

# Chicago COVID-19 Wastewater Data in December 2021

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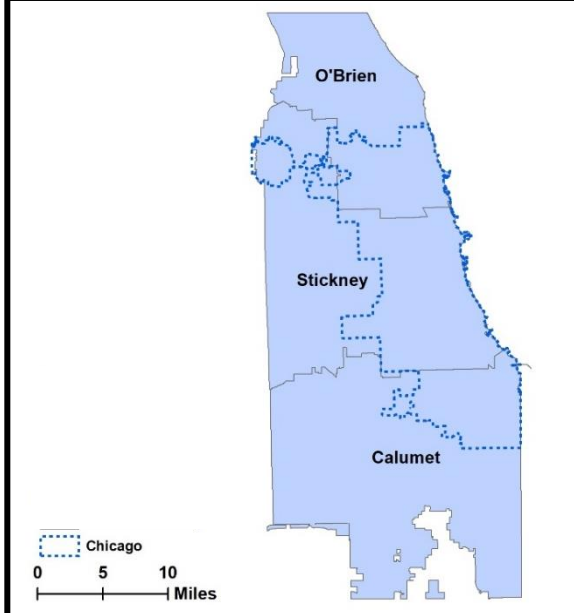
## Background

The Chicago Department of Public Health (CDPH) collects data from a variety of sources to understand the COVID-19 pandemic – some most important metrics are currently shown on [CDPH's COVID-19 dashboard](#).

CDPH is also investing in novel ways to monitor the spread of SARS-CoV-2, the virus that causes COVID-19. One such newer method is by monitoring wastewater, also known as sewage. Even though SARS-CoV-2 is a respiratory virus, wastewater surveillance can be used to track its spread since it can be shed in the feces of individuals regardless of symptoms or diagnostic testing. By measuring the amount of virus that causes COVID-19 in wastewater, CDPH can gather information about the amount of disease transmission on a community level. Combined with other types of data, wastewater surveillance helps CDPH better understand transmission of the virus that causes COVID-19 in Chicago. You can read more about CDPH's wastewater monitoring program [here](#). This report describes the CDPH wastewater monitoring program, reviews recent data, and previews how these data will be used and shared going forward.

## What have we learned from monitoring wastewater?

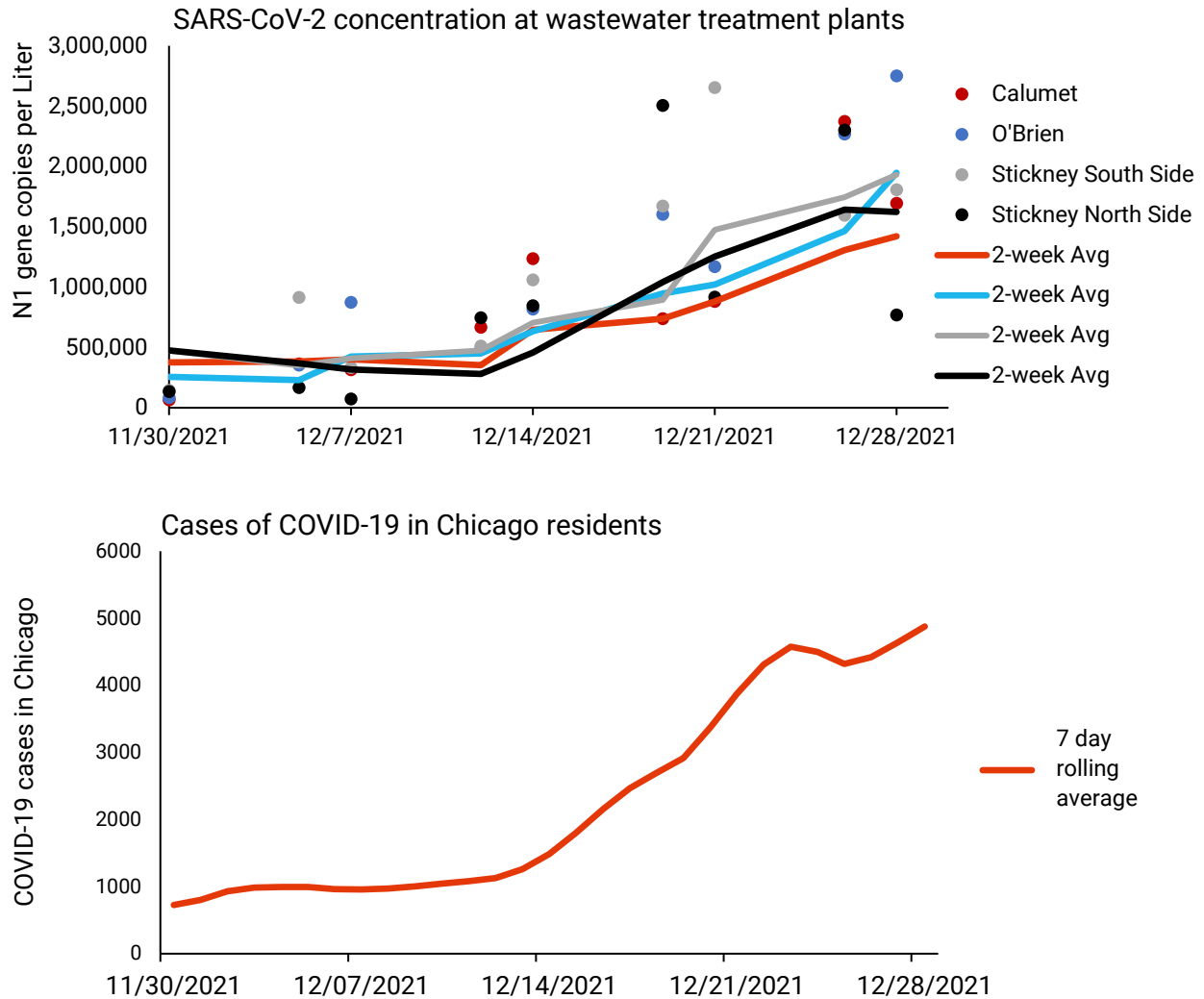
**Figure 1: Catchment areas for the three wastewater treatment plants covering the Chicago area.** Note, each also receives wastewater from residents of both the City of Chicago and nearby suburbs.



CDPH is a part of [statewide](#) and [national](#) efforts to monitor the levels of SARS-CoV-2 in wastewater. One of these larger efforts measure SARS-CoV-2 at wastewater treatment plants. These plants receive wastewater from millions of people at once, and can give a good 'overview' of the amount of virus in the general area. In the Chicagoland area, the three main plants covered are [Calumet](#), [O'Brien](#), and [Stickney](#) water reclamation plants (**Figure 1**, Stickney receives wastewater from two influent pipes) – each covers some Chicago residents and some suburban residents.

In December 2021, data from the three wastewater treatment plants covering the Chicagoland area showed a clear increase in the amount of SARS-CoV-2 (**Figure 2**). This work was conducted by the [University of Illinois Discovery Partners Institute \(DPI\)](#) in partnership with the [Metropolitan Water Reclamation District of Greater Chicago \(MWRD\)](#).

**Figure 2: Trends in data from three wastewater treatment plants covering the Chicagoland population (below) compared to reported cases of COVID-19 in Chicago residents (next page) – December 2021.** Note, the wastewater treatment plants cover the Chicago population and some of the Chicago suburbs. COVID-19 case counts only reflect Chicago residents.

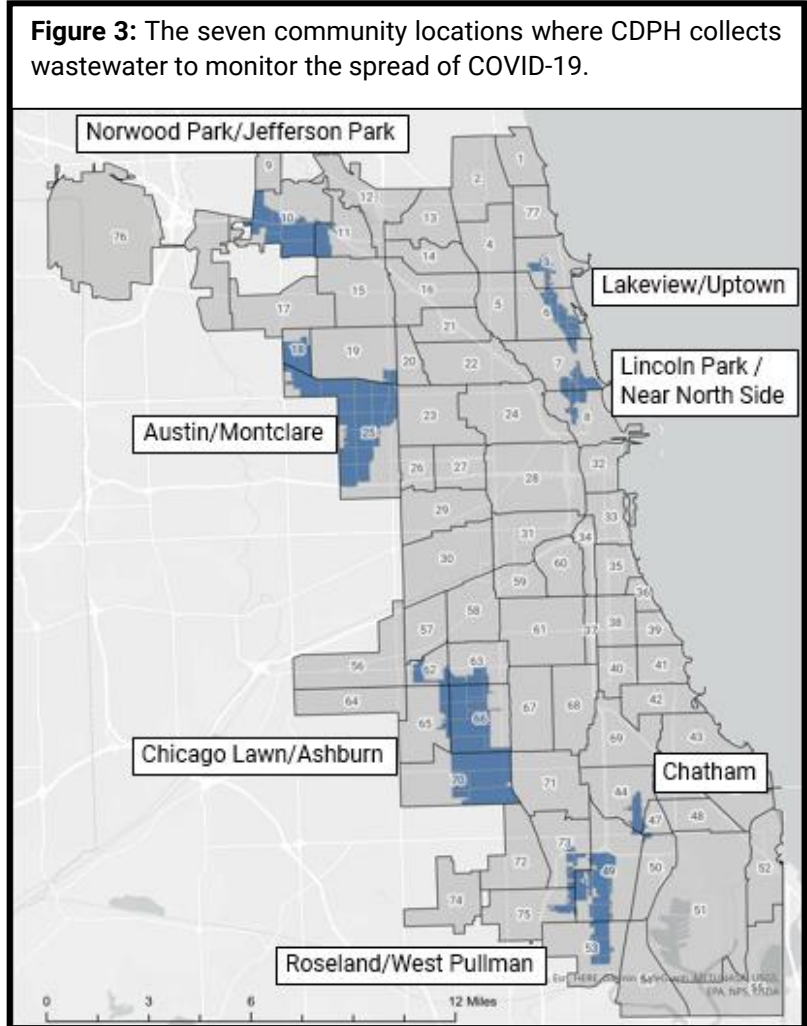


## Where does CDPH collect wastewater samples?

In addition to the ‘zoomed out’ work studying wastewater from millions of people at treatment plants, CDPH monitors wastewater from seven neighborhoods in Chicago, including one in each [Healthy Chicago Equity Zone](#). CDPH began directly supporting monitoring of wastewater in late 2021.

**Figure 3** shows the seven catchment zones sampled in Chicago (in blue). Each catchment zone represents the area whose wastewater passes through the collection site on its way to a wastewater treatment plant. Two samples are collected from each site every week.

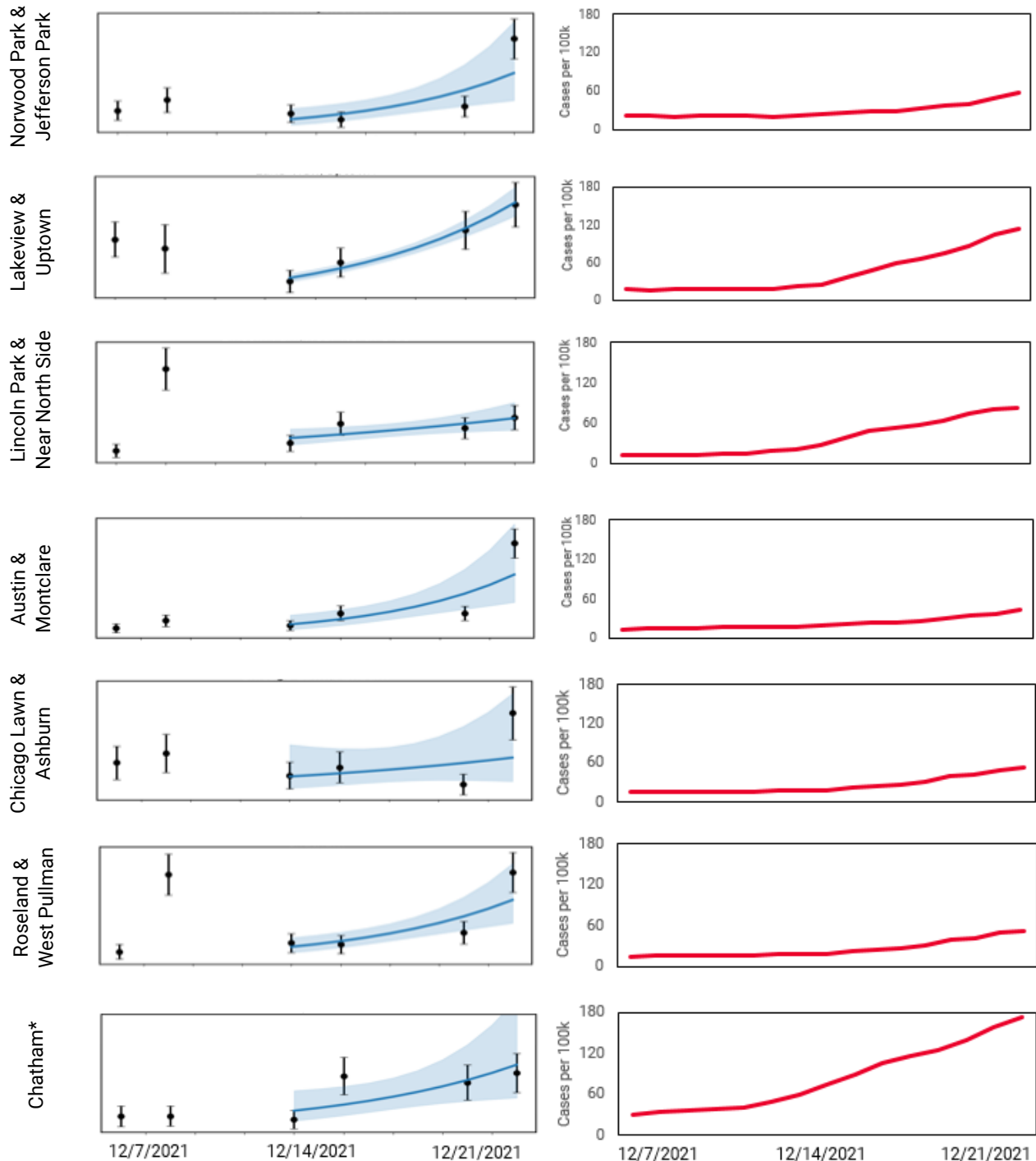
The number of people living in each catchment zone ranges from 10,000 to 215,000 people. This local monitoring complements efforts at the [statewide](#) and [national](#) levels, and allows a more zoomed-in picture of community transmission.



In December 2021, each of the seven neighborhood locations sampled by CDPH showed an increase in the amount of SARS-CoV-2 detected. Similar trends were seen in other forms of data for monitoring COVID-19, such as number of cases of COVID-19 reported to CDPH, the COVID-19 test positivity, and the number of hospital admissions due to COVID-19 (**Figure 4**).

When SARS-CoV-2 is identified in wastewater, specialized laboratory testing – including genomic sequencing – can identify specific variants. The Omicron variant was first detected in Chicago wastewater samples collected on December 12, 2021, [close to the time the first detected case in a Chicago resident was identified](#) and at a time [Omicron was still likely causing a minority of infections](#).

**Figure 4: Amount of SARS-CoV-2 in wastewater (left) and reported cases of COVID-19 (right) for each catchment zone in CDPH's wastewater monitoring program – Chicago, Illinois, December 2021.** Y-axis values for wastewater data are not provided because the values have not been corrected to account for differences in population or other factors between catchment zones. The blue line represents the estimated two-week trend. The blue shaded area is the 67% confidence interval for this trend line. Reported cases of COVID-19 are shown as 7-day rolling averages (in red). For large catchment zones, the COVID-19 case data covers the same population as the wastewater data. For the Chatham catchment zone, which has a small population, COVID-19 case data for the entire ZIP code is shown.



## What comes next?

CDPH is participating in the [CDC's National Wastewater Surveillance System](#). The CDC is preparing a publicly-available dashboard including county-level data from wastewater around the country. A link to that dashboard will be provided on the CDPH web page once the dashboard is publicly available.

Wastewater represents a pooled community stool sample; while it can provide information on infection trends in the community served by the sewer network or water treatment plant, additional considerations are needed to account for the flow and size of the community represented in the sample.

The [CDC recommends](#) collecting additional information about each sample and using this information to normalize the data. CDPH is working with academic partners at the University of Illinois and the Discovery Partners Institute to determine how to best implement these additional analyses so that the data are robust and easy to interpret. For example, efforts to normalize these data to the populations of catchment zones are ongoing. In addition, Chicago has “combined sewers”, meaning the sewers carry stormwater in addition to sewage. The amount of stormwater changes day to day depending on the amount of rainfall the city receives, which means the sewage is diluted by different amounts each day and flows at different rates. CDPH is working to include this variability in its calculations and will provide the context of these calculations when presenting data going forward.

Future reports will be posted to the [CDPH wastewater page](#).

## Conclusions

CDPH's neighborhood wastewater monitoring program successfully detected the increase in transmission of COVID-19 in December 2021, and identified Omicron in a wastewater sample collected before Omicron was the dominant variant in Chicago. More work is needed to fully interpret these data and integrate them with other data sources to inform the public health response to the COVID-19 pandemic.

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