

Evaluation of electric nets as means to sample mosquito vectors host-seeking on humans and primates

ABSTRACT

Plasmodium knowlesi is found in macaques and is the only major zoonotic malaria to affect humans. Transmission of *P. knowlesi* between people and macaques depends on the host species preferences and feeding behavior of mosquito vectors. However, these behaviours are difficult to measure due to the lack of standardized methods for sampling potential vectors attracted to different host species. This study evaluated electrocuting net traps as a safe, standardised method for sampling *P. knowlesi* vectors attracted to human and macaque hosts. Field experiments were conducted within a major focus on *P. knowlesi* transmission in Malaysian Borneo to compare the performance of human (HENET) or macaque (MENET) odour-baited electrocuting nets, human landing catches (HLC) and monkey-baited traps (MBT) for sampling mosquitoes. The abundance and diversity of *Anopheles* sampled by different methods were compared over 40 nights, with a focus on the *P. knowlesi* vector *Anopheles balabacensis*. HLC caught more *An. balabacensis* than any other method (3.6 per night). In contrast, no *An. balabacensis* were collected in MBT collections, which generally performed poorly for all mosquito taxa. *Anopheles* vector species including *An. balabacensis* were sampled in both HENET and MENET collections, but at a mean abundance of less than 1 per night. There was no difference between HENET and MENET in the overall abundance ($P = 0.05$) or proportion ($P = 0.7$) of *An. balabacensis*. The estimated diversity of *Anopheles* species was marginally higher in electrocuting net than HLC collections, and similar in collections made with humans or monkey hosts. Host-baited electrocuting nets had moderate success for sampling known zoonotic malaria vectors. The primary vector *An. balabacensis* was collected with electrocuting nets baited both with humans and macaques, but at a considerably lower density than the HLC standard. However, electrocuting nets were considerably more successful than monkey-baited traps and representatively characterised anopheline species diversity. Consequently, their use allows inferences about relative mosquito attraction to be meaningfully interpreted while eliminating confounding factors due to trapping method. On this basis, electrocuting net traps should be considered as a useful standardised method for investigating vector contact with humans and wildlife reservoirs.