



IANPHI Asia Network – Webinar on “Genomic Surveillance in One Health and Case Studies of Successful One Health Initiatives”

4 December, 2024 – 11am -1pm CET

Summary

Dr. Muhannad Aloraini, Chair of the IANPHI Asia Network and Director of the Saudi Public Health Academy, introduced the webinar. He also moderated the webinar.

The first speaker of the webinar was **Dr. Manjur Hossain Khan Jony**, Assistant Professor (Virology), Senior Scientific Officer (Zoonosis) at the Institute of Epidemiology, Disease Control & Research (IEDCR) & the National Influenza Centre (NIC) in Bangladesh. He presented his work on “Leveraging Wastewater Surveillance for One Health in Low- and Middle-Income Countries: A Pathway to Integrated Public Health”.

He focused on various aspects of epidemiological surveillance, research, outbreak investigation, and response in Bangladesh. He discussed their work as a national influenza center and their integration of different surveillance systems.

Key points included:

1. **Influenza Surveillance:** The Institute has been active in influenza surveillance since 2007, with a focus on identifying novel strains and monitoring flu cases through both outpatient and hospital-based systems. They have established Sentinel sites and have been collecting samples from Influenza-Like Illness (ILI) and Severe Acute Respiratory Infections (SARI) cases.
2. **Incorporation of Other Pathogens:** Since March 2020, the influenza surveillance platform was expanded to include testing for SARS-CoV-2, and later RSV (respiratory syncytial virus) in 2022. The integration of these pathogens allowed for better detection and monitoring of various respiratory infections.
3. **Environmental Surveillance:** The team also started testing environmental samples, particularly from sewage systems in Dhaka. They have found that environmental data can detect SARS-CoV-2 earlier than clinical samples, showing potential for using sewage as an early warning system for viral outbreaks.
4. **Testing and Sequencing:** Over the course of their research, the Institute tested over 30,000 samples, including RSV and SARS-CoV-2, and performed whole-genome sequencing. Environmental data has been used to complement clinical testing, and sequencing of both environmental and clinical samples was done to track the spread and variants of SARS-CoV-2.

5. **Geolocated Data and Surveillance:** He highlighted how geolocated data from clinical and environmental samples can provide insights into disease distribution across different social groups and geographic areas within Dhaka.
6. **Future Research Directions:** There is an ongoing effort to correlate environmental data with other infectious diseases, such as cholera and influenza, and further studies are planned to understand the relationship between the social status of populations and the spread of pathogens in the environment.

The second speaker was **Dr Md. Mahbubur Rahman**, Project Coordinator, Environmental Health and WASH, Health Systems and Population Studies Division at the iccdr.b (International Centre for Diarrheal Disease Research in Bangladesh). He presented his work on “Integration of human, animal and environmental surveillance for antimicrobial resistance (AMR) and other climate sensitive reemerging pathogens using a One Health approach in Bangladesh”.

The institute is implementing a One Health approach to address AMR. The project integrates human, animal, and environmental surveillance to detect and track antimicrobial resistance (AMR) patterns, particularly focusing on *ESBL E. coli*.

The objectives of the project include:

1. Establishing a multi-sectoral integrated surveillance system to detect ESBL *E. coli* across human, animal, and environmental components.
2. Incorporating environmental surveillance into existing platforms.
3. Using genomic analysis to study the occurrence, transmission, and trends of AMR.
4. Identifying factors that cause variations in AMR trends.

The study started in July 2023 and involves collecting various samples (e.g., blood, rectal swabs, chicken cecum, and environmental wastewater) from two locations in Bangladesh: Dhaka and Mymensingh. These samples help monitor AMR in both humans and animals. The data collected will be shared across government departments.

The project aims to establish national guidelines for integrated AMR surveillance, improve communication and coordination between different sectors, and develop effective, implementable interventions. A key challenge is data sharing and collaboration across sectors. The government expects the development of sustainable guidelines, integrated surveillance costing reports, and a functional One Health secretariat to guide future AMR surveillance efforts in the country.

The project also aims to strengthen environmental AMR sampling methods and integrate environmental monitoring into the national surveillance system, with a goal to scale up efforts within the government health budget. Ultimately, the findings will help in generating data that informs public health interventions in Bangladesh.

