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Adverse health effects of industrial wind turbines

We are pleased to see the interest generated by our article in the May issue.¹ Much of the feedback has been constructive and should help advance awareness of the health risks of placing industrial wind turbines (IWTs) too close to humans. However, the opinions expressed by blogger Mike G. Barnard deserve comment.²

The Society for Wind Vigilance is not an "anti-wind" campaigning organization. It is a not-for-profit organization, the purpose of which is to ensure safe positioning of wind turbine facilities based on human health research; educate through the dissemination of facts and references on the risk of adverse health effects of human exposure to IWTs; work constructively with interested parties to ensure that guidelines for wind turbine facilities will protect the health and safety of communities; and achieve vigilance monitoring and long-term surveillance regarding the risks to health of IWTs.³ Society board members are authors of peer-reviewed articles on the effects of IWTs.⁴⁻⁸

The term *industrial wind turbine*

Mr Barnard states that the term *industrial wind turbine* is "emotionally laden" and "propaganda terminology."²

Our use of the term is not intended to invoke an emotional response, but to differentiate consumer turbines from industrial-scale turbines that have a blade radius of greater than 40 m, are greater than 140 m in height, generate multiple megawatts of electricity, and produce approximately 105 dBA of sound power.

Eighteen reviews

Mr Barnard states we "do not cite the 18 reviews worldwide of the peer-reviewed evidence ... that found no evidence of harm from wind turbines to human health ..."²

We were aware of and carefully reviewed the 18

articles. We found some reviews had substantial weaknesses, including the failure to consider indirect health effects. Horner et al (2011) conducted an audit and commented on the completeness, accuracy, and objectivity of these references.⁶

One of these aforementioned 18 reviews that was cited in our article was a panel literature review (Colby et al, 2009) sponsored by the American Wind Energy Association and the Canadian Wind Energy Association.⁹

Two authors of that paper, Dr David Colby and Dr Geoff Leventhall, have provided consulting services to members of the wind energy industry and wind industry trade associations. In other references, Dr Colby¹⁰ and Dr Leventhall¹¹ mentioned that

It appears that there is no specific Wind Turbine Syndrome, but there are stress effects from low levels of noise, either high frequency or low frequency noise, which affect a small number of people. It is the audible swoosh-swoosh which, when it occurs, is the cause ...

In a 2009 reference, Dr Leventhall stated:

I am happy to accept these symptoms, as they have been known to me for many years as the symptoms of extreme psychological stress from environmental noise ... what Pierpont describes is effects of annoyance by noise—a stress effect ...¹²

Other references listed in the “18 reviews” support our conclusions. For example, the Minnesota Department of Health (2009) concludes:

The most common complaint in various studies of wind turbine effects on people is annoyance or an impact on quality of life. Sleeplessness and headache are the most common health complaints and are highly correlated (but not perfectly correlated) with annoyance complaints. Complaints are more likely when turbines are visible or when shadow flicker occurs. Most available evidence suggests that reported health effects are related to audible low frequency noise.¹³

In addition, the National Research Council (2007) states that

[T]o the extent that wind-energy projects create negative impacts on human health and well-being, the impacts are experienced mainly by people living near wind turbines who are affected by noise and shadow flicker.¹⁴

Noise annoyance—a health effect

Symptoms associated with noise annoyance include stress, sleep disturbance, headache, difficulty concentrating, irritability, fatigue, dizziness or vertigo, tinnitus, anxiety, heart ailments, and palpitations.¹⁵⁻¹⁷

Health Canada’s Dr David Michaud explains that

According to the World Health Organization (WHO), health should be regarded as “a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity” (World Health Organization 2001). Under this broad definition, noise induced annoyance is an adverse health effect.¹⁸

According to the WHO, “Noise seriously harms human health and interferes with people’s daily activities at school, at work, at home and during leisure time.”¹⁹ The WHO also notes the main identified health risks of noise include annoyance.

