

Wastewater Modelling Report: Forecasting the State of the Pandemic using Wastewater Data



Public Health
Agency of Canada

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Statistics
Canada

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Wastewater based forecasting using data up to: 2022-04-10

Public Health Agency of Canada has developed a mathematical model ([Nourbakhsh et al., 2022](#)) for conducting wastewater based forecasting that describes infections of COVID-19 in the community and also considers how infected people shed the COVID-19 virus into the sewer systems and how that shed virus signal is detected and reported. The clinical case and wastewater surveillance data are used to generate forecasts and help understand what is happening in the community.

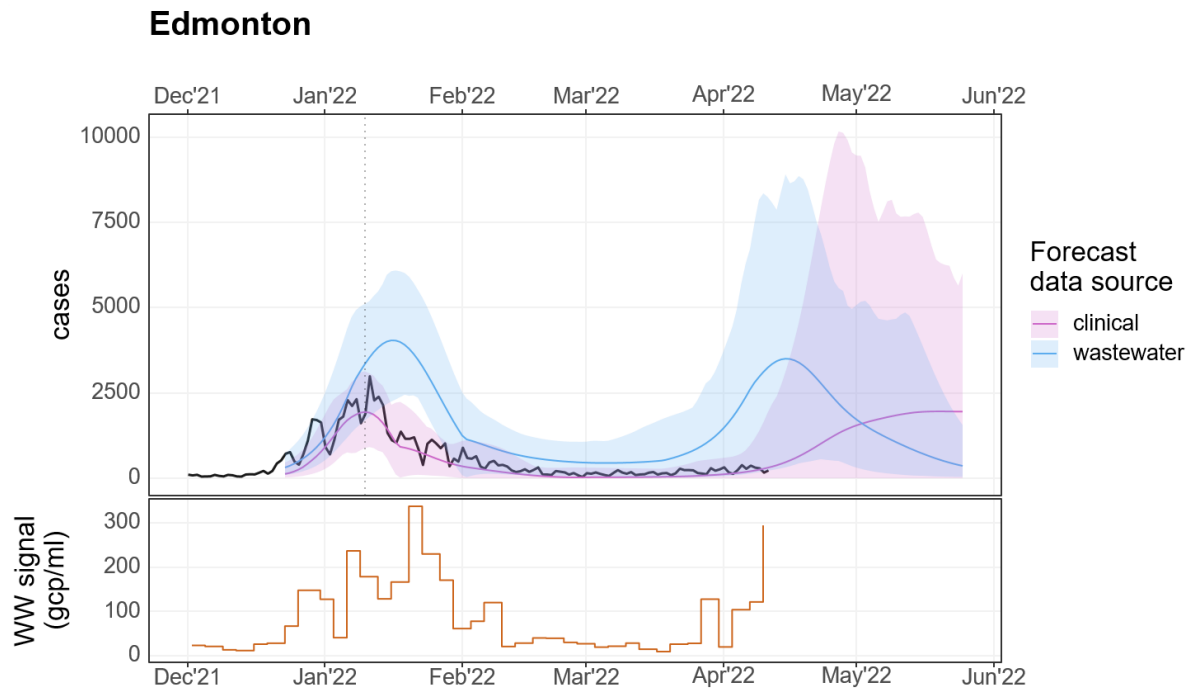
The next figures show clinical case and wastewater surveillance data for each city during the Omicron wave. In each figure, the top panel shows the traditional reported human clinical case data (solid black line), model forecasts using only clinical data (pink shaded area), and model forecasts using only wastewater data (blue shaded area). The bottom panel shows the SARS-CoV-2 signal in wastewater (brown line).

The model uses clinical surveillance data up to 2022-04-13, and wastewater data up to following dates for each site:

- Halifax: 2022-04-06
- Vancouver: 2022-04-08
- Montreal: 2022-04-09
- Edmonton: 2022-04-10
- Toronto: 2022-04-10

