

Early morning anopheline mosquito biting, a potential driver of malaria transmission in Busia County, western Kenya:

What the entomological and human behavioral data tell us

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Methods: Study Design/Sampling

- Randomly sampled 12 of 58 project villages
- Data collected in 4 compounds / village.

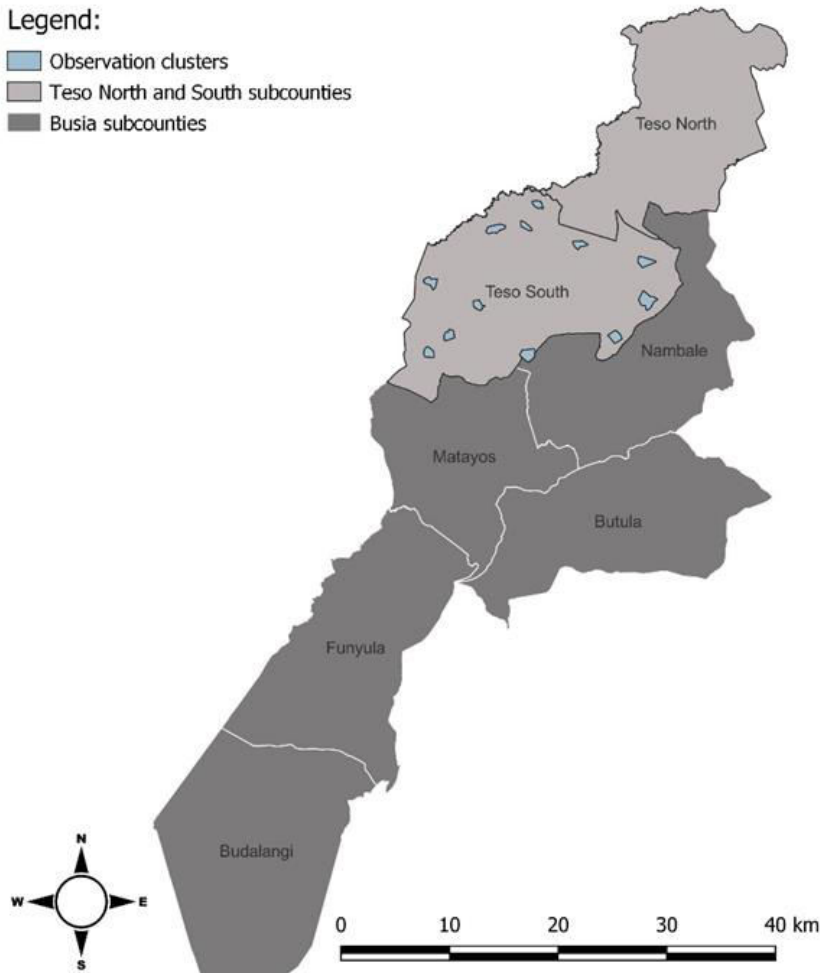
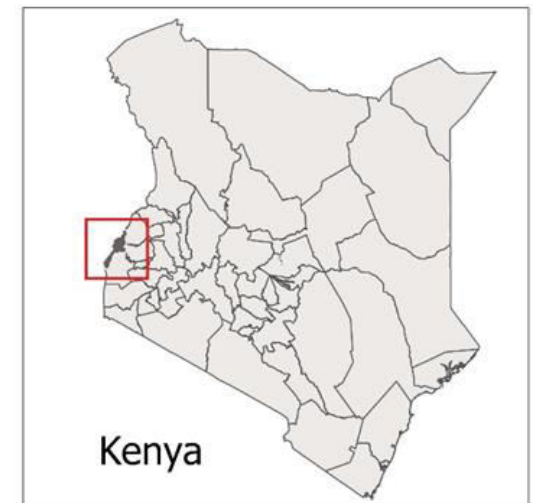


Figure 1: Map of study site



Methods: Human landing Catches (HLC) / Nighttime Observation

- Mosquito biting behaviour was collected by HLC that occurred indoors and outdoors
- Human location/ activity data were collected by direct observation of residents.



Methods: Human-vector interaction analysis

The hourly indoor and outdoor biting data were integrated with hourly human location and ITN use to estimate exposure patterns of humans to anopheline bites over the course of the night.

