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One Health Modelling Network  
for Emerging Infections

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# OMNI-REUNIS Super-Spreader Seminar Series

These seminar series is intended to provide faculty members, OMNI-RÉUNIS affiliates and HQPs a platform to present their research, share experiences and foster collaboration among OMNI-RÉUNIS, the Emerging Infectious Disease Modelling (EIDM) networks, and the scientific community.

## BAYESIAN SPATIAL ANALYSIS OF SOCIOECONOMIC INFLUENCES ON MPOX IN THE AFRICAN REGION: IMPLICATIONS FOR A ONE HEALTH APPROACH



Hybrid Seminar (Zoom) Petri Sci. & Engr  
Building, Room 018, 140 Campus Walk



Thursday, Dec 19, 2024



10:30 am-11:30 am EDT

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**DR. CHIGOZIE LOUISA J. UGWU**

### MEET THE PRESENTER

Dr. Chigozie Louisa J. Ugwu is a post-doctoral fellow in the Department of Mathematics & Statistics at York University, where she is directly supervised by Professors Woldegebriel Assefa Woldegerima and co-supervised by Professors Jianhong Wu and Ali Asgary. Dr. Ugwu holds a PhD in Statistics with specialized training in biostatistics, spatial epidemiology, and machine learning. Her current research focuses on utilizing mathematical, statistical, geospatial, and machine learning methodologies to model, predict, and assess the risks of Mpox (monkeypox) and other zoonotic diseases. She explores how sociodemographic, behavioral, and multifactored elements, including climate and environmental changes, influence the spatial distribution of these diseases. Through her interdisciplinary work, Dr. Ugwu bridges the gap between human, animal, and environmental health, applying the One Health approach to inform data-driven public health strategies. She is committed to mentoring students and fostering collaboration across disciplines, Dr. Ugwu actively presents at research meetings, contributes to publishing findings, and advances interdisciplinary research in epidemiology and data science. Her work aims to inform public health decision-making and actions by developing and applying models that highlight disparities in disease prevalence.

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## SEMINAR TITLE AND ABSTRACT

### BAYESIAN SPATIAL ANALYSIS OF SOCIOECONOMIC INFLUENCES ON MPOX IN THE AFRICAN REGION: IMPLICATIONS FOR A ONE HEALTH APPROACH

Mpox remains an ongoing public health concern and is endemic in many parts of the African region, driven by complex interactions among environmental, socioeconomic, and health factors. This study employed a Bayesian Poisson hierarchical regression model to estimate the spatial distribution of Mpox incidence and its association with socioeconomic determinants, including key components of the Human Development Index (HDI), such as health, education, and income. Using reported Mpox cases from the World Health Organization (WHO) and World Bank Open socioeconomic data, we computed risk ratios, exceedance probabilities, and spatially structured and unstructured effects to uncover patterns of Mpox transmission. Our results highlight significant spatial heterogeneity in Mpox risk, with high-burden regions characterized by low HDI scores and inadequate healthcare infrastructure. The study detected areas with elevated disease risk, emphasizing the need for targeted interventions. Additionally, the analyses revealed geographic clustering of Mpox cases, indicating influence of local, unmeasured factors. While the primary focus is on socioeconomic influences, the study also emphasizes the importance of One Health approach, recognizing that human health is intricately linked to animal and environmental health, particularly in the context of zoonotic diseases. The findings suggest that addressing socioeconomic disparities and adopting a One Health framework could enhance Mpox control and prevention efforts across Africa.



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