

# Urban Agenda | Get your hands dirty: Sewage surveillance is critical for public health in India

By Soumya Chatterjee · Hindustan Times · 4 min

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Sewage surveillance has been used since the 1940s to monitor public health in cities and track the spread and reemergence of polio. Like the rest of the world, India has also been carrying out periodic sewage testing to check the community-level presence of polio as part of the National Polio Surveillance Project, even though it has been polio-free since 2011.



## PREMIUM

“Sewage surveillance is essential for knowing the pathogen dynamic in cities.” (MAHENDRA KOLHE/ HT PHOTO)

# Framework to track more diseases

Rakesh Mishra, director of Tata Institute for Genetics and Society in Bengaluru and member of Alliance for Pathogen Surveillance Innovations (APSI)-India, said the system, once operational, can provide timely information for the administration to prepare infrastructure to deal with a situation like that witnessed during the Covid-19 pandemic.

“Sewage surveillance is essential for knowing the pathogen dynamic in cities. Without timely information, there is no possibility of formulating effective action. Just by spending a few crores of rupees, we can ready a detection system of a full spectrum of pathogens for a whole year for a city,” Mishra said.

If all goes according to plan, then cities in India should have near real-time data on the presence of pathogens that cause common infectious diseases such as swine flu, dengue, and Japanese encephalitis. This early warning system has the potential not only to help identify outbreaks but also to track the effectiveness of public health interventions like lockdowns imposed during the pandemic.

APSI comprises research institutes like the National Centre for Biological Sciences (NCBS), municipal corporations, hospitals and other medical industry players working in four nodal cities of Bengaluru, Hyderabad, Pune, and Delhi-NCR. The consortium has been active since July 2021, primarily working to detect newer variants of the SARS-Cov-2 and measure the viral load at a population level to detect infection hotspots. Even though Covid-19 is no longer a public health emergency, APSI routinely tracks the SARS-Cov-2.

LS Shashidhara, director at NCBS, said as part of APSI, they are working on identifying sampling sites, determining the frequency of sampling, laboratory methods to detect viral and bacterial pathogens, and understanding the implications vis-a-vis clinical prevalence of those infections. “We are also developing high-quality but low-cost kits so that environmental surveillance may be taken up by public health authorities across the country,” he said.

Bruhat Bengaluru Mahanagara Palike chief commissioner Tushar Girinath confirmed the development and said the modalities for different diseases are yet to be finalised. He said that the union government had proposed that under the national health mission, the first such lab for this purpose would be built in Bengaluru before the same is built for other cities.

By studying the samples collected from different sewage sheds, the city administration can detect the presence of diseases such as swine flu, dengue, and Japanese encephalitis virus.

APSI, funded by the Rockefeller Foundation, has been running along INSACOG.

Shashidhara said that all the data collected regarding SARS-Cov-2 is still being shared with the respective cities, even though no variants of major concern have been detected at a population scale since the vaccination.

## **Tracking anti-microbial resistance**

As part of APSI's work, cities are working to measure anti-microbial resistance (AMR) in 18 Indian cities and soon, the measures are likely to be standardised by the National Centre for Disease Control under the Union ministry of health and family welfare to be implemented at a national scale.

Mishra said, "We explore what pathogens are present there through the genetic material be it DNA or RNA. We come to know of what kind of AMR genes are around and what is their signature." He explained through this they are able to know what kind of resistance the microbes have developed and also the relative quantification of the same. He explained

that by periodic testing they can compare if the presence of certain AMR is increasing or decreasing.

Over the years, AMR has emerged as a public health threat leading to increased mortality rates. The World Health Organisation in November 2023 warned that 10 million fatalities will occur annually on a global scale by 2050 and could drain the global economy of up to one hundred trillion dollars. India has the largest burden of drug-resistant pathogens.

Similarly, in Jaipur, a team of scientists led by Sudipti Arora, assistant director at Dr B Lal Institute of Biotechnology from January is tracking the pattern of AMR presence in sewage.

"By studying sewage samples, we detect a range of microbes that can cause disease in an entire community. By studying further, we can understand how pathogens react to antibiotics and to what degree they are becoming resistant," Arora explained. She said through this exercise, they can provide doctors with relevant information about which antibiotics will no longer be effective at a population level.

Since 2021, Arora and her team have been part of multiple international projects, including the Asia-Pacific Network for Wastewater Monitoring for Covid-19 funded by the Australian government and the University of Wollongong.

In one exercise in Nagpur in January 2021, researchers from the University of Nottingham studied multiple sewage samples and found the presence of rotavirus, norovirus from urban samples, and zoonotic viruses like chikungunya and rabies. She is currently exploring how mathematical models using artificial intelligence can be used to predict future outbreaks of diseases based on the routine data collected from cities.

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