Ohio Coronavirus Wastewater Monitoring Network Dashboard Frequently Asked Questions

Wastewater monitoring in Ohio helps to inform local and state public health practices when infectious disease trends are increasing or decreasing in a community.

What Is the Ohio Wastewater Monitoring Network?

The Ohio Wastewater Monitoring Network (OWMN), launched in June 2020, is a collaborative effort across the state to monitor coronavirus gene fragments from incoming sewage collected at participating wastewater treatment plants. Monitoring sites represent a wide spectrum of demographics including rural, suburban, and urban locations as well as communities with increased social vulnerabilities. Wastewater monitoring is a real-time, leading indicator that provides early warning and trend information regarding what is occurring in a community. Wastewater monitoring data, along with syndromic surveillance, case data, death and hospitalization information, testing data, and vaccine data, all are data sources that can be used to help inform local public health initiatives in communities.

Map Viewing Tips

The dashboard provides a list of participating wastewater treatment plants that are monitored for coronavirus gene fragments next to the state map of locations. Hover on the site or arrow next to the facility name to see the regression analyses results. Click on a facility name to zoom in on the site and view the concentration data under the map. To return to the state view, click the site again. When viewing on a mobile device, such as a phone or tablet, pinch with both fingers to move the map or zoom in on a specific area.

Note: A full screen option for this dashboard can be found in the lower right corner. To exit full screen mode, press the 'Esc' button.

How are increasing and decreasing wastewater viral gene data trends determined?

An arrow symbol is listed next to the facility name that describes if the flow adjusted gene copies (shown in million gene copies per day) are substantially increasing, increasing, decreasing, or steady. This trend determination is completed using a statistical method called linear regression modelling. The million gene copies per day data are first log

transformed and the statistical test is performed using the last five data values (about 2.5 weeks of data) per site. The amount of change is measured as:

- Positive regression slopes > 0.03 (and pass the statistical test) are labeled as significantly increasing with a red arrow.
- Positive regression slopes greater than 0 and < 0.03 (and pass the statistical test) are labeled as increasing with a yellow arrow.
- Regression slopes that do not pass the statistical test are labeled with a gray horizontal arrow as steady.
- Negative regression slopes that meet the statistical test are labeled as a blue arrow and as a decreasing trend.

Hover on the arrow symbol or a dot on the map to see the regression line, 95% confidence intervals, and the summary statistics of the regression output for that site.

Why Is Wastewater Being Monitored?

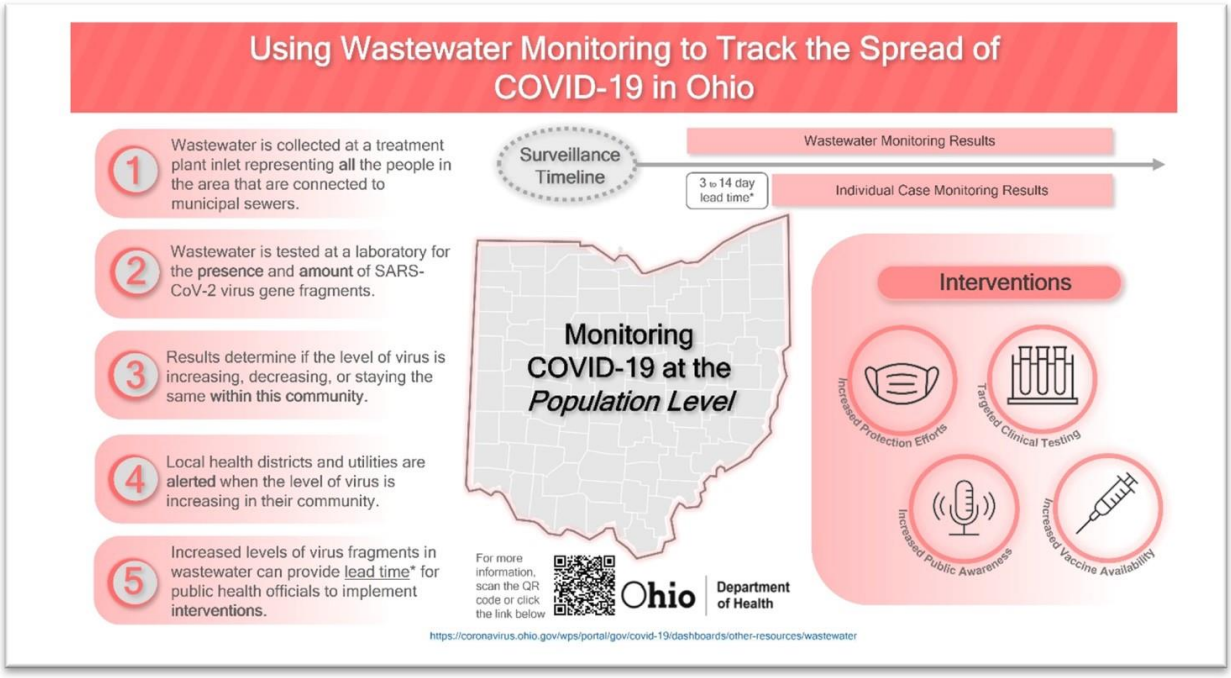
The increase of COVID-19 cases in communities has historically been tracked by testing people with symptoms, an indicator that lags behind the actual spread of the disease. Increasingly, testing data is not available due to the popular use of at-home test kits where results are not reported. Consequently, there is a need to use additional monitoring methods to evaluate COVID-19 disease trends within communities. Research in the U.S. and elsewhere has shown that non-infectious ribonucleic acid (RNA) from the virus that causes COVID-19 (called SARS-CoV-2) can be excreted in the feces, urine and saliva of both symptomatic and asymptomatic infected people and can be detected in wastewater as many as three to seven days before those infections lead to increases in case counts or hospitalizations. As such, monitoring raw wastewater in sewage collection systems can provide an early warning of increasing and decreasing disease trends in a community. This early warning and trend information can be used to help inform public health initiatives in communities.

Where Is Wastewater Being Monitored?

The OWMN includes twice weekly sampling for coronavirus RNA gene copies or fragments from the influent of more than 70 participating wastewater treatment plants located in 56 different counties in Ohio. Current sample collection sites are shown on the map above. The wastewater monitoring network continues to add sites on a voluntary basis.

How Does Wastewater Monitoring Work?

Wastewater entering treatment plants is sampled and analyzed for fragments of the virus RNA. The wastewater comes from homes in the treatment plant service areas and travels through pipes to the plant. A mixed wastewater sample (24-hour composite) is collected in an area where all the sewage from a service area enters the plant. This sample is analyzed by a laboratory to determine the number of virus gene copies present, related to the wastewater flow that occurred on the sample day and therefore the population that contributed to the flow. Based on current research, these virus fragments are not infectious at this sample collection point. It is important to note that the water discharged from the treatment plants is treated to remove viruses and bacteria and is monitored to meet all state and federal discharge limits.



Where Can I Find Results?

Click on a dot on the map to see the location of a collection site and obtain information about the viral gene copies detected in that location under the map. When available from the utility, the area displayed in light blue on the map shows the geographic boundaries of the service area collected by the sewer system that was sampled. Currently, wastewater data from each site is reported to the Ohio Department of Health for majority of sites two times per week (and, for a handful of sites, once per week), but the information is updated on the dashboard every Thursday at approximately 2 p.m.

What Do the Results Mean?

There are several factors to consider when interpreting viral data in wastewater. Because scientists are still learning about the timing and rate of shedding of the virus RNA in feces of infected people, it is only appropriate to monitor and observe the trends of viral gene copies detected in a community over time. It is also useful to consider the current wastewater data based on trends and viral loads observed during occurrences of prior variants, that is, are the viral loads and regression slopes similar to historical events. The data presented in the graphs show the total number of RNA copies detected in the area from which the wastewater was collected. A significant increase in viral gene copies over time is an indicator that cases may be increasing in the community. (See "What Is Shown on the Viral Gene Copy Trend Graph?" below for more details.) Trends in viral gene copies should be considered along with community case numbers and other COVID-19-related data, such as hospitalizations and vaccination rates, to inform public health initiatives that address COVID-19.

How Does the Ohio Wastewater Monitoring Network Improve Public Health?

Wastewater monitoring benefits the health of Ohioans in many ways including:

- Serving as an early warning of infection spread in communities or congregate settings.
- Monitoring trends in the amount of coronavirus gene copies as an indicator of disease occurrence in communities, especially when case data is not available or limited.
- Providing information that can help local communities more quickly identify and address disease trends.
- Helping communities measure the effectiveness of efforts to address disease trends.
- Determining impacts on disproportionately affected communities or communities where risk of infection is greater.

How Did the Ohio Wastewater Monitoring Network Get Started?

To help mitigate the spread of COVID-19, the Ohio Wastewater Monitoring Network was developed to analyze samples of wastewater to look for the presence of gene copies/fragments of the virus that causes the disease. The initiative was started in June 2020 as a collaboration between the Ohio Department of Health (ODH), the Ohio Environmental Protection Agency (Ohio EPA), the U.S. Environmental Protection Agency (U.S. EPA), the Ohio Water Resources Center (Ohio WRC) at The Ohio State University, and other participating universities, including the University of Toledo, Kent State University,

the University of Akron and Bowling Green State University. In July 2022, full implementation and sample analysis for the Network has transitioned to the Ohio Department of Health. Initial monitoring sites included the seven most populous cities and has expanded to a network of more than 70 wastewater treatment plants located in 56 different counties in Ohio representing wastewater flows from about 5.7 million Ohio residents.

How Are Sampling Sites Selected?

Wastewater treatment plants that were voluntarily willing to serve as sampling sites were initially selected to include the monitoring of large, medium, and smaller cities, with a smaller set of sites targeted at Census tracts with vulnerable populations. Group 1 sample site selection began with the seven largest cities in Ohio — Columbus, Cincinnati, Cleveland, Dayton, Akron, Toledo, and Youngstown — to cover the largest percentage of Ohio residents. Small and medium-sized communities were then identified (Group 2) and, were prioritized based on Ohio Public Health Advisory System alert levels and data trends, the Ohio vulnerability index, and the availability/willingness of the city to participate in the sampling effort. The network of participating wastewater treatment plants continues to grow as more agree to serve as monitoring sites. Wastewater treatment plants that are interested in joining the Ohio Wastewater Monitoring Network, or who have questions about involvement in the network, should contact ODH staff (see contact information at the bottom of this page).

What Is Shown on the Viral Gene Copy Trend Graph?

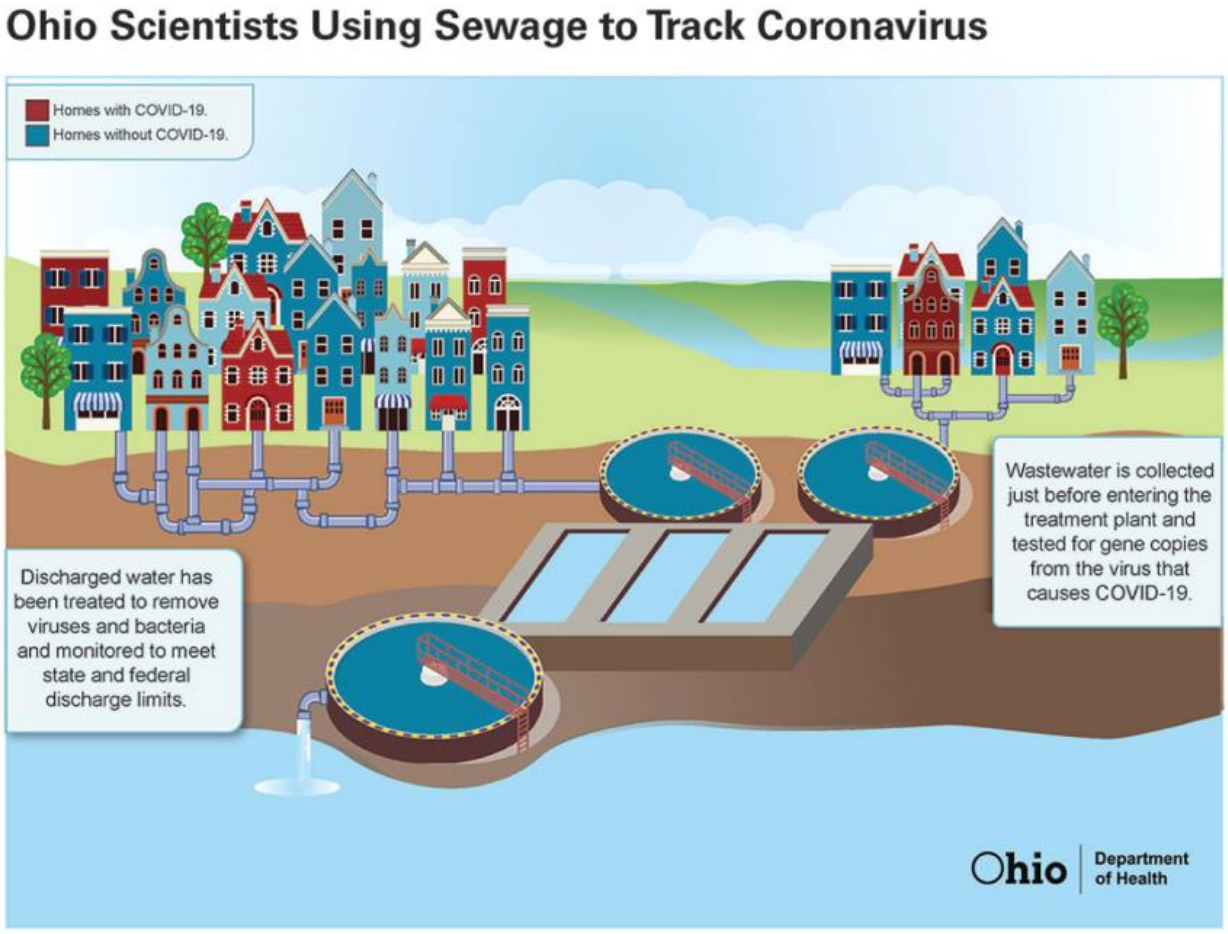
Individuals infected with the SARS-CoV-2 virus shed the virus RNA in their feces at different rates based on the severity and timing of their infections, and wastewater flowing from homes with infected individuals can change throughout the course of one day. In addition, the amount of flow received at a wastewater treatment plant on any given day can change based on water use in a community, the age of the system, and other factors. Because of these factors, the number of gene copies detected at each sampling location is multiplied by the average flow on the sampling day. (This is referred to as "normalizing" the viral gene copy results.) Two wastewater samples are analyzed from each sampling site, and the data is presented as the average of those samples.

