INVITED PRESENTATION

Wastewater-Based Epidemiology and Data Analytics for Community-Level Pathogen Surveillance and Genetic Tracking: Proof-of-Concept

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Abstract

Over 60 countries have integrated wastewater-based epidemiology (WBE) into their COVID-19 surveillance programs, focusing on wastewater treatment plants (WWTPs). In the Philippines, COVID-19 surveillance relies heavily on clinical diagnostics for symptomatic individuals and their contacts. Hence, this project aimed to establish a proof of concept for wastewater-based epidemiology as a complementary approach for COVID-19 surveillance, using Davao City—without a WWTP—as a pilot study area. From July 2021 to June 2022, wastewater from the sewer pipes at three sampling sites in a prescreened barangay was assessed. Sewershed network data were generated to estimate the wastewater-contributing population. During this period, wastewater SARS-CoV-2 genome copies and confirmed COVID-19 cases in the contributing population exhibited similar temporal patterns. Additionally, total and fecal coliform levels, along with several physico-chemical parameters such as ORP, DO, TDS, salinity, and conductivity, were significantly correlated with wastewater RNA levels, indicating a potential effect on RNA recovery. This information was considered in the development of a molecular community tracker app for SARS-CoV-2. RT-LAMP assay was developed to allow point-of-risk testing of wastewater in laboratory resource-constrained communities. This multifaceted assessment of WBE provides a contextualized framework for wastewater-based surveillance in low-resource and low-sanitation communities.