Mapping autochthonous transmission potential of Chikungunya virus in the United States

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INTRODUCTION
Chikungunya virus (CHIKV):
• an arbovirus endemic to Africa and South and East Asia
• transmitted to humans by the bite of an infected mosquito:
  • Aedes aegypti
  • Aedes albopictus
• identified in Tanzania in 1952
• in December 2013, the first autochthonous transmission of CHIKV in the Western Hemisphere was reported in Saint Martin
• to date (20 June 2015) there have been eleven reported cases of autochthonous transmission in the U.S. (in Florida)

OBJECTIVE
To map regions of the U.S. vulnerable to autochthonous transmission of Chikungunya virus at the county scale.

MATERIAL AND METHODS
• Publicly available data on human West Nile Virus (WNV) cases from 1999-2014
• Publicly available data on human WNV neuroinvasive disease (Meningitis and Encephalitis) cases from 1999-2014
• Correlation analysis between human WNV fever cases and human WNV neuroinvasive disease cases
• Regression analysis to estimate the relationship of socio-economic covariates
• Data on presence and absence of Aedes albopictus
• Map where Aedes albopictus is present and prevalence of human WNV cases

RESULTS
• Human WNV and Meningitis and Encephalitis are strongly correlated (p-value < 2.2\(^{-16}\))
• The correlation between the covariates and the prevalence of human WNV cases were:
  • Population Size 2.71e-06
  • Poverty Level 3.68e-05
  • Older than 65 years 5.13e-02
  • Younger than 5 years 3.77e-01
  • Median Income 4.48e-06

CONCLUSION
• Meningitis and Encephalitis is a good predictor of WNV infection in humans
• Important socio-economic and demographic covariates that are significant in predicting human exposure to Chikungunya virus are age and living below the poverty level
• Southern United States has the greatest risk of exposure to Chikungunya; specifically Florida

FUTURE PLANS
Environmental factors are also important in dictating the suitability for onward local transmission of CHIKV, therefore we will explore them and include them in our prediction to make it more complete. We would also like to include county level occupational data to our list of covariates.

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