Contribution ID: **402** Type: **Oral presentation**

Temperature-driven mortality in Aedes aegypti and its role in modulating dengue outbreaks: an ecological time-series analysis

Monday, October 5, 2026 2:00 PM (15 minutes)

Background: Temperature influences dengue transmission, but the direction and magnitude of extreme heat effects on vector populations remain unclear. This study quantifies how cumulative heat-induced mortality in adult *Aedes aegypti* contributes to dengue incidence under real conditions, adopting a One Health perspective linking climate variability, vector biology, and human disease risk.

Methods: We combined a thermal tolerance landscape with a dynamic thermal tolerance model to predict mosquito mortality under variable temperatures, using laboratory heat tolerance data on *A. aegypti.* Daily survival probabilities are being aggregated into weekly cumulative measures and incorporated into a negative binomial regression within a distributed lag non-linear model, estimating the exposure-lag-response between predicted mortality and dengue incidence across three Brazilian municipalities, using ERA5 reanalysis data, adjusting for humidity and precipitation, with 1-3 week lags reflecting dengue's incubation period.

Findings: The thermal tolerance landscape yielded a CTmax of 49.9℃ and z = 5.88℃ (r^2 = 0.993): survival time decreases one order of magnitude for every 5.88℃ increase in temperature. Predicted mortality varied among municipalities, peaking during sustained thermal accumulation, coinciding with the warmest periods rather than isolated spikes. The DLNM analysis linking mortality to dengue incidence is underway, and full results will be presented at the symposium.

Keywords

vectors, Aedes aegypti, climate change, south america

Registration ID

OHS26-101

Professional Status of the Speaker

PhD Student

Junior Scientist Status

Yes, I am a Junior Scientist.

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