



What is wastewater?

Wastewater, or sewage, is the “dirty” or used water that’s generated from homes (from toilets, sinks, kitchens, showers, laundry, etc.) and from facilities like restaurants, schools, offices, or industrial buildings. It’s not safe drinking water. Wastewater is collected through a series of pipes and drains and transported to a wastewater treatment plant (WWTP) where it’s cleaned and treated before being safely returned to the environment.

What is a sewershed?

The sewershed of a WWTP refers to the area serviced by that WWTP through a network of pipes, sewers, and manholes. This area is also sometimes referred to as a catchment area.

What is Wastewater-Based Epidemiology (WBE)?

Wastewater surveillance, also known as wastewater-based epidemiology (WBE), is a public health tool that tests for fragments (e.g., RNA, DNA) of infectious pathogens (e.g., viruses, bacteria, etc.) in untreated wastewater samples. Samples for wastewater surveillance are generally collected as the wastewater enters a WWTP before it begins the treatment process in which microbes, contaminants, and debris are removed from the wastewater.

Testing these samples provides additional understanding about the presence or spread of diseases within a community to supplement other sources of public health information. For example, people infected with SARS-CoV-2 (COVID-19), can shed the virus in their feces up to several days before they’re tested. Those viral fragments get flushed down the toilet where it gets mixed together with sewage from the entire community.

By taking a single small sample of wastewater at the WWTP and looking for how much viral material is in it, wastewater surveillance can quickly provide public health with information about how much COVID-19 is impacting the entire community. This type of public health monitoring tool provides useful information even as people change their testing habits over time and can sometimes provide early warning of increased disease activity.

What is wastewater surveillance for SARS-CoV-2?

Wastewater surveillance for SARS-CoV-2 is carried out by testing and monitoring wastewater for the inactive fragments of the SARS-CoV-2 virus. Once infected, SARS-CoV-2 is often present in a person’s intestinal tract, and the virus is excreted through feces. Research suggests approximately half of people with COVID-19 shed the virus in their stool, whether they’re symptomatic or not. Wastewater treatment plants collect samples and have them analyzed in a lab to look for the presence and amount of SARS-CoV-2. The amount of SARS-CoV-2 found in wastewater can approximate the number of COVID-19 cases in the sewershed. Additional



testing of the SARS-CoV-2 virus found in wastewater can also provide important information about circulating variants, including if a new variant is present in a community. Monitoring wastewater for COVID-19 variants, the quantity of SARS-CoV-2 virus, and changing trends provides public health with useful data to support COVID-19 preparedness and response.

How does data from wastewater surveillance for SARS-CoV-2 support COVID-19 public health preparedness and response?

Wastewater surveillance for SARS-CoV-2 is a supplemental tool used to help monitor the spread of COVID-19 within a community. Since wastewater surveillance doesn't rely on individual testing behavior or the use of specific tests (e.g., polymerase chain reaction, or PCR, tests) needed for a case to be recorded by public health, it can provide a more accurate reflection of disease activity in a community. In some cases, wastewater surveillance helps detect changing trends before increases are seen in the number of reported cases, test positivity, or hospitalizations. Wastewater surveillance can also provide information on circulating SARS-CoV-2 variants in a community. This information can help local health departments, hospitals, and communities stay vigilant and prepare accordingly.

How do you measure SARS-CoV-2 in wastewater?

Collection methods vary; however, trained professionals typically use a device known as an autosampler to automatically collect a composite wastewater sample over 24 hours, several times per week. Different laboratories may use different methods for sample processing and analysis. First, SARS-CoV-2 genetic material (RNA) in wastewater samples is concentrated and isolated. Next, a molecular PCR biology method is used to detect and quantify SARS-CoV-2 RNA sequences.

Is there evidence of infectious SARS-CoV-2 virus found in effluent or processed wastewater?

There hasn't been evidence of infectious SARS-CoV-2 found in effluent wastewater after processing at a treatment plant. WWTPs are designed to disinfect treated wastewater through multiple processes, including steps of either chlorination and/or ultraviolet light that are known to destroy the SARS-CoV-2 virus.

Is there increased risk of COVID-19 to WWTP workers?

There is no current evidence to show increased risk of COVID-19 to workers at wastewater treatment plants.

