

# Mathematical Modeling and Analysis of the Zika Virus Epidemic with Human Mobility and Parameter Estimation for Localities in Puerto Rico

Carmen Caiseda<sup>1,\*</sup>, Edilberto Arteaga-Narváez<sup>2</sup>, Luis Arias<sup>2</sup>

<sup>1</sup>*Natural Sciences and Mathematics Department, Inter American University of Puerto Rico-Bayamón Campus, 500 John W. Harris, Bayamón, Puerto Rico, 00957*

<sup>2</sup>*Natural Sciences Department, Inter American University-Metropolitan Campus, San Juan, 100 Calle Francisco Seín San Juan, Puerto Rico 00926*

`ccaiceda@bayamon.inter.edu`

Mosquito-borne transmission diseases have been a multiple threat in the past years including Dengue, Chikungunya and Zika viruses. In the US 2016 Zika Virus outbreak, the island territory of Puerto Rico accounts for 85% of all cases. The disease has been connected to serious complications for pregnant women including severe birth defects, and associated strongly with Guillain-Barré Syndrome and thrombocytopenia. To gain insights on the transmission and effect of mobility in the spread of this virus, a mathematical model will be developed. In this research a 16-variable analytic model of mosquito-human transmission and human mobility will be introduced. The  $R_0$  for the model will be obtained using the Next Generation Matrix method. Finally, using available data, parameter estimation experiments will be conducted in order to tailor the model to localities of Puerto Rico.