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**“Simulation and Forecast of Infectious Disease:  
Environmental Determinants and Transmission  
Dynamics”**

ABSTRACT: Dynamic models of infectious disease systems are often used to study the epidemiological characteristics of disease outbreaks, the ecological mechanisms affecting transmission, and the suitability of various mitigation and intervention strategies. Here we describe investigations of the environmental determinants and transmission dynamics of influenza and other pathogens. Much of the research centers on the development of model systems and combined model-inference frameworks designed for the simulation and forecast of disease outbreaks. We identify meteorological drivers of influenza survival and transmission, demonstrate that accurate and reliable predictions of seasonal influenza outbreaks can be made using an optimized mathematical model representing population-level transmission dynamics, and apply these methods to the study of other respiratory pathogens and Ebola.