

Comparative evaluation of the Ifakara tent trap-B, the standardized resting boxes and the human landing catch for sampling malaria vectors and other mosquitoes in urban Dar es Salaam, Tanzania

Abstract:

Frequent, sensitive and accurate sampling of *Anopheles* mosquitoes is a prerequisite for effective management of malaria vector control programmes. The most reliable existing means to measure mosquito density is the human landing catch (HLC). However, the HLC technique raises major ethical concerns because of the necessity to expose humans to vectors of malaria and a variety of other pathogens. Furthermore, it is a very arduous undertaking that requires intense supervision, which is severely limiting in terms of affordability and sustainability. Methods A community-based, mosquito sampling protocol, using the Ifakara tent trap-B (ITT-B) and standardized resting boxes (SRB), was developed and evaluated in terms of the number and sample composition of mosquitoes caught by each, compared to rigorously controlled HLC. Mosquitoes were collected once and three times every week by the HLC and the alternative methods, respectively, in the same time and location. Results Overall, the three traps caught 44,848 mosquitoes. The ITT-B, HLC and SRB caught 168, 143 and 46 *Anopheles gambiae* s.l. as well as 26,315, 13,258 and 4,791 *Culex* species respectively. The ITT-B was three- and five-times cheaper than the HLC per mosquito caught for *An. gambiae* and *Cx. Species*, respectively. Significant correlations between the numbers caught by HLC and ITT-B were observed for both *An. gambiae* s.l. ($P < 0.001$) and *Cx. species* ($P = 0.003$). Correlation between the catches with HLC and SRB were observed for *Cx. species* ($P < 0.001$) but not *An. gambiae* s.l. ($P = 0.195$), presumably because of the low density of the latter. Neither ITT-B nor SRB exhibited any obvious density dependence for sampling the two species. Conclusion SRBs exhibited poor sensitivity for both mosquito taxa and are not recommended in this setting. However, this protocol is affordable and effective for routine use of the ITT-B under programmatic conditions. Nevertheless, it is recommended that the trap and the protocol be evaluated further at full programmatic scales to establish effectiveness under fully representative conditions of routine practice.