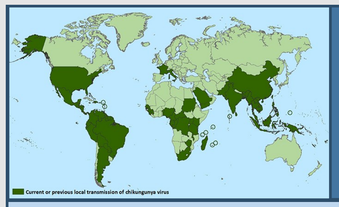
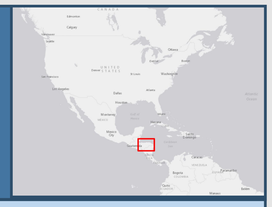


Mapping the Incidence of Chikungunya in Honduras

Utilizing demographic and ecologic characteristics to guide future public health interventions , 2015



Chikungunya in Honduras

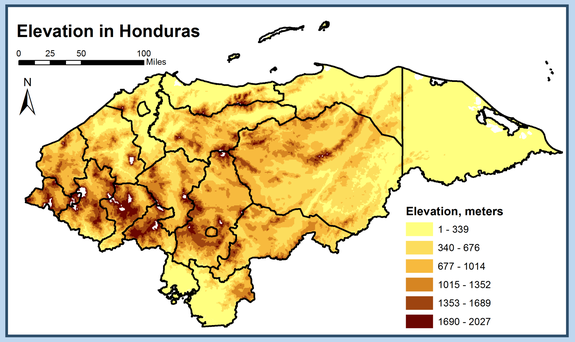
According to the CDC, there have been more than 1.7 million suspected cases in the Americas since 2013. According to the WHO, there were, 14,325 suspected cases in Honduras in the first 8 months of 2016. Chikungunya is a mosquito-borne illness that causes debilitating joint pain and fever. There is no current vaccine or cure for the illness, and prevention is based around utilizing protective clothing, eliminating mosquito breeding grounds, using insecticide-treated nets, and the use of insecticides as a spray.

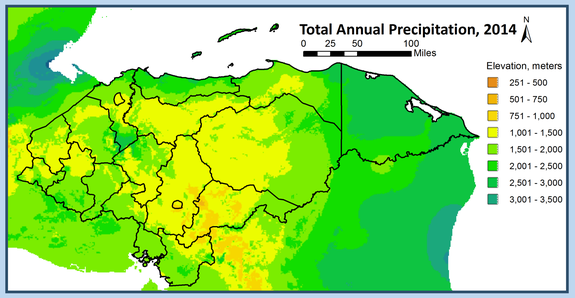
Methodology

Chikingunya incidence rates are from 2015 and originate from national surveillance data of *confirmed* cases. Rates were joined to department-level boundaries obtained by the DHS survey database are represented in shades of blue. Population density per square mile was calculated on a department level using data from ArcGIS Online. This data is from 2010 and is shown with various sizes of orange circles. Elevation was measured using the Shaded Relief dataset and is shown in meters. The precipitation map uses 2014 data from the WorldClim database. Percent of women with a secondary education or higher was used as a proxy for education level overall. This data was imported from the Demographic and Health Survey from 2011. Pink circles show the relative percentage of education. Percent of children receiving all 8 major vaccinations was used as a proxy for formal health facility access and usage. Immunizations included in the variable are anti-tuberculosis, diphtheria, pertussis, tetanus, Hepatitis B, polio, and measles. Green circles show the relative vaccination rate by department.

Ecology

Elevation and precipitation are important risk factors for chikungunya as factors that influence the spread *Aedes aegypti* and *Aedes albopictus*, the species of mosquitos that transmit chikungunya. These species are less likely to live in areas of higher elevation and more likely to breed in areas with higher precipitation/ more standing water. Higher elevation may play a protective role in the southwestern departments, where it is more mountainous and chikungunya rates are relatively low. Annual precipitation alone does not seem to be related to incidence, as Gracias a Dios, Atlantida, and the southwestern departments all have high levels of precipitation but relatively low incidence of chikungunya.

