APHL GLOBAL HEALTH CAPABILITIES

WASTEWATER SURVEILLANCE

DECEMBER 2023

Wastewater-based surveillance (WWBS) involves the strategic sampling and testing of untreated wastewater to detect and observe pathogens or targets of public health interest to better understand disease burden and spread within a community. WWBS supplements clinical and syndromic surveillance to provide early warning of the pathogen spread within a community. Since its introduction in the 19th century, WWBS of *Vibrio cholerae*, *Polio virus*, *Salmonella typhi* and other infectious agents has contributed to early warning systems and allowed for informed and timely public health responses. With the emergence of COVID-19, wastewater-based detection of SARS-CoV-2 has highlighted the need to establish WWBS more broadly to better inform public health responses.

Value of Wastewater-Based Surveillance

WWBS can serve as a tool for surveillance of emerging and re-emerging diseases because most viral, bacterial, and other pathogens are shed in the fecal and other wastes of symptomatic and asymptomatic individuals. Wastewater data are also unique from case-based surveillance because WWBS captures subclinical infections and data are independent of healthcare-seeking behavior and testing access. Untreated wastewater can be seen as an efficient pooled sample representing community level infections from within the sewerage network.

Along with other existing surveillance systems, WWBS has the potential to be an important tool for other emerging and re-emerging infectious diseases. WWBS could allow to early identify diseases outbreaks before clinical trends emerge and can provide an opportunity for early intervention strategies.

APHL Supports WWBS

The Association of Public Health Laboratories (APHL) provides a range of technical assistance options to support WWBS activities, such as:

- Building local capacity in wastewater-based testing, including validation and standardization of PCR testing protocols, next generation sequencing (NGS) and bioinformatics.
- Implementing molecular detection and NGS of wastewater for SARS-CoV-2 and other pathogens of public health concern (AMR, VHF, pan-respiratory, etc.).
- Improving data management and electronic test reporting system, including transfer of data from Laboratory Information Management Systems to epidemiology partners.
- Using data from WWBS surveys to complement case-based surveillance and monitor trends.
- Establishing communities of practice for wastewater-based surveillance.

APHL ASSOCIATION OF PUBLIC HEALTH LABORATORIES®

7700 Wisconsin Avenue, Suite 1000 • Bethesda, MD • 20814 | aphl.org/GlobalHealth | global.health@aphl.org

Building Local Capacity to Establish Wastewater Epidemiology Systems

APHL works with Project Stellar, funded by The Global Fund in six African countries (Ethiopia, Kenya, Mozambique, Tanzania, Uganda, and Zambia) to support a pilot project on the feasibility and effectiveness of WWBS for molecular detection and genomic sequencing of SARS-CoV-2. The overall approach is to develop a validated protocol for use to assure quality of testing, strengthen national laboratory capacity, use a stepwise implementation and demonstrate proof of practice for a reliable WWBS system.

The pilot WWBS strategy can be expanded to other emerging and re-emerging infectious diseases, including NGS to detect genetic variants of concern. The results obtained through wastewater epidemiology will inform public health decision-making and targeted interventions.

Top Left: Staff at the Central Public Health Laboratory of Uganda makes Moore Swabs for WWBS.

Top Right: APHL conducts a PCR and NGS laboratory capacity readiness assessment at the Churches Health Association of Zambia.

Bottom Right: Staff at the Instituto Nacional de Saúde of Mozambique collect Moore Swabs for PCR and NGS testing.