DIVISION OF RESEARCH CAPACITY DEVELOPMENT (RCD)

October 2023
57039

SAMRC INTRA-MURAL POSTDOCTORAL PROGRAMME

Request for Applications 2023/2024

PROJECTS OPEN FOR APPLICATIONS

PROJECT 1

Research Unit	Unit Director/ Principal Investigator (PI)	Project in which the postdoc fellow will be hosted
Environment & Health Research Unit (EHRU)	Dr Renee Street Tel: 031 242 3738 Email: renee.street@mrc.ac.za	Water, sanitation, and society

Background

Climate change disrupts weather patterns that may lead to unpredictable water availability and contamination of water sources. Such impacts can drastically affect the quantity and quality of water. Moreover, the availability of safe and sufficient water is linked to how wastewater is managed. Access to potable water remains a challenge in many low- and middle-income countries. The United Nations Sustainable Development Goals (SDGs) include improving water quality, supporting the participation of the local communities in improving water and sanitation management (Goal 6) and reducing the number of deaths due to waterborne diseases (Goal 3). In partnership with the University of Venda, this project will explore environmental (water) surveillance, hazard identification and risk management of water sources in both urban and rural settings.

Aim: To determine changes in the quality of local water sources due to climate events and to reduce health risks through locally relevant risk communication.

Objectives

1. Evidence synthesis to (a) determine the effectiveness of household-level interventions to improve quality of drinking water (including issues related to environmental contaminants of emerging concern) and (b) risk communication linked to water quality / contamination.
2. To determine the temporal trends in water quality of various water sources in urban and rural settings of Limpopo province with emphasis on climate events
3. To enhance science / risk communication of water-related climate events regarding safe water use

Methodology

Evidence synthesis relating to water quality and associated health risks as well as risk communication will be done according to the PRISMA guidelines. For field studies, water samples will be collected regularly from various sources up-and downstream of wastewater treatment plants and within proximity to urban and rural areas in the Limpopo Province. Standard physico-chemical and microbiological tests will be done on a range of water samples, with emphasis on temporal trends and changes due to climate events. Through community engagement, risk communication strategies will be evaluated.

Only applicants from fields including environmental chemistry, environmental health, public health or similar should apply.

PROJECT 2

Research Unit	Unit Director/ Principal Investigator (PI)	Project in which the postdoc fellow will be hosted
Biomedical Research and Innovation Platform (BRIP)	Rabia Johnson Tel: 0219380866 Email: rabia.johnson@mrc.ac.za	Wastewater microbiome for monitoring viral pathogens in Sewage: Being Pandemic Ready

Background:

The COVID-19 pandemic has renewed research needs on the detection and monitoring of various pathogens in urban wastewater systems using wastewater-based epidemiology (WBE). This epidemiological approach to monitoring sewer systems is especially relevant for an early warning of pathogens that can have catastrophic consequences. Organisms transmitted by the fecal–oral route are usually excreted in large numbers in the feces of the infected individual. In many situations, an infection will result in the pathogen shedding in wastewater before a community-level epidemic begins. Hence, detecting viral RNA early will allow policy makers to respond timeously to eliminate a potential disaster. Published data from the current SARS-CoV-2 pandemic demonstrated that a definite correlation exists between the isolation of RNA fragments from enteroviruses in sewage and the number of recognized clinical cases within the community. This epidemiological approach to monitoring the sewer systems for pathogenic viruses is especially relevant as an early warning to timeously implement mitigation strategies. Individuals infected with enterically transmitted viruses shed large amounts of virus in feces for days or weeks, both before and after the onset of symptoms. Therefore, viruses causing gastroenteritis may be detected in wastewater, even if only a few persons are infected. The establishment of methodologies and monitoring of these pathogens in wastewater is important to ensure global readiness to respond to the large-scale outbreak of infectious diseases.

Aim: This study will use wastewater-based epidemiology to investigate the spatial and temporal trends of seasonal viruses including SARS-COV-2, Rotavirus, Norovirus, Hepatitis virus, and Influenza virus as well as monitor the presence of sporadic outbreaks in the Western Cape, South Africa.

Objectives:

1. To continue with weakly surveillance of SARS-CoV-2
2. To investigate the capability of multiplex RT-PCR and real-time PCR assays to detect enteric virus outbreaks.
3. To use WBE as an early warning system to track the seasonal pathogens within the Western Cape
4. To track and characterize pathogens of emerging concern within the Western Cape

Methodology:

Samples of the untreated sewage will be collected from 24 wastewater treatment plants within the City of Cape metropolitan. To establish the methodology, a retrospective study will be conducted on samples previously collected during the Covid-19 Pandemic from 24 WWTP in the WESTERN Cape. Wastewater samples will be collected and extracted as part of the SARS-CoV-2 surveillance. RT-qPCR will be performed using primers and probes targeting Rotavirus A, Norovirus GI and GII, Hepatitis virus, influenza virus and pathogens of emerging concern. Clinical case data will be collected from the local health authorities and correlated to viral loads observed in the respective areas. Whole-genome sequencing will be done on selected samples at the SAMRC genomics platform.

The successful candidate will be allowed to further explore the application of the used methodology to the epidemiology of other diseases /conditions of local importance.

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