Comparative performance of the Mbita trap, CDC light trap and the human landing catch in the sampling of Anopheles arabiensis, An. funestusand culicine species in a rice irrigation in western Kenya

Abstract:

Abstract Background Mosquitoes sampling is an important component in malaria control. However, most of the methods used have several shortcomings and hence there is a need to develop and calibrate new methods. The Mbita trap for capturing host-seeking mosquitoes was recently developed and successfully tested in Kenya. However, the Mbita trap is less effective at catching outdoor-biting Anopheles funestus and Anopheles arabiensis in Madagascar and, thus, there is need to further evaluate this trap in diverse epidemiological settings. This study reports a field evaluation of the Mbita trap in a rice irrigation scheme in Kenya Methods The mosquito sampling efficiency of the Mbita trap was compared to that of the CDC light trap and the human landing catch in western Kenya. Data was analysed by Bayesian regression of linear and non-linear models. Results The Mbita trap caught about 17%, 60%, and 20% of the number of An. arabiensis, An. funestus, and culicine species caught in the human landing collections respectively. There was consistency in sampling proportionality between the Mbita trap and the human landing catch for both An. arabiensis and the culicine species. For An. funestus, the Mbita trap portrayed some density-dependent sampling efficiency that suggested lowered sampling efficiency of human landing catch at low densities. The CDC light trap caught about 60%, 120%, and 552% of the number of An. arabiensis, An. funestus, and culicine species caught in the human landing collections respectively. There was consistency in the sampling proportionality between the CDC light trap and the human landing catch for both An. arabiensis and An. funestus, whereas for the culicines, there was no simple relationship between the two methods. Conclusions The Mbita trap is less sensitive than either the human landing catch or the CDC light trap. However, for a given investment of time and money, it is likely to catch more mosquitoes over a longer (and hence more representative) period. This trap can therefore be recommended for use by community members for passive mosquito surveillance. Nonetheless, there is still a need to develop new sampling methods for some epidemiological settings. The human landing catch should be maintained as the standard reference method for use in calibrating new methods for sampling the human biting population of mosquitoes.