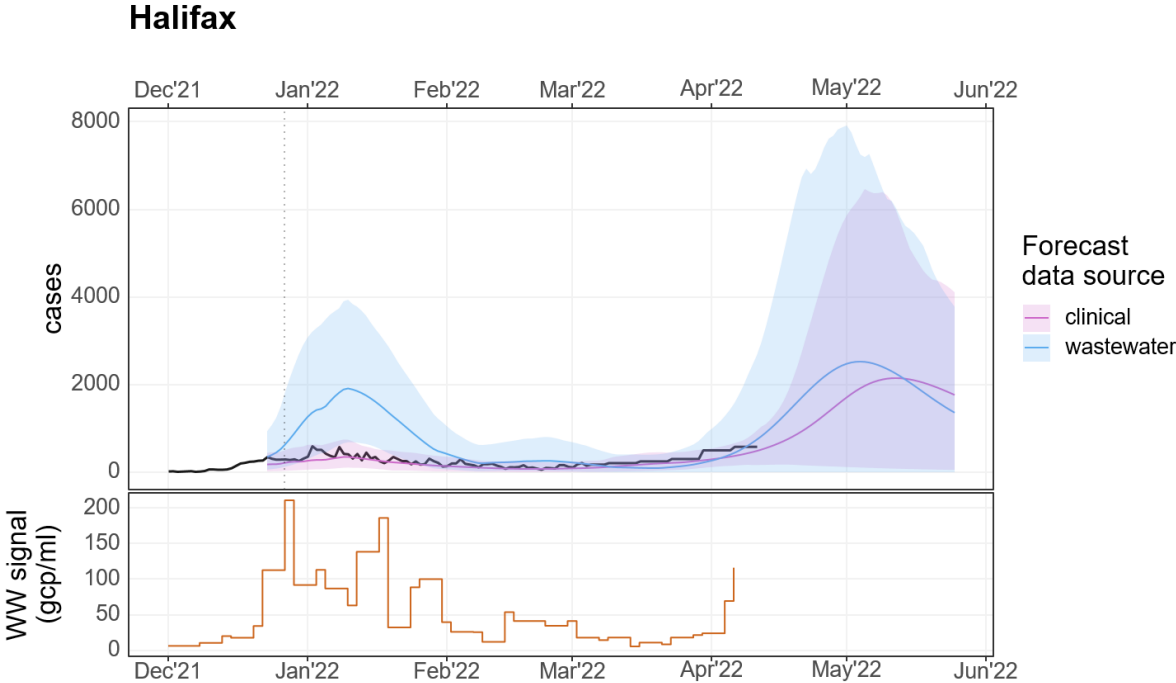
Edmonton

The recent increase of the wastewater signal (bottom panel, brown curve) suggests an increase of new SARS-CoV-2 infections in the community that seems largely under-reported through clinical surveillance, as shown by the difference between reported clinical cases (top panel, black curve) and what is predicted according to wastewater signals (top panel, blue curve). Therefore, the forecast of the reported cases between clinical and wastewater data are not in agreement. The wastewater data forecast suggests that the number of cases in Edmonton are about to peak, whereas clinical data predicts an increase in the next few weeks.



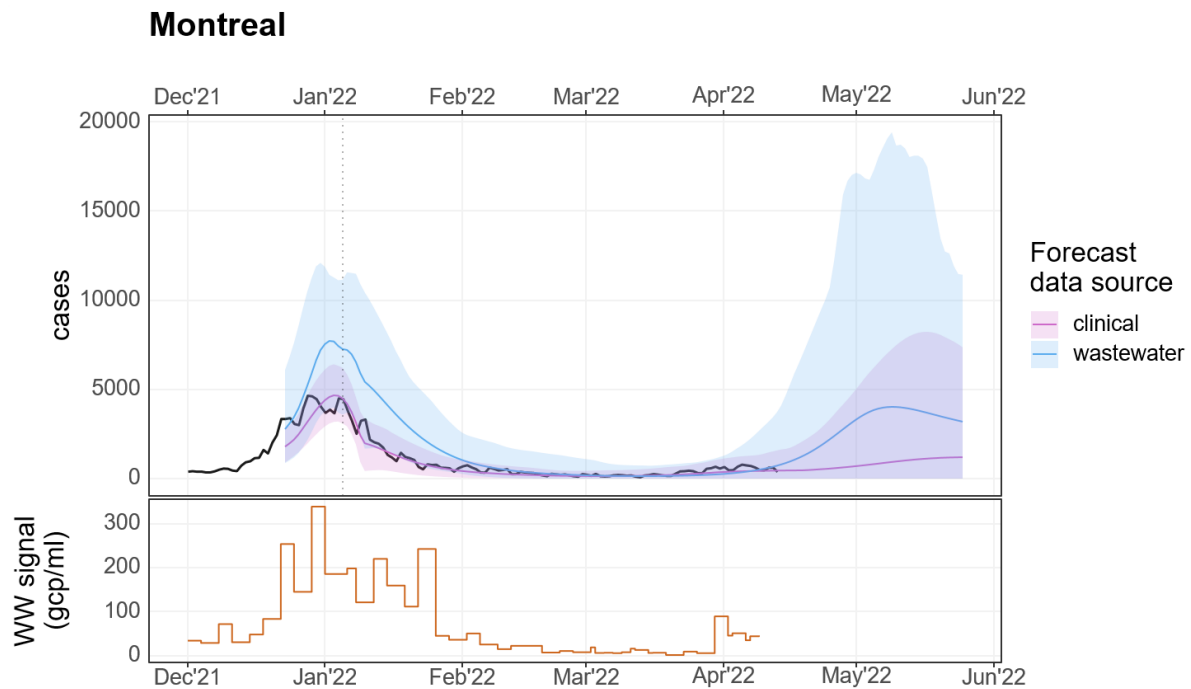
Halifax

After the significant under-reporting during the peak of the Omicron wave in January 2022 (top panel, blue curve above the black curve), there is a relatively good agreement between the clinical and wastewater data in Halifax (top panel, blue and pink curves have similar trajectories). The modelling forecast based on both clinical and wastewater data suggests an increasing trend in the number of cases for the next few weeks.



