

## WHAT IS THE EVIDENCE FOR POTENTIAL HEALTH IMPACTS FROM WIND POWER?

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Wind power is a major renewable energy source without most of the environmental pollution associated with the fossil fuel industries. It therefore has great potential to protect and improve health through reducing ambient air pollution, maintaining healthy ecosystems and reducing the risks of climate change. Climate change is in itself a major threat to human health, so a rapid transition to renewable energy is vital.

In recent years in Australia, however, anti-wind groups have claimed that wind turbines can cause a wide array of health impacts including ‘wind turbine syndrome’. These claims and anecdotal reports are commonly found on internet searches and reported in the media. The focus of these claims has been primarily on suggested impacts from low frequency sound, particularly infrasound<sup>1</sup>.

The issue has become highly politicised, so separating out the facts from the hyperbole can be difficult. Despite arguments being played out in the media and in the courts, and an Australian Senate Inquiry<sup>2</sup>, there is a paucity of high-quality research in the peer-reviewed literature directly on the health impacts of wind turbines. Nevertheless, there is some published evidence, primarily relating to perception and impacts of noise, and what relevant scientific evidence exists has been extensively reviewed. Over a dozen reviews of the literature have been undertaken over the last decade internationally,<sup>3</sup> and in Australia a review has been undertaken by both the National Health and Medical Research Council (NHMRC)<sup>4</sup> and the Victorian Department of Health<sup>5</sup>.

‘Wind turbine syndrome’ is not a recognised medical condition, but was coined in a self-published book by Dr Nina Pierpont in 2009. She undertook telephone interviews of ten families living near wind turbines and proposed that low frequency sound from wind turbines might be affecting bodily balance and causing a multitude of symptoms such as headache, dizziness and sleep disturbance.<sup>6,7</sup>

Unfortunately, the methods used had major limitations and biases such that no valid conclusions can be drawn and the work has not been submitted to the normal peer review process.<sup>8</sup> Symptoms described are common symptoms in the community. Anti-wind groups have since claimed even more extreme impacts on health from wind turbines with anecdotal claims of adverse impacts numbering in the hundreds.<sup>9</sup>

Both sound pressure levels (loudness) and frequency (pitch) are relevant to understanding this issue. The normal human ear perceives sounds at frequencies ranging from 20 Hz to 20,000 Hz; frequencies below 200 Hz are low frequency sound. The audible sound from a wind turbine is likely to be approximately 40 dBA, which is in the region of quiet background noise.<sup>5</sup>

Infrasound (often considered inaudible sound) is sound at the frequencies lower than 20 Hz. What is an audible frequency may depend on the sound pressure level, and the sensitivity of the individual. Infrasound exposure is ubiquitous in modern life, from our bodies with our heartbeat, breathing and coughing, to sound coming from our natural and built environments.<sup>10</sup>

There is a lack of evidence demonstrating harm from infrasound at the sound pressures that are relevant to wind turbines, although this is often the component of wind turbine sound that some people fear, as it is seen as being imperceptible but potentially able to cause symptoms.

A review of health effects of exposure to infrasound for the UK Health Protection Agency concluded: ‘Overall, there is little evidence to suggest that acute exposure to infrasound at levels commonly experienced in the environment is capable of causing any consistent physiological or behavioural effect, although there is a general paucity of high quality research in this area’.<sup>10</sup> Another expert author has indicated that any adverse health effects from infrasound occur at considerably higher sound pressure levels than are emitted from modern wind turbines.<sup>11</sup>

The primary effect of audible noise from wind farms in humans appears to be annoyance. Wind turbine noise may be perceived as more annoying than other noise at comparable levels, possibly due to the character of the sound, and lack of diminishment at night. Annoyance has both objective and subjective components, but can be associated with lower sleep quality and negative emotions. A number of studies have found a small percentage of exposed people were annoyed at sound levels 35–45 dBA. There was a relationship between modelled sound pressure level and sound perception and annoyance. However, a person’s response to wind farms appears to be a major factor in the response to noise annoyance. There was a strong correlation with attitude to the turbines, particularly their

visual impact, and whether the turbines were associated with economic benefit.<sup>6,12,13,14</sup>

It has been noted that anxiety about potential adverse health effects may ironically contribute to some of the symptoms of concern.<sup>1,8</sup> Chapman has noted that 65% of Australian wind farms have never recorded noise or health complaints, and of the 129 complainants, the majority reside near only six wind farms, which have been targeted by anti-wind farm groups.<sup>15</sup>

In contrast, the literature reviews that have been undertaken have consistently failed to establish convincing evidence of direct health impacts from wind farms. The exception is the conclusion that some local residents may suffer annoyance from audible noise, and this may have health or quality of life implications. Annoyance may also be related to a range of other factors.

The NHMRC rapid review concluded: 'There is currently no published scientific evidence to positively link wind turbines with adverse health effects'. It is currently commissioning an additional systematic review.<sup>4</sup>

The Victorian Department of Health review concluded: 'The potential for health impacts depends on acoustic factors (including sound pressure levels and other characteristics of the noise) and non-acoustic factors (including individual noise sensitivity and attitude to the source) ... There is no evidence that sound which is at inaudible levels can have a physiological effect on the human body'.<sup>5</sup>

International reviews have included statements such as:

'To date, no peer reviewed articles demonstrate a direct causal link between people living in proximity to modern wind turbines, the noise they emit and resulting physiological health effects'.<sup>12</sup>

'There is insufficient evidence that the noise from wind turbines is *directly* (i.e. independent from an effect on annoyance or sleep) causing health problems or disease ... There is no evidence for a set of health effects, from exposure to wind turbines that could be characterized as a 'Wind Turbine Syndrome'.<sup>16</sup>

The most recent published review notes: 'At present, a specific health condition has not been documented in the peer-reviewed literature that has been classified as a disease caused by exposure to sound levels and frequencies generated by the operation of wind turbines. Communities are experiencing a heightened sense of annoyance and fear from the development and siting of wind farms'.<sup>6</sup>

#### WHAT CAN BE CONCLUDED ABOUT THE POTENTIAL HEALTH IMPACTS FROM WIND POWER?

While limitations in the evidence base are acknowledged, the current evidence does not support the claim that exposure to wind turbines directly causes adverse health

impacts. In fact it may be that wind energy is among the most innocuous choices of energy generation in terms of health impacts. The qualification to this statement is that audible noise from any source, including wind farms, can cause annoyance in some people, with the ensuing potential for sleep disturbance and impacts on wellbeing and quality of life, and further research on this issue in Australia is needed.

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