built our amazing energy efficient ICF home in an area full of horrible noise pollution.

feel violated

upset that my lonely elderly mother came to live with us to have a happier life but now has vertigo (we have not mentioned to her the possible correlation to windmills.)

feel like we should have known better!

we trusted township and [wind company]

#130

6) [distance from turbines] approx 400m but there are 10 of them within 1 mile of our home.

8) [health affected] YES—WITHOUT A DOUBT!!!

9) [symptoms] [palpitations] not sure, [excessive tiredness] I have trouble sleeping, [tinnitus] sometimes, I've just noticed it. [other] I don't know if it's palpitations or anxiety, but sometimes my heart races like it's going to jump out of my chest.

10) [life altered]

I now have great trouble getting to sleep in fact I now use sleeping pills, I never used to, EVER!!!

I can no longer enjoy my home outdoors, There is a constant "buzzing" that I cannot escape. The further that I walk onto my vacant land, the closer I get to the neighbors tower—these towers make me feel constantly stressed and I always am anxious or have a feeling of anxiety.

I worry about my plummeting real estate value, and if a bank will even renew my mortgage when its time.

I'm in a position that if I complain, I fear that my property value will fall even further. [identifying comment left out]

myself and other members of my family are now getting unexplained headaches, even my [age] year old daughter who has never had a headache prior to these towers coming online. I have a feeling of helplessness because I want to get away from the towers but we must remain due to the fact that we can't afford to abandon our home and move.

11) Our dog is restless constantly pacing

#133

9) [other symptoms] Lack of focus—Lack of Concentration—Memory loss—High Blood Pressure—Nausea—Feeling of Fullness in the Head—Fullness Feeling in the ears

[approached doctor] Weekly pain clinic and migraine treatments. Pain medication for migraine. Nausea medication. Anti-hypertensive medication. Anti-depressant medication. Several types of pain medication. Acupuncture and Chinese Medication. Acupuncture bi-weekly.

(continued)

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Appendix E (continued)

10) [life altered]

1. Lost my career, which I loved dearly. It was a part of my life since age 18. *A huge loss*.
2. Lack of sleep has caused an enormous amount of stress; has impacted my everyday life from everyday appointments to social events + friendships; routines of living such as shopping, house cleaning, gardening; entertaining and family gatherings.
3. I was an avid reader but I cannot sit and concentrate to read a book.
4. I'm exhausted most of the time.
5. I feel tense all the time.
6. My ill health has become a major focus of my life and I fear a major fear of having a stroke!
7. I don't have people in my home anymore.
8. All our needed home renovations are on hold.

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