Niemann et al (2006), the authors of the WHO pan-European LARES (Large Analysis and Review of European housing and health Status) study, state:

The results of the LARES study in relation to severe annoyance by neighbourhood noise demonstrate that neighbourhood noise must be classified as a serious health endangerment for adults.²⁰

Health effects expected

Mr Barnard comments: “Wind turbine noise under Canada’s setbacks is a non-issue as they are formulated to achieve WHO noise annoyance compliance.”²

The WHO does not provide noise annoyance compliance criteria for IWTs.^{21,22}

Some governments in Canada have developed IWT noise limits that are expected to result in adverse health effects. In correspondence dated June 30, 2009, the Honourable Rona Ambrose, then a federal Minister and Member of Parliament, wrote that

Health Canada provides advice on the health effect of noise and low-frequency electric and magnetic fields from proposed wind turbine projects, particularly for environmental assessments done under the Canadian Environmental Assessment Act. To date, their examination of the scientific literature on wind turbine noise is that the only health effect conclusively demonstrated from exposure to wind turbine noise is an increase

of self-reported general annoyance and complaints (i.e., headaches, nausea, tinnitus, vertigo).

Health Canada employees have proposed a “justification” for a 45-dBA IWT sound level criterion.²³⁻²⁵ The authors predict this noise criterion will result in an increase in the percentage of those who are highly annoyed.

Based on dose-response data for wind turbines, Janssen et al report that, with a highest allowed immission level of 45 dBA, it is expected that “... less than 14% of the exposed population [will] be highly annoyed indoors by wind turbines and less than 29% [will] be highly annoyed outdoors.”²⁶

From internal correspondence obtained through a Freedom of Information request from the Ontario Ministry of Environment,

It appears compliance with the minimum setbacks and the noise study approach currently being used to approve the siting of WTGs [wind turbine generators] will result or likely result in adverse effects ...

HGC Engineering is a member of the Canadian Wind Energy Association (CanWEA). Mr Brian Howe, president of HGC Engineering,

... [S]peaks frequently at [CanWEA] Symposiums ... prepared a “best practices” guide for CanWEA in 2007 and provided input on the assessment methods contained in the Ontario Green Energy and Green Economy Act (2009).²⁷

The Ontario Ministry of Environment report prepared by HGC Engineering concludes:

The audible sound from wind turbines, at the levels experienced at typical receptor distances in Ontario, is nonetheless expected to result in a non-trivial percentage of persons being highly annoyed. ... [R]esearch has shown that annoyance associated with sound from wind turbines can be expected to contribute to stress related health impacts in some persons.²⁸

Conclusion

Mr Barnard writes that health effects are related to the negative attitude of the individual exposed to IWTs.² Some researchers have found that the IWTs were initially welcomed into communities for their perceived economic⁸ or environmental²⁹ benefits. “The reported adverse impacts were unexpected.”⁵ The 2011 Ontario Real Estate Association Form 220 (Seller Property Information Statement) requires disclosure of environmental issues when selling residential property, including toxic waste, soil contamination, landfills, and wind turbines planned for the immediate area.³⁰

The adverse health effects of audible and inaudible noise are substantial. Their effects are underestimated and underappreciated by some. We are guided by the references and the desire to safeguard the health and well-being of those living in the environs of IWTs. Harm can be avoided by placing IWTs at a protective distance from residents. The acknowledgment that health effects occur in some is an important step toward achieving this goal.

—Roy D. Jeffery MD FCFP

—Carmen Krogh

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Competing interests

Dr Jeffery, Ms Krogh, and Mr Horner are on the Board of Directors for the Society for Wind Vigilance, an international federation of physicians, acousticians, engineers, and other professionals who share scientific research on the topic of health and wind turbines.

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Correction

In the article "Knowledge and understanding of urinary incontinence. Survey of family practitioners in northern Alberta,"¹ which appeared in the July 2013 issue of *Canadian Family Physician*, an error was inadvertently introduced. The list of authors should have read as follows:

Katherina Nguyen Kathleen F. Hunter PhD RN NP NCA
Adrian Wagg MBBS FRCP FHEA

Canadian Family Physician apologizes for this error and any confusion or embarrassment it might have caused.

Reference

1. Nguyen K, Hunter KF, Wagg A. Knowledge and understanding of urinary incontinence. Survey of family practitioners in northern Alberta. *Can Fam Physician* 2013;59:e330-7. Available from: www.cfp.ca/content/59/7/e330.full.pdf+html. Accessed 2013 Aug 13.

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