The third speaker was **Dr Simmi Tiwari**, Joint Director and Head of the Centre for One Health at the National Centre for Disease Control (NCDC) in India. She presented “One Health initiatives in India”. She explained the concept of One Health, which integrates human, animal, plant, and environmental health to address emerging and re-emerging diseases, focusing on zoonoses, antimicrobial resistance (AMR), food safety, and climate health.

She highlighted several key initiatives in India:

1. **National One Health Mission:** A new overarching program, approved in 2024, aimed at coordinating One Health efforts at the highest political levels.
2. **Zoonosis Control:** The NCDC leads efforts to prevent and control zoonotic diseases with programs like the National One Health Program for Zoonosis Prevention.
3. **AMR Containment:** A national program to manage antimicrobial resistance, with a coordinated approach across sectors.
4. **Climate and Health:** Addressing the impact of climate change on public health, focusing on extreme heat, air pollution, and waterborne diseases.
5. **Workforce Development:** Initiatives like the Sector Connect program to train district and state officials in responding to zoonotic and environmental health threats.
6. **Digital Surveillance:** A platform monitoring over 40 diseases in real-time, integrating data from various sectors for rapid response.

She also discussed India's collaborative approach involving multiple sectors, including agriculture, environment, and public health, as well as partnerships with international organizations like WHO, CDC, and the World Bank.

The fourth speaker was **Dr Meera Dhuria**, also from the National Centre for Disease Control in India. She presented her work: "SectorConnect (Field Epi Programme- One health): Multisectoral Workforce development initiative". SectorConnect is an epidemiology initiative designed to integrate multi-sectoral responses to health emergencies. The program aims to shift from reactive to proactive approaches by bringing together professionals from human health, animal health, and environmental sectors, fostering a collaborative and integrated response at the field level.

The training, intended for frontline public health workers, involves two courses: a 3-month frontline course and a 12-month intermediate field epidemiology program. The curriculum includes basic epidemiology, surveillance, joint risk assessments, and field assignments. Trainees are mentored by faculty from medical and veterinary colleges to ensure clear communication and effective coordination during outbreaks.

The program successfully built strong intersectoral communication and collaboration, improving outbreak management. The program has already been piloted in Gujarat and is ongoing in Karnataka. It aims to strengthen data reporting, improve outbreak detection, and ensure timely responses to public health emergencies.

The last speaker was **Dr. Kokouvi Kassegne**, Assistant Professor at the School of Global Health of Shanghai Jiao Tong University School of Medicine in China. He presented "Genomic Surveillance of Malaria Parasites Leading for Malaria Elimination in China : under Umbrella of One Health".

Dr. Kassegne highlighted two main aspects: the geographic origins of malaria in China, particularly in the border areas of Yunnan province, and case studies tracing malaria cases.

Since 2021, China has been declared malaria-free, although imported cases continue to pose a challenge. These cases primarily come from border areas like Yunnan, which borders Myanmar, and other regions. Malaria transmission in these areas is a key concern due to the cross-border movement of people.

Dr. Kassegne explained that genomic sequencing has been used to track the origins of malaria outbreaks. For instance, in 2019, an outbreak in the Yunnan border area revealed that the malaria cases had undergone population expansion. Genomic analysis identified genes associated with disease severity under high pressure. Further studies of malaria parasites from both China and Myanmar border regions revealed shared genetic similarities, helping trace the origins of these outbreaks.

Additionally, he explained that an intriguing case study involved a patient from central China who was diagnosed with malaria despite no reported history of travel to malaria-endemic areas. Genomic analysis revealed that the parasite's genetic sequence was similar to those found in Africa, particularly Congo and Ghana, raising questions about the source of the infection.

In conclusion, he explained that genomic surveillance of malaria in China has been instrumental in tracing the origins of infections and understanding their spread across borders. However, challenges remain, such as low parasite density, co-infections, and small sample sizes, which can affect the accuracy of genetic analysis. Efforts are ongoing to improve tools for monitoring imported malaria cases and integrating environmental factors, like the role of mosquitoes, into malaria control strategies.