Results: HLC/Nighttime observation results

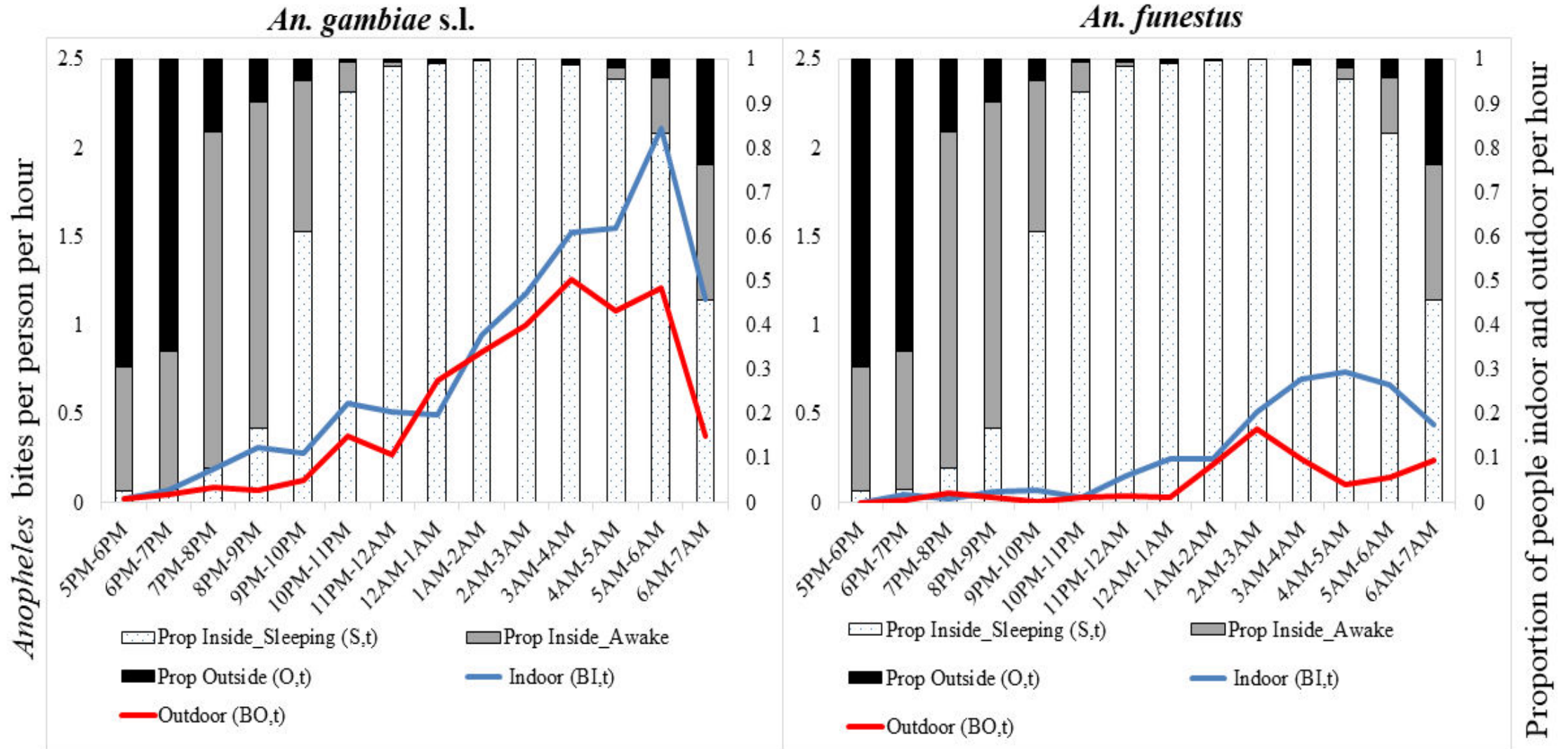
Anopheles species	Indoors n (%)	Outdoors n (%)	Total n (%)
<i>An. gambiae</i> complex	382 (52.5)	345 (47.5)	727 (100.0)
<i>An. funestus</i> group	131 (70.4)	55 (29.6)	186 (100.0)
<i>An. coustani</i>	9 (42.9)	12 (57.1)	21 (100.0)
<i>An. rufipes</i>	2 (100)	0 (0.0)	2 (100.0)
Total	524 (56.0)	412 (44.0)	936 (100.0)

- Proportions of indoor biting rates for *An. gambiae* s.l. species complex and *An. funestus* were 59% and 71%, respectively.
- A total of 328 people were observed for human behaviour.

