

Making environmental research more effective



By Rehnuma Haque Sarah



More support for environmental surveillance can boost the potential of this approach in LMICs.

Environmental research in low- and middle-income countries (LMICs) has traditionally focused on the identification and monitoring of specific environmental pollutants, such as heavy metals, pesticides and other toxic substances in biological markers. Environmental surveillance is instead based on the systematic monitoring and analysis of environmental air, water, soil and wildlife to assess potential risks to public health and the environment. In low-middle income countries, environmental surveillance is particularly important due to the prevalence of environmental health risks such as poor sanitation, air pollution and exposure to hazardous chemicals due to industrialization. By conducting comprehensive surveillance of these and other environmental factors, researchers can gain a better understanding of the complex interactions between environmental factors and public health outcomes.

Perhaps the most promising application of environmental surveillance is wastewater surveillance used for the detection and monitoring of infectious diseases. In developing countries, where traditional surveillance methods may be limited, wastewater surveillance can provide a cost-effective and non-invasive method for tracking the prevalence of infectious diseases in a population. Studies have shown that wastewater surveillance can be used to detect the presence of poliovirus, norovirus and other enteric viruses.

At the beginning of my research career, I focused on assessing the impact of arsenic exposure in water on the health of communities. During my doctoral studies, I expanded my research interests to include the quantification of persistent organic pollutants in

various environmental and biological samples. However, conducting human biomonitoring studies can be expensive, particularly in countries like Bangladesh where there is a lack of laboratory support and other essential facilities. Since the peak of the COVID-19 pandemic, I have been conducting wastewater surveillance. At the outset, I faced several challenges in identifying the appropriate sampling locations and determining the types of samples that would yield the results my colleagues and I were seeking. There were many factors to consider, including the presence of pathogens and potential chemical inhibitors that could affect our results. To overcome these challenges, we engaged in extensive brainstorming sessions to develop effective sampling strategies. We considered a range of factors, such as the population density of the sampling site, the type of wastewater treatment facility and the potential for contamination from industrial or agricultural activities in the surrounding area. Through our diligent efforts, we were able to develop a reliable wastewater surveillance program that has yielded valuable insights into the prevalence of COVID-19 in Bangladesh.

This experience has taught me the importance of careful planning and collaboration when conducting environmental research and the need to remain adaptable in the face of unexpected challenges.

In addition to infectious disease surveillance, wastewater surveillance can also be used to monitor environmental contaminants, such as heavy metals, pesticides and persistent organic pollutants. This is particularly important in developing countries, where exposure to environmental contaminants may be higher due to poor sanitation practices and limited regulations.

Overall, environmental surveillance requires a diverse range of technical expertise, including laboratory analysis, data analysis, risk assessment, communication and

technology. Developing and maintaining strong technical skills is crucial for successful environmental surveillance efforts.

Environmental surveillance can be used for a variety of purposes, including public health monitoring, risk assessment, environmental monitoring and compliance monitoring. In terms of public health monitoring, it is an effective tool for tracking the prevalence of diseases and other health outcomes that are linked to environmental exposures. It can also be used to identify and quantify risks associated with exposure to environmental contaminants, and this information can then inform risk management decisions. Environmental surveillance can be utilized to monitor the health of ecosystems and wildlife and to identify trends and changes in environmental conditions over time. Finally, it is essential for ensuring compliance with environmental regulations and permit requirements.

While the use of environmental surveillance is still relatively new in countries with lower resources, there is growing recognition of its potential to improve public health and promote sustainable development. To realize the full potential of the approach, it is essential to invest in the necessary infrastructure, technologies and personnel to support its implementation. By doing so, we can usher in a new era of environmental research and public health protection in low-middle-income countries.

Rehnuma Haque Sarah

Environmental Interventions Unit,
Infectious Diseases Division, International
Centre for Diarrhoeal Disease Research,
Dhaka, Bangladesh.

✉ e-mail: rehnuma.haque@icddr.org

Published online: 15 May 2023

Competing interests

The authors declare no competing interests.