Survival of *Legionella* in earthquake-induced soil disturbance (liquefaction)

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The recent paper by Graham and Harte on the survival of *Legionella* in earthquake-induced soil disturbance (liquefaction) is misleading. In particular, it incorrectly implies that there is no clear reason for the dramatic increase in Legionnaires' disease case detection in Christchurch from September 2010.

While an influence of earthquake activity cannot be ruled out completely, this increase in case detection is almost certainly the result of a change to a more rigorous testing algorithm in Christchurch for suspected Legionnaires' disease. From October 2010, all sputum samples sent to Canterbury Health Laboratories from patients with suspected pneumonia have been tested for *Legionella* by PCR, whether requested or not by clinicians. This major intervention resulted in a marked increase in case detection that has persisted ever since. Indeed, a similar increase in case detection has been observed when the same testing algorithm was rolled out in other regions of New Zealand from May 2015. Although, by coincidence, this testing algorithm started about the same time as the commencement of intense earthquake activity in Canterbury, the persistence of the increased case detection ever since that time, following expected seasonal patterns, and the lack of associated increases in pneumonia admissions in Christchurch during the earthquakes, do not support an association between earthquakes and the increase in Legionnaires' disease case detection.

While Graham and Harte make passing reference to the change in testing algorithm in their discussion, they fail to highlight the significance of this intervention, which is widely acknowledged to be responsible for the increased case detection for which New Zealand is renowned. By doing so, they provide an imbalanced view and place undue emphasis on the potential effects of earthquake activity.

In addition, the claim that liquefaction-affected soil does not support the growth and survival of legionellae is not justified based on their findings. The majority of cases of Legionnaires' disease were caused by *Legionella longbeachae*, yet Graham and Harte used a different species, *Legionella bozemanae*, for their seeding experiments. *L. bozemanae* is a relatively uncommon cause of Legionnaires' disease in New Zealand. Although both species are environmental bacteria, *L. bozemanae* is a poor choice as the sole species used in experiments given the ready availability of isolates of the species that was actually causing the majority of human disease. Also, the reliance on culture-based methods alone meant the experiments had inadequate sensitivity to address the study questions.
Competing interests: Nil.

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REFERENCES: