

New disease surveillance can inform public health responses

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A team of researchers, including Te Whare Wānanga o Waitaha | University of Canterbury (UC) Dr. Leighton Watson and Professor Michael Plank, combined wastewater data with reported case numbers to

create a statistical model that could be used to inform public health responses to infectious diseases worldwide.

Their study is based on data from the Institute of Environmental Science and Research (ESR) [wastewater](#) COVID-19 surveillance program and COVID-19 data collected in Aotearoa New Zealand.

The disease surveillance tool analyzes data in a way no other study has previously done—combining wastewater data and reported case numbers to estimate how the case ascertainment rate, or proportion of infections reported, has changed over time. The model also estimates the effective reproduction number.

School of Mathematics and Statistics Lecturer Leighton Watson's model provides a clearer picture of the state of an epidemic, disease dynamics and infections in the community.

"While the results are not the only piece to the puzzle, the model could be used as an additional source of information to inform public health policy decisions and hospital capacity planning," Watson says.

He explains the model could be used by any country where most people are connected to the wastewater system. The model could be applied nationally or regionally and help inform planning of public health responses to multiple [infectious diseases](#).

Watson noted that over time government restrictions and testing guidelines have been eased. "At first, people would test every time they got a sore throat. Anecdotally, now it seems like many people are assuming they are just under the weather because, for example, their kids bring every single bug possible home from school."

Watson says fewer cases could mean fewer infections or fewer people

reporting. Reported cases during the [second wave](#) in July 2022 were significantly lower than in the first wave in February and March 2022. However, the model suggests that there was a substantial drop in case ascertainment between the waves and that true numbers of infections were actually similar.

Wastewater surveillance has proven to provide valuable data on COVID-19 trends in the community in New Zealand and overseas. This led the research team to investigate how clinical and wastewater data could be combined to provide a better overall picture of the pandemic.

"Everyone who lives somewhere that's linked up to the town wastewater system is going to shed the virus into the wastewater if they have COVID. If they are plumbed into the wastewater system and we are sampling it, we can pick that up independent of whether people are testing or not," Watson says.

According to the researchers the model provides the most accurate source of data on case ascertainment rate and effective reproduction numbers currently available.

A preprint of the research is available on *medRxiv*.

More information: Leighton M. Watson et al, Improving estimates of epidemiological quantities by combining reported cases with wastewater data: a statistical framework with applications to COVID-19 in Aotearoa New Zealand, *medRxiv* (2023). [DOI: 10.1101/2023.08.14.23294060](https://doi.org/10.1101/2023.08.14.23294060)

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