

Considerations for Implementing Wastewater Surveillance in Rural Communities

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Implementing effective wastewater surveillance for **SARS-CoV-2** in rural communities requires additional considerations such as ensuring privacy while sampling in smaller populations, limited laboratory and utility capacity due to fewer personnel and resources, access to representative clinical data for interpretation, and transparent, timely and targeted communications. However, when these factors are considered and addressed, wastewater surveillance can aid in decreasing health inequities in rural communities and serve as a valuable public health tool by providing beneficial information about community health trends.

In summer 2020, **Mathematica** secured funding to launch wastewater surveillance for SARS-CoV-2 in Jackson County, North Carolina. With a population of approximately 43,000 residents, Jackson County is a rural area located in the Southern Appalachian Mountains. Mathematica's goals were to provide local officials with a more comprehensive picture of COVID-19 exposure risk and create a pathway for sustainable monitoring through inclusion in the North Carolina Wastewater Monitoring Network.

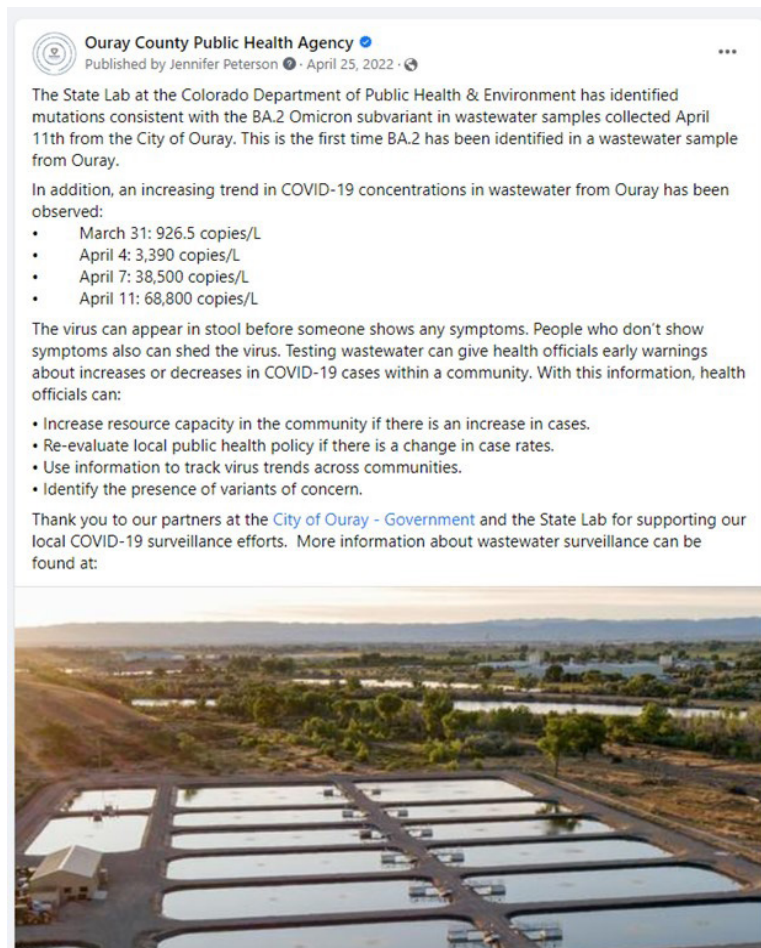
The **Colorado Department of Public Health and the Environment** (CDPHE) also implemented wastewater surveillance for SARS-CoV-2 at the pandemic's start, collaborating with both urban and rural areas. A rural utility in Ouray County serving approximately 1,000 people, began collecting wastewater samples for SARS-CoV-2 testing in February 2022 as a participant in the Colorado Wastewater Surveillance Program. Both Jackson and Ouray Counties considered the following factors to successfully initiate wastewater surveillance in their communities.

Privacy Concerns

Due to the small population of rural communities, privacy concerns can be more prevalent compared to an urban area and reporting practices should be adjusted if monitoring small utilities. Sewershed level-sampling results in pooled community wastewater samples, which allows for the anonymity of residents. Additionally, Colorado does not publicly release data for small populations of 1,000 people or less.

Capacity

The lack of a nearby laboratory caused problems for Mathematica that would have likely been less pronounced in an urban area. This resource constraint forced them to ship their samples to be tested at another laboratory, which caused an information lag. However, by developing a strong partnership with an out-of-state laboratory, data were reliably gathered within a usable timeframe. When the utility in Colorado could no longer sample due to limited staff capacity, the Ouray County Public Health Agency volunteered to assume the responsibility.



An example of the social media posts that were distributed by Ouray County and CDPHE. Photo: CDPHE

They continued collecting samples and communicating the results to ensure the community did not have a break in information.

Data Interpretation and Access to Representative Clinical Data

In rural communities, individuals are less likely to have medical insurance compared to their urban counterparts, leading to decreased healthcare-seeking behavior and data gaps.¹ Wastewater surveillance data can help to fill this

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gap, particularly since utility sewersheds with smaller populations are likely to have less signal dilution than in larger sewersheds with more wastewater inputs. In Jackson County, Mathematica was able to interpret this high-quality granular data into definitive results that informed risk messaging to the public. Clear communications were then developed to target resources for public health action.

Transparent, Timely and Targeted Communications

The key to wastewater surveillance success is establishing communication patterns that earn the residents' trust, resulting in meaningful public health action. Mathematica created short memos and weekly emails to share plain-language summaries of patterns

in the data, and has also developed a **series of briefs** on best practices. To explain community risk based on wastewater surveillance data, the Ouray County Public Health Agency released transparent social media posts developed to be easily understood.

Both Mathematica's and Colorado's experiences have shown wastewater surveillance can be successful in rural areas when specific considerations are accounted for and addressed, yielding valuable and actionable information that is beneficial to public health. Mathematica's success in North Carolina led to Jackson County being one of the first rural communities to be included in the state's program expansion and in Colorado, Ouray County Public health agency used wastewater data to

References:

1. Bureau UC. Rates of Uninsured Fall in Rural Counties, Remain Higher Than Urban Counties. Accessed February 8, 2022. <https://www.census.gov/library/stories/2019/04/health-insurance-rural-america.html>

effectively message their community about disease risk, proving wastewater surveillance can be successfully executed in a rural community. ■



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