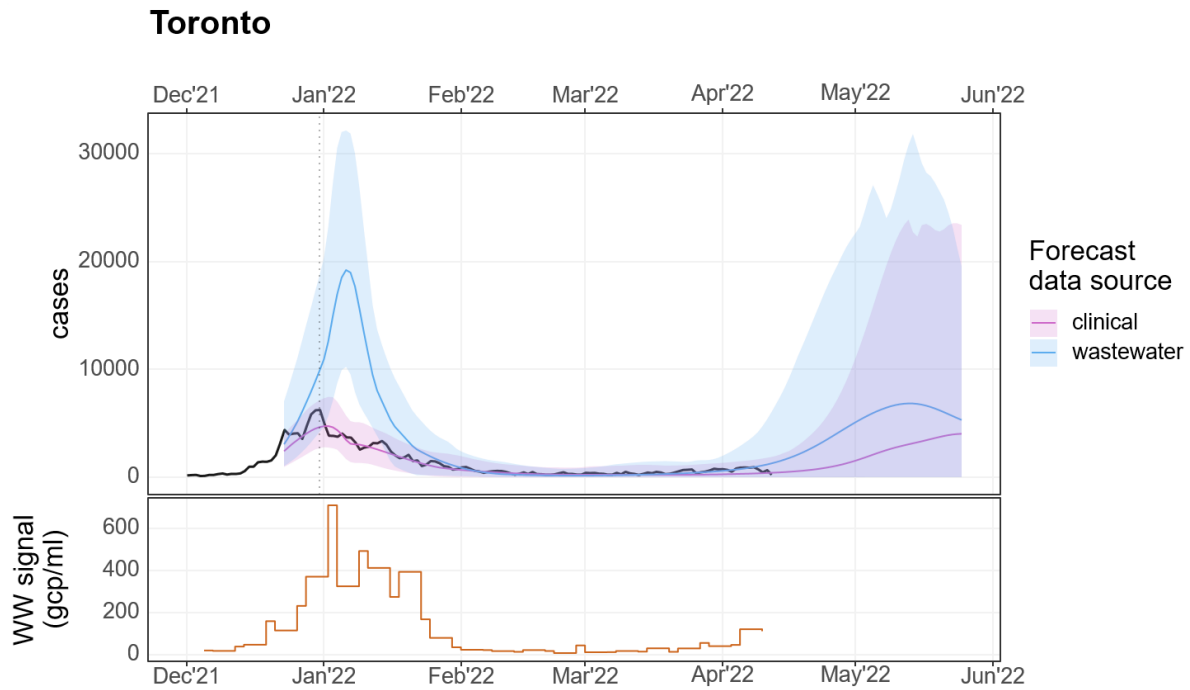
Montreal

Despite a relatively good agreement between clinical and wastewater signals, the recent trend of the wastewater signal (bottom panel, brown curve) suggests a larger increase in new cases than what clinical data indicates. This is apparent in the trajectories of the forecasts, where forecasts based on wastewater signal are higher than the ones informed by clinical data (top panel, blue curve higher than pink curve for future dates). The modelling forecast based on wastewater and clinical data predicts an increase in new cases over the next few weeks.



Toronto

Despite a relatively good agreement between clinical and wastewater signals since February 2022, the recent trend of the wastewater signal (bottom panel, brown curve) suggests a larger increase in new cases than what clinical data indicates. This is apparent in the trajectories of the forecasts, where forecasts based on wastewater signal are higher than the ones informed by clinical data (top panel, blue curve higher than pink curve for future dates). The modelling forecast based on wastewater and clinical data predicts a large increase in new cases over the next few weeks.



Vancouver

Despite a relatively good agreement between clinical and wastewater signals since March 2022, the recent trend of the wastewater signal (bottom panel, brown curve) suggests a large increase in new SARS-CoV-2 cases than what clinical data indicates. This is apparent in the trajectories of the forecasts, where forecasts based on wastewater signal are higher than the ones informed by clinical data (top panel, blue curve higher than pink curve for future dates). The modelling forecast based on wastewater and clinical data predicts an increase in new cases over the next few weeks.