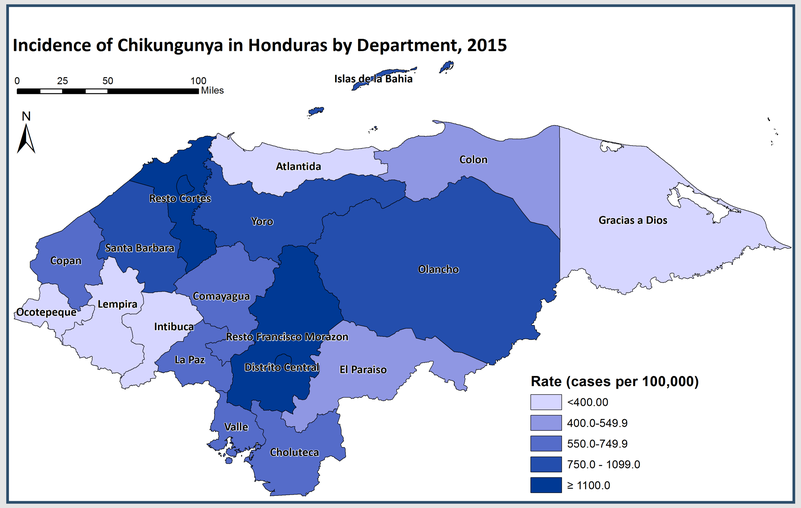


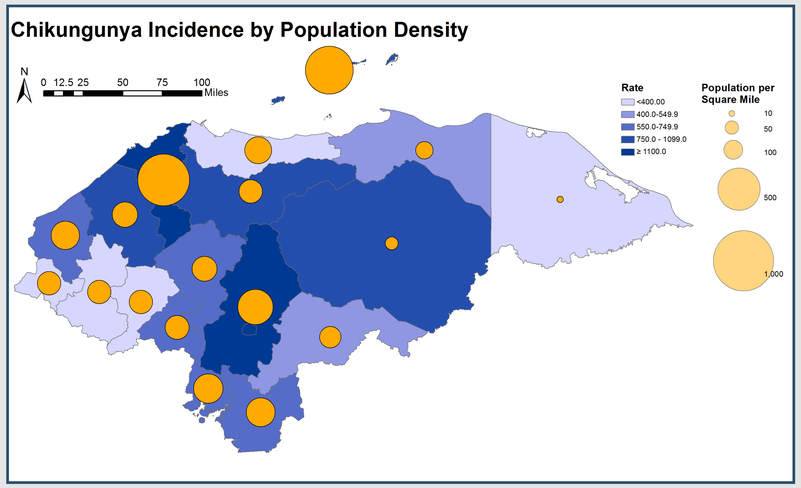


Data Sources: DHS Survey of Demographics and Health, National Census of Honduras, WorldClim, ENDESA, ESRI, Shaded Relief

Projected coordinate system: WGS_1984_UTM_Zone_16S

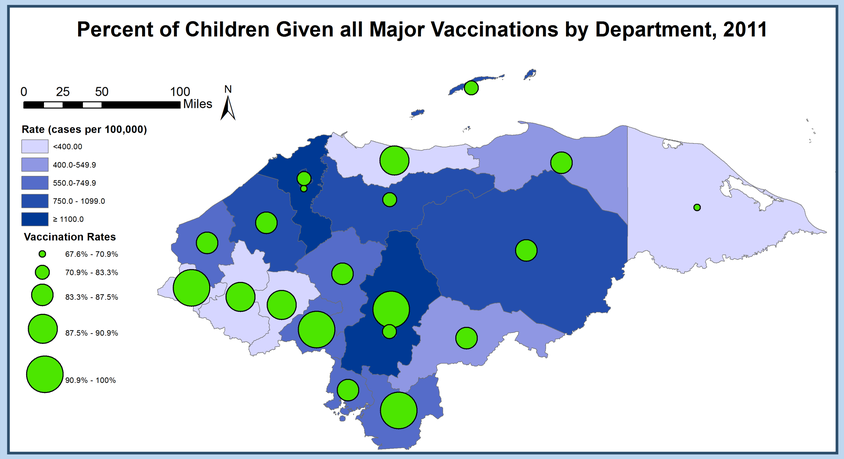
Projection: Transverse Mercator

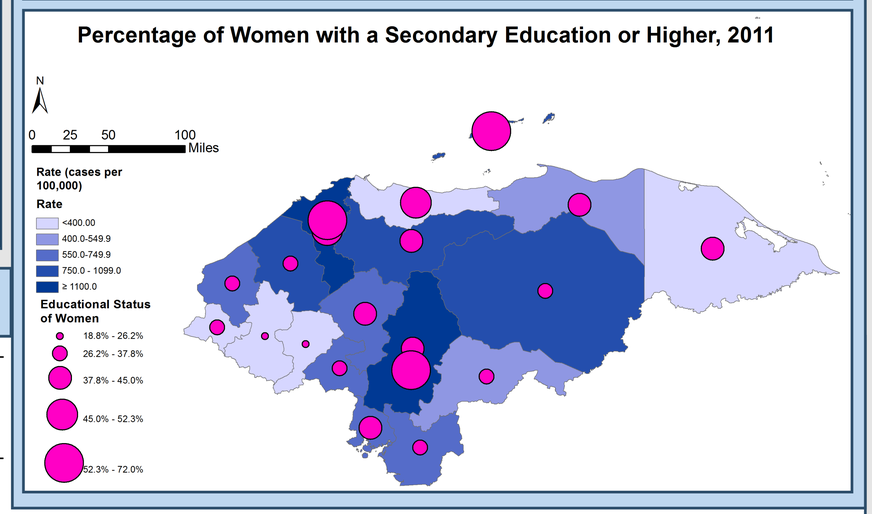




Access to Public Services

The green circles show percentage of children who receive all major vaccinations. Vaccination rate suggests access to a formal health center, meaning intervening through a health center could be a successful intervention. The secondary education rate of females was used as a proxy for the strength of the education system. Education about the spread of chikungunya and other mosquito-borne illnesses could be successful in areas where a higher percentage of the population completes secondary school. Utilizing systems already in place, such as the school system and formal health sector, is important when planning cost-effective and practical interventions.





Conclusions & Recommendations

Higher elevation may offer protection from chikungunya, which follows previous research. It is difficult to draw conclusions about precipitation, and it would be helpful to have data about proximity of residents to standing water. Francisco Morazán, Cortes, and Las Islas de Bahia were departments with some of the highest incidences of chikungunya and are the three most densely populated departments. These three departments also have the highest percent of women with a secondary education, which suggests that the use of the education system could be an effective method to disseminate information about vector control and other prevention strategies. Vaccination rates, used as a proxy for access to the formal health sector, showed diverse relationships with chikungunya incidence rates. In areas where access to vaccination rates are high, interventions should be developed to educate people about mosquito-borne illnesses through the formal healthcare sector. Overall, it is important to focus on prevention in departments with high population density. The use of the education system could be an effective way to disseminate knowledge and prevention strategies. Future research should also look at the role of poverty and other social factors, and should aim to look at municipality-level data.

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