

Practical and exposure-free methods for monitoring biting time phenotypes by the malaria and filariasis vectors.

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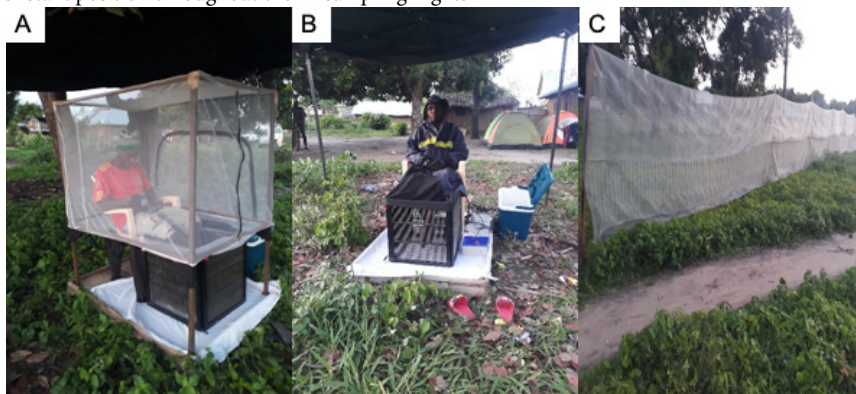
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BACKGROUND:

Although, the original version of Mosquito Electrocuting Trap (MET), has been demonstrated to be effective and consistently replicate key mosquito human-feeding behaviours as human landing catch gold standard, its complete safety to the users with respect to participant's exposure to mosquito bites remain questionable. Despite the user wearing protective clothing during collection, the face remains uncovered, and sometimes the use of protective clothing makes the user uncomfortable especially, during hot seasons. A modified prototype which offers complete protection to the collector has been developed, but the impact of such modification on the performance of trap remained unknown, and its established here for the first time. On the other hand, barrier screen trap has proven its reliability in South East Asia and Madagascar for outdoor sampling, but yet to be tested in ecological settings of Tanzania.

METHODS:

The study was conducted for 12 sampling nights in a 3x3 Latin square design where the three traps were placed in an equilateral fashion and rotated each night in three different positions (A,B,C). One complete rotation made one round and the experiment had four rounds. The participant was kept constant position throughout the 12 sampling nights



A: Mosquito electrocuting trap (METc)

B: Mosquito electrocuting trap (MET)

C: Barrier Screen BS

Questions to be answered:

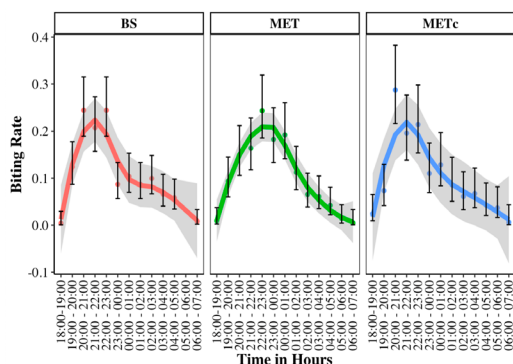
- 1) Do the three traps have the same distribution of when (biting profile pattern) the mosquitoes are caught?
- 2) Do the three traps have the same trapping performance in comparison to their expected mean catch?
- 3) Does any of the three traps have species bias sampling in comparison to each other?

DATA ANALYSIS:

- 1) A GLM model on each trap with the biting rates as the explanatory variable and time as the response variable.
- 2) The response variable was total female *An. gambiae* and *Culex* collected by each trap type, the mean catch for each trap was found and compared by fitting a negative binomial generalised linear mixed effect model (GLMMs).
- 3) The species distribution for each species was calculated by dividing the sum of the mosquitoes caught for a particular species by the sum of the mosquitoes caught across all species.

RESULTS:

- 1) Statistically, the three traps show similar trend in biting rate profile.



Hourly Biting Rate Profile

- 2) The sensitivity of the mean catch of the METc and barrier screen compared to MET evaluated by the GLMM did not detectably change over the course of the whole experiment

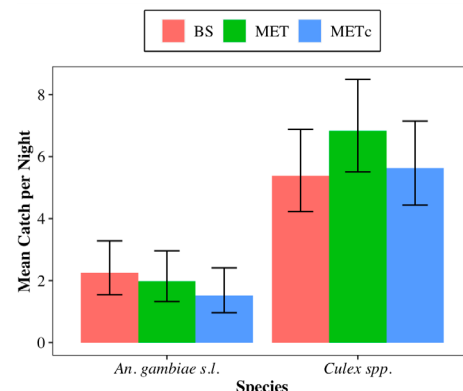
Table 2 Comparison of the estimated mean catch for each trap analysed with negative binomial GLMM

Trap type	RR [95% CI]	P
<i>Anopheles gambiae</i>		
MET	1*	NA
METc	0.79 [0.44 - 1.43]	0.44
BS	0.80 [0.27 - 2.35]	0.68
<i>Culex spp.</i>		
MET	1*	NA
METc	0.94 [0.65 - 1.34]	0.73
BS	0.83 [0.39 - 1.79]	0.64

NA not applicable, RR relative rate, CI confidence interval

Comparison of the estimated mean catch

- 3) Statistically, there is no bias in the species distribution among the three traps.



The species distribution

CONCLUSION:

The modification made for the MET did not strongly affect its performance. This prototype is recommended for use over the original design, as it offers complete protections for users against mosquito bites. Similarly, to southeast Asia, the Barrier screen has also demonstrated potential for monitoring malaria and filariasis transmitting mosquitoes in these settings, and perhaps in other African settings.