

Dengue Dynamics & Student Movement in Rural Mexico

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Introduction

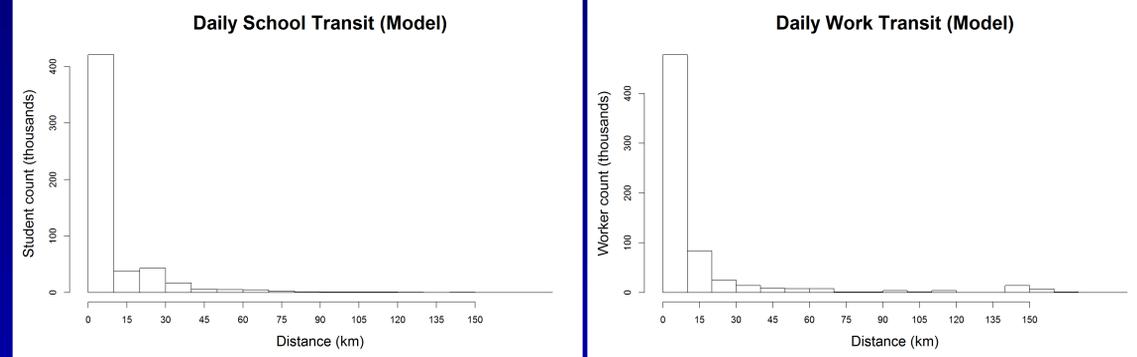
- Dengue disease is an increasing problem in the tropics, including Mexico
- Transmission and persistence not well-understood; however, human movement is a key factor
- Considered an urban disease; rural areas may be important for persistence



AIMS:

- Determine the effect of movement of children on dengue transmission
- Differences between rural and urban areas
- Explore a policy solution to reduce transmission such as adding schools to decrease spread of disease

Possible Issues with Schools



Possible explanations for long-distance school travel:

- Distance traveled is not accurate because some children don't attend school
- Simulated model is missing some rural schools
- Some rural areas lack schools and children travel long distances (the model)

Discussion & Future Work



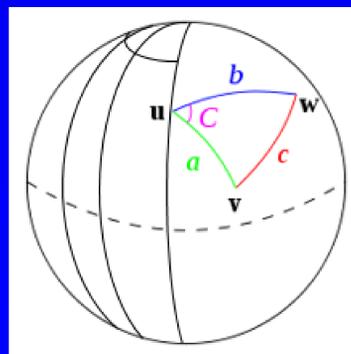
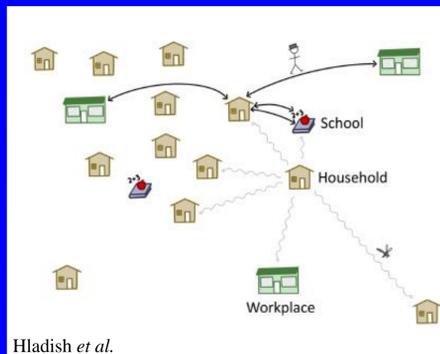
One of the various rural schools we found in Yucatan that was not in our data set.

Testing dengue transmission effect of adding rural schools:

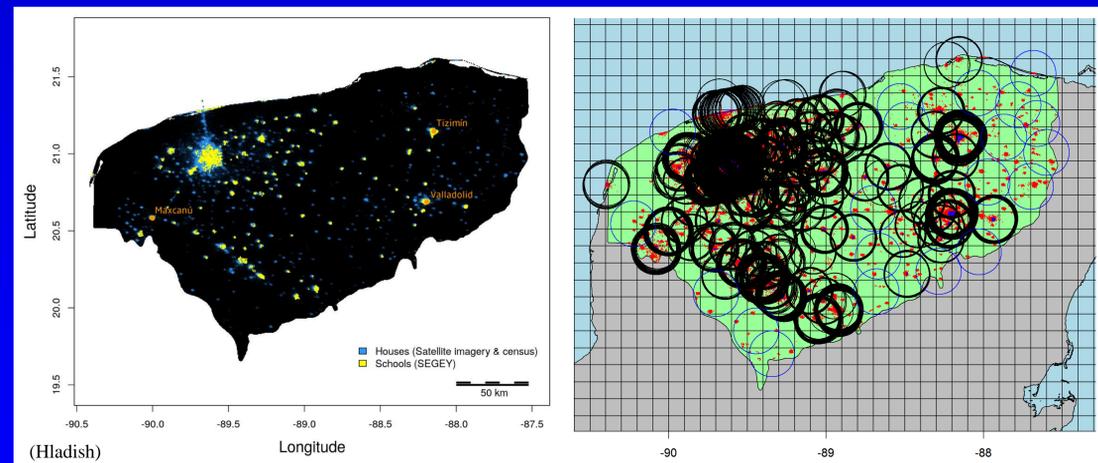
- Reduced human movement might reduce transmission
 - If the transmission is not affected, it shows the model is robust to changes in population structure
- In the future, we aim to use the transmission model to investigate the effect of adding schools to localities lacking schools nearby (8-10 km).
 - Using the Google Maps API, we will geolocate schools from the new data set, and incorporate this into the model
 - We aim to create a map defining urban & rural populations, and then analyze case data to find whether urban/rural areas experience different disease dynamics

The Model & Methods

- Agent-based transmission model
- Synthetic population: 1.8 million people; 375,000 households and 100,000 workplaces and schools in Yucatan, Mexico
- R programming language used to draw maps and compute haversine distances between schools, work, and homes
- Catchment areas: these maps visualize the range each school covers, which we estimate to 15km



Addressing the Issues



We determined the areas lacking schools. We then traveled to Yucatan to explore these rural areas. Here, we discovered a new data set from 2017 with an updated list of schools. Available government data indicate that schools exist but don't provide locations for many rural schools. We are using the new data and Google Maps to improve what is known about the location of rural schools.

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