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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.

## QUANTIFYING THE BASIC REPRODUCTION NUMBER AND THE UNDER-ESTIMATED FRACTION OF MPOX CASES AROUND THE WORLD AT THE ONSET OF THE OUTBREAK: A MATHEMATICAL MODELING AND MACHINE LEARNING-BASED STUDY



Zoom (Virtual Seminar)



Thursday, Jan 18, 2024



11:00 am-12:00 pm EDT

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### MEET THE PRESENTER



Dr. Woldegerima is a faculty member as an Assistant Professor at the Department of Mathematics and Statistics at York University. Before his recruitment to York University, he was a Postdoctoral Research Fellow at the Mathematical Models and Methods in Biosciences and Bioengineering Lab at the University of Pretoria, South Africa. He has also worked as a Predoctoral Research Associate at Lehigh University in the USA; as an Assistant Lecturer at the University of Pretoria in South Africa, He has worked as a lecturer at Mekelle University in Ethiopia; and as Teaching Assistant at AIMS-Cameroon.

**DR. WOLDEGEBRIEL ASSEFA  
WOLDEGERIMA**

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## SEMINAR TITLE AND ABSTRACT

### QUANTIFYING THE BASIC REPRODUCTION NUMBER AND THE UNDER-ESTIMATED FRACTION OF MPOX CASES AROUND THE WORLD AT THE ONSET OF THE OUTBREAK: A MATHEMATICAL MODELING AND MACHINE LEARNING-BASED STUDY

The current global outbreak of mpox, which started in April 2022 has different epidemiological and clinical features compared to previous mpox outbreaks. Sexual contact has been hypothesized as the major transmission route for the disease in this outbreak, with the community of men having sex with men (MSM) disproportionately and dramatically affected. To better understand the transmission dynamics of the disease, it is essential to understand its dynamics during the early stages of the outbreak. In this article, we estimate the basic reproduction number and the ascertainment fraction of the reported cases of mpox around the world. We divide the population of each country into two groups (high- risk and low-risk groups) and consider two routes of transmission: sexual and non- sexual. Our estimate of the basic reproduction number of mpox in the considered countries ranges between 1.37 (Canada) and 3.68 (Germany). Furthermore, our estimates of the ascertainment fraction for the reported cases of mpox show a large variation in the under-reporting of cases in the high-risk population around the world with ascertainment fractions between 0.25 and 0.93, and a more consistent ascertainment fraction for the low-risk population, which ranges from 0.65 to 0.85. The ratio between the total estimated and observed cases yielded the highest values for Colombia (3.60), followed by Chile (2.57) and Mexico (2.16), whilst the lowest value was obtained for Canada (1.08). Its median value was 1.8. Our estimates can help public health decision- and policymakers better understand the mpox outbreak, in terms of how many underestimated cases can occur in several countries, and how the epidemic can spread differently.



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