Development of an exposure-free bednet trap for sampling Afrotropical malaria vectors

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Abstract:

An exposure-free bednet trap (the 'Mbita trap') for sampling of Afrotropical malaria vectors was developed during preliminary studies of mosquito behaviour around human-occupied bednets. Its mosquito sampling efficiency was compared to the CDC miniature light-trap and human landing catches under semi-field conditions in a screen-walled greenhouse using laboratory-reared Anopheles gambiae Giles sensu stricto (Diptera: Culicidae). When compared in a competitive manner (side by side), the Mbita trap caught 4.1+/-0.5 times as many mosquitoes as the CDC light-trap, hung beside an occupied bednet (P < 0.000 1) and 43.2+/-10% the number caught by human landing catches (P < 0.0001). The ratio of Mbita trap catches to those of the CDC light trap increased with decreasing mosquito density. Mosquito density did not affect the ratio of Mbita trap to human-landing catches. In a non-competitive comparison (each method independent of the other), the Mbita trap caught 89.7+/-10% the number of mosquitoes caught by human landing catches (P < 0.0001) and 1.2+/-0.1 times more mosquitoes than the CDC light trap (P = 0.0008). Differences in Mbita trap performance relative to the human landing catch under noncompetitive vs. competitive conditions were explained by the rate at which each method captured mosquitoes. Such bednet traps do not expose people to potentially infectious mosquito bites and operate passively all night without the need for skilled personnel. This trap is specifically designed to catch host-seeking mosquitoes only and may be an effective, sensitive, user-friendly and economic alternative to existing methods for mosquito surveillance in Africa.