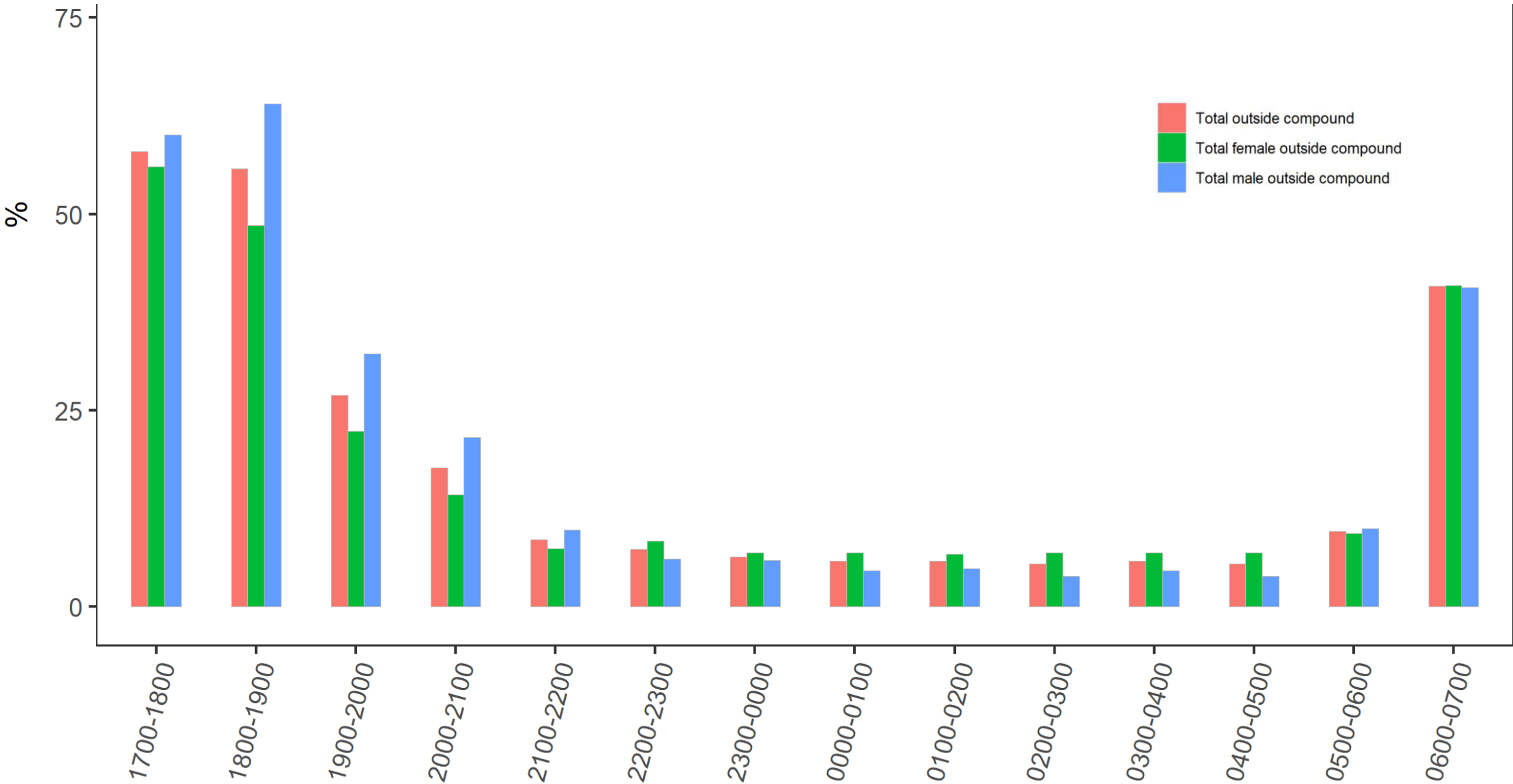
Results: Human-vector Interaction

- When accounting for human location, for an unprotected individual in the peri-domestic space, the proportion of bites that occurred indoors was 98% for both *An. gambiae* and *An. funestus*.
- Taking the protective efficacy of 92.0% for ITNs, the proportion of bites prevented by using an ITN was estimated at 79% for *An. gambiae* and 82% *An. funestus*.
- For both ITN users and non-users, most exposure to malaria vectors within the household space was estimated to occur indoors. (87% and 86% respectively)
- The proportion of exposure prevented by current levels of ITN use in the Population was estimated at 60% and 62% for *An. gambiae* and *An. funestus* respectively.

Results: Human location vs. indoor & outdoor biting rates



Results: Population away from home, by hour & gender



Results: Published


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Conclusion & Recommendations

- Combining mosquito and human behavioural data
 - Possible to identify times and locations where people are likely to need additional protection especially in western Kenya where high levels of malaria transmission persist, despite good coverage with core vector control interventions.
- For both ITN users and non-users:
 - Most exposure to malaria vectors within the household space was estimated to occur indoors, suggesting the added value of complementary indoor-oriented interventions such as spatial repellents
- High % population away from home in early evening & morning:
 - Additional research needed on gaps in protection & exposure during these times.

Study Limitations

- More lag time than anticipated between HLC and HBO
- Had hoped to collect data same day or next day
- Actual gap around 2 Weeks.

Acknowledgements



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