BI-CO MATHEMATICS COLLOQUIUM

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"An Old Threat in New Territory: Investigating Dengue Emergence with Mathematical Modeling"

Monday, March 27, 2023
Talk at 4:00 – Park 338
Tea at 3:30 – Park 361, Math Lounge

Abstract:
Mosquito-borne diseases endemic to areas with tropical climates have been spreading in temperate regions of the world with greater frequency in recent years. Numerous factors contribute to this spread, including urbanization; increases in global travel; and changes in temperature, precipitation, and humidity patterns due to climate change. Mathematical modeling is a useful tool to examine how these different influences impact transmission and spread of arboviruses and for projecting how potential future changes in these factors could affect arbovirus dynamics. Models have been employed for years to study disease dynamics, but diseases emerging in new regions present particular challenges.

Here, we discuss models developed to study the introduction, emergence, and spread of dengue fever in Argentina. Dengue, caused by a virus transmitted by *Aedes aegypti* mosquitoes, first emerged in temperate Argentinian cities in 2009, and multiple outbreaks of increasing incidence have occurred since. With particular focus on the role of climate in dengue emergence, we present mathematical models designed to study meteorological influences on seasonal *Aedes aegypti* and dengue dynamics in temperate Argentinian cities, and we show how different seasonal patterns influence the risk of outbreaks. We also investigate potential influences of climate change on risk of dengue transmission in the future. We discuss the implications of our work on dengue and mosquito mitigation strategies, and we address some of the issues and areas for improvement in modeling emerging arboviruses.

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