Dengue study to focus on asymptomatic carriers

April 15 2014, by Carol Clark

A NASA satellite image shows the metropolitan area of Iquitos, Peru, nestled in the Amazon Basin, on the banks of the Amazon River (lower left) and surrounded by smaller rivers, lakes and lagoons.

Dengue fever is a leading cause of illness and death in the tropics and subtropics, infecting as many as 400 million people annually, according to the CDC.

"Currently, the most effective way to control dengue outbreaks is to

spray for mosquitoes and help people to avoid getting bit by them," says Gonzalo Vazquez-Prokopec, a disease ecologist in Emory's Department of Environmental Sciences.

Vazquez-Prokopec is a co-principal investigator on a major dengue research project ongoing in Iquitos, Peru, which is honing in on ways to control outbreaks of the disease and more effectively treat infections. The National Institutes of Health recently awarded $7 million to the project team, led by the University of California, Davis, and also including the U.S. Navy, North Carolina State University, the University of Iowa, Tulane University and San Diego State.

Emory's portion of the grant – $1.3 million – will be used to study how people who are infected with a dengue virus, but not showing symptoms, may contribute to the spread of dengue.

Infections can spread like wildlife through urban areas of the developing world where many people live in close quarters in substandard housing. Mosquitoes are the vectors of the disease, transmitting the four viruses that cause dengue between people.

"It's a complex disease, made even more complicated by the fact that four different species of dengue viruses can interact with one another," Vazquez-Prokopec says. "And yet, we actually know more about these viruses than we do about the behaviors of the people who get infected with them."

The Emory research team also includes Uriel Kitron, chair of Emory's Department of Environmental Sciences, and Lance Waller, chair of the Department of Biostatistics and Bioinformatics at the Rollins School of Public Health.

Dengue is endemic in Iquitos, a city on the edge of the Amazon

rainforest. A large portion of people who get infected do not experience the usual debilitating symptoms of dengue and continue going to work or visiting friends and relatives.

"We want to determine if these people are significant spreaders of the disease," Vazquez-Prokopec says.

The experiment will require participants to undergo blood tests and wear a device that uses a GPS to track their movements and a body temperature monitor to record any bouts of fever. The data from asymptomatic people who are infected will be analyzed along with spatial-temporal data on infected people who become sick during an outbreak. Ultimately, the project will infer the contribution of asymptomatic people by linking those data with mathematical models simulating virus spread within the city.

Previously, Vazquez-Prokopec and colleagues used GPS technology to quantify the movement and contact dynamics of nearly 600 residents of Iquitos, where most people are self-employed or hold several jobs to try and make ends meet. The results showed that the participants visited an average of six locations per day overall, compared to cities in North America and Europe where urbanites visit an average of two to four locations daily.

The researchers have also conducted spatial-temporal analyses of dengue outbreak patterns through two large neighborhoods of Iquitos. When a case of dengue was confirmed through a blood test, social workers would interview the patient, recording all the places he patient went during the 15 days leading up to the onset of fever. That study found that one of the main drivers for infection was people visiting friends and relatives in nearby homes, as opposed to large gathering places like schools.

"This large project will shed light onto something that hasn't been

explored before: The role of people who are undetected by the health system in propagating dengue," says Vazquez-Prokopec.

Provided by Emory University