



Lessons Learned from NACCHO's Wastewater Surveillance Mentorship Program

Local Health Departments Share Best Practices

Background

Wastewater surveillance is a rapidly developing tool used to monitor community-level infections and disease trends. Though it existed prior to the COVID-19 pandemic, it was the pandemic that led to the widespread implementation of community-level wastewater surveillance across the United States. Wastewater surveillance systems are used to detect the presence of pathogen biomarkers, typically shed by humans in the form of microbial deoxyribonucleic acid (DNA) or ribonucleic acid (RNA), in untreated wastewater. SARS-CoV-2, the virus that causes COVID-19, can be detected through wastewater surveillance up to 3 to 4 days before detection is possible with individual testing. As a result, wastewater surveillance can serve as a non-invasive and cost-efficient early warning system that may inform public health leaders in decision-making to limit the spread of COVID-19. Looking beyond the pandemic, wastewater surveillance can serve as a valuable tool for tracking other pathogen targets, such as influenza A and B, Respiratory Syncytial Virus (RSV), Mpox, and more.



The National Association of County and City Health Officials (NACCHO), with support from the Centers for Disease Control and Prevention (CDC), launched the [Wastewater Surveillance Mentorship Program](#) in 2022 to match local health departments (LHDs) with demonstrated experience in utilizing wastewater surveillance with LHDs seeking guidance, tools, and resources while in the early stages of developing a wastewater surveillance program. The goal of this mentorship program is to ensure that LHDs have the support necessary to start or expand wastewater surveillance programs to fit their community's needs. It also ensures that LHDs with expertise in wastewater surveillance have the opportunity to share their knowledge through mentorship. NACCHO funds and supports mentors and mentees to complete project goals and participate in monthly technical assistance calls, share tools, resources, and lessons learned with peers, and connect with subject-matter experts on wastewater surveillance. Mentees have opportunities to connect with other mentees through peer-to-peer sharing and receive support from their mentor through a combination of group and one-on-one meetings.

The first cohort featured the City of Tempe, AZ as a mentor and Chautauqua County (NY) and Genesee & Orleans County (NY) as mentees. Read about their experience in the program at bit.ly/WastewaterMentorshipReport.

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For the 2023 cohort of the mentorship program, one mentor, **Tacoma-Pierce County Health Department (WA)**, supported three mentees:

- **Cherokee Nation Public Health Department (OK)**
- **San Mateo County Health (CA)**
- **Pima County Health Department (AZ)**

This report summarizes the background and activities of each participating health department of the 2023 Wastewater Surveillance Mentorship Program, as well as best practices for other LHDs interested in developing or expanding a wastewater surveillance program.

Mentor: Tacoma-Pierce County Health Department

tpchd.org

Serving the large jurisdiction of the city of Tacoma and Pierce County in Washington State, the Tacoma-Pierce County Health Department (TPCHD) has extensive experience in establishing a successful wastewater surveillance program. The department currently tests wastewater samples twice a week for COVID-19 and Mpox, with flu and RSV testing to be added soon. Both of their wastewater sites pull samples twice a week and send them to the state public health lab, which provides their department with lab data that is analyzed for internal use. They partner with the state's Wastewater-Based Epidemiology Program for public reporting of data.

TPCHD mentored LHDs with unique challenges and needs, all at different stages of the implementation of their wastewater surveillance programs. To best meet the needs of all mentees, TPCHD mentored through a combination of individual and group meetings. They identified common interests of all three sites - laboratory practices and procedures, data analysis and use, and communication of relevant data to stakeholders – and brought relevant subject matter experts from their team and elsewhere to meet with mentees. Throughout their mentoring experience, TPCHD often found themselves learning from the mentees and were able to look internally and evaluate aspects of their own surveillance program.



