Department of Applied and Computational Mathematics and Statistics Colloquium

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Heterogeneity, Mixing, and the Spatial Scales of Dengue Virus Transmission in Iquitos, Peru

It is becoming increasingly recognized that mathematical models are useful, if not essential, tools for understanding the dynamics of transmission and control of denque, the most predominant mosquito-borne virus in the world. Models can play important roles in study design, interpretation of field-collected data, evaluation of control strategies, and forecasting future outbreaks. Given the general utility of models for research on dengue and other pathogens, I have developed a suite of models of dengue virus transmission that are capable of incorporating various levels of biological detail. Parameterization of these models leveraged 15 years of field studies in the city of Iquitos, Peru. Particularly novel features of these models include a sub-model of human movement that is the most realistic description of fine-scale movement in resource-poor cities to date, and a spatiotemporal surface of adult female *Aedes aegypti* densities that leverages a data set comprised of over 150,000 individual mosquito captures. In this talk, I will review important concepts that enter into the formulation of these models and show that predictions based on a mechanistic model accounting for these factors are consistent with realized patterns of transmission during the invasion of a novel serotype of dengue into Iquitos from 1999 to 2003. I will then discuss ongoing work to incorporate further biological detail into these models so that the contributions of different properties to heterogeneity in transmission can be assessed. Throughout, I will discuss the implications of these results for the evaluation and deployment of control measures such as vaccination and mosquito control.

Monday, November 24, 2014
4:15 PM – 5:15 PM
127 Hayes-Healy Center

Colloquium Tea 3:45 PM to 4:15 PM 154 Hurley Hall