Wastewater-based Epidemiology: A New Tool for Monitoring and Tracking COVID-19 and Influenza Viruses in Orangeburg, South Carolina, Home of Two Historically Black Colleges and Universities

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Background: COVID-19, caused by the severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2), emerged in Wuhan, China, in December 2019, rapidly evolving into a global pandemic that has resulted in over 7 million deaths globally. In humans, besides SARS-CoV-2, Influenza A and B viruses also impose a significant burden on global health. The primary transmission of both SARS-CoV-2 and Influenza A and B viruses is through respiratory droplets released by infected individuals. SARS-COV-2 and influenza viruses have been detected in human feces; hence, wastewater has become a critical resource for monitoring and tracking environmental persistence and community transmission. **Objective:** The aim of this research focuses on the utility of wastewater-based epidemiology (WBE) as a non-invasive tool for monitoring and tracking environmental persistence levels of both viruses, in Orangeburg, a small city in rural South Carolina, home to two Historically Black Colleges and Universities (HBCUs): Claflin University and South Carolina State University. **Materials and Methods:** Composite raw (influent) and treated (effluent) wastewater samples were collected twice a week from the Orangeburg County wastewater treatment plant, before the start of the fall 2024 semester. Laboratory-based digital Polymerase Chain Reaction (dPCR) technique was used for monitoring and tracking environmental persistence and community transmission of COVID-19 and influenza viruses until October 30, 2024. **Results:** SARS-CoV-2 was detected in the raw influent samples while it remains below the limit of detection in the effluent samples. Influenza A and B were currently undetected as we approached the typical seasonal transmission season. **Conclusion:** By analyzing wastewater samples for viral RNA, WBE can detect trends in infections, particularly in regions with limited access to traditional testing. Ongoing monitoring and tracking are crucial for early outbreak detection and maintaining public health readiness, especially as periodic waves of infection are expected following the 2023 classification of COVID-19.