Mentee: Cherokee Nation Public Health Department

cherokeepublichealth.org

Representing the Cherokee Nation Reservation in Oklahoma, a mostly rural reservation home to the largest federally recognized Native American tribe in the United States, the Cherokee Nation Public Health Department (CNPHD) sought to increase its proactive response efforts against COVID-19, particularly among vulnerable communities. Prior to participating in the mentorship program, CNPHD had limited knowledge of the processes for wastewater surveillance, few connections to external partners with expertise, and gaps in resources to complete the picture for COVID-19 data within their community. Their objectives, which they accomplished while participating in the mentorship program, were to begin establishing a wastewater surveillance program by generating protocols for processing and sample testing, building capacity across departments for analysis of wastewater sequencing reports, and developing dashboarding systems for future use.

Mentee: San Mateo County Health

smchealth.org

San Mateo County Health (SMCH) represents a large area in the Silicon Valley region of California served by eight wastewater treatment plants, as well as an additional treatment plant located in San Francisco International (SFO) airport, which is geographically located in San Mateo County. Prior to the mentorship program, SMCH utilized data from a partnership with Stanford University and Verily Life Sciences, known as the [Sewer Coronavirus Alert Network or SCAN](#). This partnership provided wastewater data from four of the eight treatment facilities in the county. SMCH was able to accomplish three goals through mentorship in this program: establishing a wastewater testing program at the San Mateo County Public Health Lab, developing a wastewater surveillance plan, and expanding wastewater surveillance capacity building by testing at three additional facilities.

Since participating in the mentorship program, SMCH has established a wastewater testing program at the San Mateo County Public Health Lab (PHL) and developed wastewater surveillance and communication plans and protocols. They have also fully implemented wastewater testing for SARS-CoV-2 at three additional facilities beyond the four facilities already covered by SCAN. They are now able to provide testing coverage for 85% of the county's population, particularly communities that have been socioeconomically marginalized.

Mentee: Pima County Health Department

pima.gov/2031/Health

Pima County Health Department (PCHD) in Arizona has been involved in wastewater surveillance for SARS-CoV-2 since the inception of the CDC's [National Wastewater Surveillance System](#) and has since expanded its own program to include Mpox monitoring. As a mentee, PCHD sought to gain further technical assistance and recommendations as the department communicates its wastewater surveillance findings with impacted communities, while also continuing to expand program capacity. The health department's specific goals included creating an ethical communication and intervention toolkit, developing staff capacity to effectively present data to its communities, and identifying additional targets of interest that will meet the community's public health needs.

While participating in the program, PCHD worked towards achieving their goals with their mentor's support. They received guidance from their mentor on developing a systematic process for analyzing wastewater concentration levels and a memorandum of understanding on data sharing with external wastewater laboratories. They also successfully conducted five workshops with different communities in their jurisdiction to better understand public questions and concerns related to wastewater surveillance. Lastly, with support from their county's Ethics Committee, they have developed and are finalizing an ethical communication and intervention toolkit for wastewater surveillance.

Best Practices

Both cohorts of the Wastewater Surveillance Mentorship Program reflected on best practices for other LHDs to consider when developing or expanding a wastewater surveillance program in their jurisdictions.

1. Build relationships with local jurisdictions with established wastewater surveillance systems

LHDs found that connecting and building relationships with other jurisdictions conducting wastewater surveillance was vital to their program's success. Because wastewater surveillance rapidly expanded as a result of the COVID-19 pandemic, there are many LHDs that have undergone the process of developing a wastewater surveillance program. One mentor recommends connecting with other LHDs, either formally (through a Community of Practice or mentorship program) or informally. A mentee recommends using these connections to "[review] testing protocols of other jurisdictions and [learn] how they utilize their data." LHDs don't always need to "reinvent the wheel" — learning from other jurisdictions' experiences and utilizing resources that have already been developed and tested by colleagues in the field can be extremely helpful.

Refer to the resource section in this brief to access resources from other LHDs and keep an eye out for future opportunities to participate in NACCHO's Wastewater Surveillance Mentorship Program.

