



# CLOSING NOTES

Provisioning of potable piped water and safe sanitation have been seen as one of the best disease prevention mechanisms. The advent of piped water supply in 1896 in Bengaluru and the beginnings of the piped sewerage network in the early 1900s have shown the city to be proactive in its water and wastewater management.

While the full coverage of the city with piped sewer network and the treatment of the collected sewage in the many decentralized sewage treatment plants are ongoing, the benefits of Environmental Surveillance through these sewage flows is clearly emerging as shown in this study. Not only the health of the population can be monitored in these wastewater flows but also a close monitoring of the treated wastewater will allow for its safe reuse in agricultural, environmental and other purposes since Bengaluru runs one of the largest programmes in the world for transfer of treated wastewater to fill lakes in the neighboring drought prone districts.

**Vishwanath S, Advisor,**  
*Biome Environmental Trust*

I am a molecular biologist and biotech engineer working in the fields of public health and clinical diagnostics. For me, the wastewater based epidemiology for Covid-19 started off as a small project in April 2020. But in the ensuing months, this “small project” has grown to change my mindset and expand it. My team and I have now started actively thinking about urban and rural water systems and how they affect agricultural land and the livelihood of communities, rejuvenation of ground water and the transformation of ecological systems. We have started looking at wastewater with a great deal of fascination and respect- as a motorway of creatures large and small, including pathogens and antimicrobial resistance, as an indicator of community health, as a driver of soil health and as a source of innovation in therapeutics and diagnostics.

Thus, looking back over these past two years, with Covid-19 catalyzing such paradigm shifts in so many different aspects, I would credit this “small project” with catalyzing some of the largest transformations to my thinking and growth.

**Dr Varsha Shridhar, CEO,**  
*Molecular Solutions Care Health LLP*

Wastewater-based epidemiology (WBE) for SARS-CoV-2 in Bangalore has focused on real-time surveillance as an early warning indicator of new waves of COVID-19. We have strived to combine epidemiological data with genomic surveillance to gain insights on how the virus populations are changing, and how the virus is evolving and emerging in the city. What we need now is to compare clinical and wastewater genomic surveillance data to gain insights into the SARS-CoV-2 genetic population structure circulating within a community, which might not be observed if relying solely on clinical cases.

**Dr Farah Ishtiaq, Principal Scientist,**  
*Tata Institute for Genetics and Society*

As a practicing family physician, I receive early signals from patients on new or altered patterns of illness e.g. an increase in the number of people experiencing fever, diarrhea, body aches etc. This is often associated with enhanced anxiety within the community as well. Wastewater surveillance has proved to be a very valuable early warning system for me as a practitioner in terms of my conversations with patients, also sometimes choice of the best mode of care provision (telecare vs in-person visit), testing, and treatment decisions that are most appropriate at both the individual patient level and in terms of public health.

**Dr. Ramakrishna Prasad, MD, MPH,**  
*Physician - Family Medicine & Infectious Diseases, PCMH Restore Health & Wellness, LLP & President, Academy of Family Physicians of India (AFPI) - Karnataka*



@rainwaterclub  
@zenrainman



@shridhar\_varsha



@fishtiaq



@RKPrasadMD



**Ms. Sangita Patel, Director, Health Office**  
*U.S. Agency for International Development in India*



Since the onset of the pandemic, the U.S. Government, through USAID, has provided more than \$216 million in COVID-19 relief to India providing life-saving treatments, disseminated public health messages, strengthened case-finding and surveillance, mobilized innovative financing mechanisms to bolster emergency preparedness, and helped keep India's brave frontline health workers safe so they can continue to save lives. As of June 2022, these investments have benefited more than 120 million people in India since the start of the pandemic, including more than 320,000 health workers and more than 17,700 health facilities to respond to the pandemic, while helping to deliver more than 17.5 million vaccines through USAID-supported vaccination sites. USAID's investments are contributing to health-systems strengthening, in partnership with the Government of India, to help address the current COVID-19 pandemic and prepare for future infectious disease outbreaks.

As part of this coordination, USAID supported the COVID Action Collaborative (CAC), an India-wide network of more than 350 organizations working together to provide relief and recovery and build resilience to India's most vulnerable communities. Working with state governments, local institutions, and the private sector, CAC provides high-impact relief packages supporting livelihoods, enhancing social protection, and providing COVID-19 risk prevention and mitigation. These relief packages help vulnerable communities recover from the adverse effects of health and loss of livelihood caused by the pandemic and help build long-term resilience.

USAID is happy to support the Precision Health Initiative, an innovative solution that supports cities to conduct sewage tests to help identify infectious outbreaks before they spread widely. Early warning systems can help guide local COVID-19 response and provide policymakers with the information they need to better allocate resources. The Precision Health Initiative has the potential to be applied more broadly to monitor other infectious disease outbreaks, antimicrobial resistance, illicit opioid use, and pathogens.

USAID recognizes the importance of innovations in solving health problems, particularly for the most vulnerable and marginalized. However, innovations are only as valuable as the people that intentionally use them, thus we applaud the team for creating this playbook to help others research and scale this important preparedness work.

