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DON’T WASTE THE WASTEWATER

Relevant for: Environment | Topic: Environmental Pollution - Air, Water, Soil & E-waste

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Untreated wastewater in the Thevara-Perandoor canal in Kochi. | Photo Credit: H. Vibhu

John Snow, a physician in London, found himself in the middle of a devastating cholera outbreak in 1854. In a painstaking investigation in the densely populated Soho district, he traced the source of the epidemic to a contaminated water pump on Broad Street, before knowledge of the causative organism. The epidemic subsided when the pump handle was subsequently removed. Snow’s work underscores the potential of disease prevention and control. It also leads us to a tantalising question: What could he have achieved with the tools of today? Could he have sounded the alarm at the earliest stages that an outbreak was imminent?

This hypothetical scenario is now a tangible reality. A recently published study in *The Lancet Global Health* reiterated the promise of using wastewater for public health surveillance. This strategy, originally proposed more than 80 years ago to monitor the spread of poliovirus within communities, played a role in confirming India’s victory over poliovirus. It gained fresh relevance during the COVID-19 pandemic, when it was identified as an approach for tracking the spread of SARS-CoV-2.

Wastewater surveillance for known or new health threats offers many benefits for enhancing public health efforts. It is a cost-effective approach that does not rely on invasive samples from individuals with clinical symptoms. While our public health surveillance system has improved in recent years, it still faces many implementation challenges. For instance, according to a recent report by Niti Aayog, the system grapples with issues like uneven coverage and siloed disease-specific efforts. Incorporating wastewater surveillance will not fix these issues, but it could help reduce the reliance on any one source of data. In practical terms, wastewater surveillance in India could involve systematic sampling and analysis of samples from varied sources such as wastewater ponds in rural areas and centralised sewage systems in urban localities. These samples would undergo testing at designated laboratories to identify markers of disease-causing agents, such as genetic fragments of bacteria or viruses. These data could be compiled together with other source of health data to provide real-time insights into community-level disease patterns, sometimes earlier than clinical data.

The integration of wastewater surveillance with existing surveillance mechanisms could help amplify India’s epidemiological capabilities. For instance, efforts to strengthen public health laboratory networks could incorporate the testing of wastewater samples into surveillance reporting. This could strengthen the capacity to detect diseases at an early stage, including in areas where access to healthcare facilities and diagnostic testing might be limited.

Additionally, the Ayushman Bharat Digital Mission, which aims to create a seamless online platform for healthcare services, offers an opportunity for the integration of wastewater surveillance. This would allow for real-time tracking of disease spread and facilitate more effective, targeted public health responses. Successful integration will rely on public health professionals trained not only in traditional epidemiological methods, but also in the management and interpretation of data derived from wastewater surveillance.

The promise of wastewater surveillance hinges on data sharing. This is not just a domestic issue, but also an international consideration. It is crucial to cultivate an environment of accessibility and cooperative strategies among appropriate agencies, within and beyond borders. Internally, providing access to wastewater surveillance data to health departments at all levels of government can amplify our capabilities for disease monitoring and response. Sharing wastewater surveillance data with global health agencies could foster collaborative efforts in disease tracking and mitigation. This can be a key element in building a robust global health infrastructure capable of rapidly responding to public health threats.

It is encouraging that India has already championed public health surveillance and mobilised resources accordingly. Current discussions have noted the importance of innovation and implementation. The integration of wastewater surveillance is fully aligned with Niti Aayog's current vision. Other innovative forms of disease surveillance include social media surveillance and occupational health surveillance.

India's leadership at international platforms like the G20 could serve as an opportunity to elevate the significance of innovative approaches to disease surveillance. With the world's attention focused on global health security in the wake of recent pandemics, these forums provide an opportunity to advocate for enhanced public health surveillance that integrates wastewater sampling as an essential component of health infrastructure. By actively pushing this agenda, India could not only call for international commitments and support, but also position itself as a leader and coordinator in this field. Through strategic collaborations and proactive leadership, India can lead the way in integrated public health surveillance, offering a model that is alert, predictive, responsive, and robust. With a dedicated public health and management cadre driving implementation, India can help realise this vision.