2. Consider the unique needs of a jurisdiction

While there is a wealth of knowledge and resources from jurisdictions with established wastewater surveillance systems, it is also important to consider the unique needs of each jurisdiction and how they may impact the development of a wastewater surveillance program. "...each jurisdiction will look different based on the number of treatment plants they have, the number of people served by each, and how frequently they can process samples," shares a mentee. LHDs should evaluate and keep in mind aspects of their jurisdiction that may affect the development of their testing process when reviewing the testing protocols and resources from other jurisdictions.

One mentee adapted to the unique needs of their jurisdiction while working with their mentor. "We began to realize that our initial thoughts on the best procedures to use throughout sample collection to [analyze] were based on large-scale city models; and thus, would not be actionable in a rural reservation," they reflected. Because their water facilities were several hours away from each other, they had to develop temperature control procedures to collect samples over the course of several days before sequencing could be performed so as to minimally damage the integrity of the COVID-19 virus in the process.

3. Identify key stakeholders and build partnerships early

Identify key partners within your jurisdiction early in the process to ensure successful implementation and ongoing sustainability of your wastewater surveillance program. Consider relevant partners such as wastewater treatment facilities, laboratories, public health leadership, and more. Communicate the importance of the work and role of each partner. Establishing and maintaining these partnerships is useful not only in the initial establishment of your wastewater surveillance program but also to enable continued stakeholder buy-in and long-term sustainability of the program.

At the beginning of their development, one mentee conducted a stakeholder analysis across three departments to examine all connections and challenges to a wastewater surveillance system. "Working together and effectively communicating our objectives, concerns, and goals across departments were essential in establishing the credibility of our wastewater surveillance policy," they share. Similarly, in reflecting on the importance of jurisdictional partnerships in their wastewater surveillance program, another mentee shares that they were "able to leverage relationships with the treatment facilities, utilize resources to purchase supplies and conduct testing, gain buy-in from public health leadership, and assemble a dedicated team to troubleshoot challenges."

4. Start collecting surveillance data in advance

Once wastewater surveillance is implemented in a jurisdiction, one mentor recommends collecting surveillance data for at least two months before using it for operational decisions. “Noise” or variation in the data should be expected. “Any one concentration should be analyzed in context. Large ranges of concentrations exist, but weekly or biweekly averages smooth out the data considerably,” they share. Collecting data for some time before using it allows a jurisdiction to analyze concentration levels in context with case and hospitalization data.

5. Create a communication strategy

Frequent and open communication with the public, local government, and other stakeholders will help garner support for your wastewater surveillance program and ensure program longevity. “Be very upfront and open with the public and local government. Microdose them with information frequently instead of dumping knowledge on them all at once after the project has already started,” shares a mentee from the 2022 cohort of the mentorship program. Develop a detailed communications strategy for your wastewater surveillance program before the project begins, taking into account the unique needs of your jurisdiction.

6. Keep organized records

There is no singular way to successfully develop a wastewater surveillance program. Maintaining detailed documentation of your implementation process will be essential for keeping track of your progress, adjusting as needed, and ensuring the maintenance and sustainability of your unique program. “Be prepared to iterate; document processes early; keep high-level history/timeline of implementation; prepare to learn and adjust; and include non-jurisdiction stakeholders,” reflects a mentor.

Helpful NACCHO Resources

Visit naccho.org/wash for future opportunities for LHDs in this public health field. Browse NACCHO’s Wastewater Surveillance Resource Library (bit.ly/WWS_ResourceLibrary) for background information on wastewater surveillance, guidance documents, communications materials, and examples of dashboards from NACCHO, CDC, and other verified sources.

For questions or comments, contact WASH@naccho.org.

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The mission of the National Association of County and City Health Officials (NACCHO) is to improve the health of communities by strengthening and advocating for local health departments.

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