When reviewing the sampling results, it is most important to evaluate the trend in viral gene copies. A 10-times, 100-times, or higher increase is more significant than an actual increase in the number value. For example, an increase from 600 to 5,000 gene copies (a nearly 10-times increase) is more significant than an increase from 1,200 to 3,000 viral gene copies. Regression analyses help to evaluate longer-term trends and the significance of the trends of COVID-19 at each collection site. Please refer to the regression description

under the map for more information about regression analyses. Because each community has different populations and different wastewater flow volumes, it is not appropriate to compare actual viral gene copy numbers between communities but reviewing the trend in a specific community can be used to help understand whether cases or hospitalizations are likely to increase.

Sewershed Monitoring for RNA From SARS-CoV-2

A sewershed is an area of land where the raw sewage from homes, businesses, and industries flows through a series of pipes to a single downstream point, where it enters a wastewater treatment plant. Samples of the raw wastewater can be collected and monitored for the virus' RNA before going through treatment. Additional data collected at this point helps researchers evaluate the strength and nature of the wastewater to allow for proper analysis of the RNA fragments. Before being discharged from the treatment plants, wastewater is treated to remove viruses and bacteria and is monitored to meet all state and federal discharge limits. The image below shows the flow of water from homes with and without COVID-19 to wastewater treatment plants, where it is subsequently collected, tested for viral gene fragments, and treated.



Protocols and Standards for Wastewater Sampling for SARS-CoV-2 RNA

The development and use of standard protocols and methods for sampling and analyzing the wastewater are important to ensure the sample results are correct. Most samples are collected using 24-hour composite samplers and are kept on ice until received by the ODH Public Health Laboratory. A standard protocol for sample collection and packaging, including chain of custody tracking, is followed by the participating utilities. The samples are delivered overnight to the ODH Public Health Laboratory for analysis. The ODH Public Health Laboratory has developed and routinely follows standard quality assurance and quality control measures and safety protocols when handling, analyzing and quantifying the samples. The analyzed results are reported within 2-3 days of sample receipt and additional data quality analyses are performed.

Safety of Wastewater Treatment Plant Workers

According to the Centers for Disease Control and Prevention (CDC), there is little evidence of infectious virus in wastewater, and no information to date that anyone has become sick with COVID-19 because of exposure to wastewater.

Further, the Occupational Safety and Health Administration (OSHA) has determined that handling municipal waste, managing wastewater treatment systems, and/or performing maintenance tasks on equipment used to process municipal waste or wastewater all present a low risk of exposure to SARS-CoV-2, the virus that causes COVID-19.

Standard practices associated with wastewater treatment plant operations should be sufficient to protect workers. These standard practices can include engineering and administrative controls, hygiene precautions, specific safe work practices, and personal protective equipment (PPE) normally required when handling untreated wastewater. No additional COVID-19-specific protections are recommended for workers involved in wastewater management, including those at wastewater treatment facilities.

For detailed information from OSHA on COVID-19 Control and Prevention, visit https://www.osha.gov/coronavirus/control-prevention.

Additional Resources

Centers for Disease Control and Prevention: National Wastewater Surveillance System (NWSS).

Centers for Disease Control and Prevention: NWSS COVID-19 Data Tracker.

Ohio Water Resources Center: Wastewater SARS-CoV-2 Monitoring Background.

Ohio Department of Health Team Contact Information:

Bureau of Environmental Health and Radiation Protection main phone number: (614) 466-1390.

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