Studying Malaria Transmission Patterns in the Amazon

Since 2011, the Amazon has experienced the largest increase in malaria compared to any other region in the world.

Our Bass team aims to understand the drivers of malaria in the Amazon related to three areas: (1) social network transmission (2) genetic strains of malaria (3) socio-demographic risk factors

Social Network Transmission

In collaboration with the University of San Francisco-Quito Ecuador, this team focuses on social connectivity and trans-border migration as a social determinant for malaria transmission along the Ecuador-Peru border.

Genomic Analysis

We obtained malaria positive blood slides from multiple health posts in Peru and Ecuador during the summer of 2019 and, through a partnership with the NCSU Vector Borne Disease Diagnostics Laboratory (Dr. Barbara Qurollo), we began sequencing malaria parasite DNA. The goal was to determine the origin of different circulating Plasmodium vivax strains near border regions of the two countries.

- We utilized strain-specific microsatellites to assess whether strains originated from Ecuador or Peru.
- A main challenge was sequencing the P. vivax DNA without sequencing the human DNA with which it was combined.
- Eventually, we were able to successfully separate and analyze P. Vivax DNA.

Socio-Demographic Risk Factors

In the Amazon, women often marry and begin having children before the age of 18. Our data suggests that this early marriage and childbirth is a risk factor for child malaria contraction.

Objective

Using both previously collected prospective longitudinal data from Loreto, Peru and sociodemographic data collected from Indigenous communities in Ecuador in 2019, we will evaluate whether risk factors for maternal reproductive health and family migratory behavior are associated with elevated malaria risk.

Primary Hypotheses

- Young maternal age at marriage and childbirth is associated with increased risk of malaria among children.
- Labor mobility interacts with younger age of marriage to multiplicatively increase malaria risk for children and adolescent offspring.

>> Next Steps

> Run a case-control study looking at relationship of migration and contraction of malaria and access to treatment.
> Conduct geospatial analysis of mosquito habitat related to human risk exposure

>> Next Steps

> Determine microsatellite differences between the Ecuadorian and Peruvian malaria positive slides to identify whether similar strains of malaria circulate in both countries.

>> Next Steps

> In the process of drafting a paper to submit for journal publication.

References available on request.

Thank you to Dr. Bill Pan (Duke GHI), Dr. Barbara Qurollo (NCSU), Royden Saah, Dr. Carlos Mena (USFQ), Justin Lana, and the community collaborators in Peru and Ecuador.