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Research

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Vector-Borne Diseases, Surveillance, Prevention

Comparison of Vector Trapping Methods for Outdoor Biting Malaria Vector Surveillance in Thailand and Vietnam

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Abstract

The performances of the human-baited double net trap (HDNT) and the human-baited host decoy trap (HDT) methods were compared against the outdoor human landing catch (OHLC) method in Thailand and Vietnam. Two study sites were selected in each country: a rural village and a nearby forest setting. The three outdoor trap methods were rotated nightly between three set trapping positions, in a pre-assigned Latin square design. Volunteers were rotated following the trap rotation to avoid bias. The greatest number of adult mosquitoes was collected from the forest sites in both countries, showing Anopheles minimus (s.s.) Theobald (96.54%) and Anopheles dirus (s.s.) Peyton & Harrison (25.71%) as the primary malaria vectors in Thailand and Vietnam, respectively. At the Thai forest site, OHLC collected significantly more anopheline mosquitoes per trap night than HDNT and HDT, with mean ± standard error values of 14.17 ± 4.42, 4.83 ± 1.56, and 4.44 ± 1.45, respectively, whilst HDNT and HDT were significantly less productive at 0.34 times and 0.31 times, respectively, than OHLC in capturing anopheline mosquitoes. However, there were no significant differences among the three methods of trapping malaria vectors for the village site. At the Vietnamese forest site, HDNT achieved the highest performance in collecting *Anopheline* mosquitoes at 1.54 times compared to OHLC, but there was no significant difference between the two traps. The results suggested HDNT could be a possible alternative trap to OHLC in this area. Although HDT was less efficient at attracting *Anopheline* mosquitoes, it was highly efficient at trapping culicine mosquitoes.

Key words: outdoor biting mosquitoes, human-baited double net trap, human-baited host decoy trap, outdoor human landing catch

Assessing malaria transmission intensity and the impact of vector control interventions require a robust and accurate entomological monitoring system for decision-making to ensure that control programs remain effective and responsive to any threats affecting vector control strategies. The quality and quantity of data are dependent on the tools applied for sampling host-seeking *Anopheles* mosquitoes (Diptera: Culicidae) to determine the human-biting rate (HBR) and the sporozoite infection rate, as the two components of the entomological inoculation rate (EIR) (Somboon et al. 1998, Paaijmans et al. 2007, Edwards et al. 2019). In highly endemic hotspots, the EIR is one of the most direct estimates of human exposure to malaria and has a relatively good correlation with human epidemiological outcomes, such as malaria incidence (Beier et al. 1999, Smith et al. 2005). Developing more sensitive, specific, and less costly surveillance tools for estimating the HBR that obviate the exposure of human collectors to infectious mosquito bites has been a major challenge (Service 1977, Farlow et al. 2020), especially in the Asia-Pacific region where a substantial proportion of biting occurs