

## Abstract

**Background:** *Aedes aegypti* is a competent arthropod vector of chikungunya virus (CHIKV). The rate at which the virus disseminate in the vector is limited by temperature of their environment which can be an important determinant of geographical and seasonal limits to transmission by the arthropods in the tropics. This study investigated the vector competence of *Ae. aegypti* for CHIKV at ambient temperature of 32 and 26 °C (Coastal and Western Kenya respectively) reared at Extrinsic Incubation Temperature (EIT) of 32 and 26 °C that resembles those in the two regions.

### Methods:

*Ae. aegypti* eggs were collected from coastal and Western Kenya, hatched in the insectary and reared to F1 generation. Four-day old mosquitoes were exposed to CHIKV through a membrane feeding. They were then incubated in temperatures mimicking the mean annual temperatures for Trans-Nzoia (26 °C) and Lamu (32 °C). After every 7, 10 and 13 days post infection (DPI); one third of exposed mosquitoes were sampled and assayed for virus infection and dissemination.

### Results:

The midgut infection rates (MIR) of *Ae. aegypti* sampled from Coastal Region was significantly ( $p < 0.05$ ) higher than those sampled from Western Kenya, with no statistical differences observed for the coastal *Ae. aegypti* at EIT 26 and at 32 °C. The MIR of *Ae. aegypti* from the Western Region was significantly ( $p < 0.05$ ) affected by the EIT, with mosquito reared at EIT 32 °C exhibiting higher MIR than those reared at EIT 26 °C. There was a significant ( $p < 0.05$ ) interactive effects of the region, EIT and DPI on MIR. The disseminated infection rates for the CHIKV in *Ae. aegypti* in the legs (DIR-L) was higher in mosquitoes sampled from Coast regardless of the EIT while those from Western Kenya, dissemination rates were significantly higher at higher EIT of 32 °C.

### Conclusions:

Vector competence was higher in mosquito populations reared under high temperatures which weakens the midgut infection barrier. Hence, suggesting Lamu population is more susceptible to CHIKV therefore having a weaker mid gut infection barrier than the Trans Nzoia population. These underscores importance of examining the course of infection at various ambient temperatures and EIT between regions mosquito populations.