

**RISK OF MALARIA TRANSMISSION
IN DIFFERENT SETTINGS
IN NINH THUAN PROVINCE (CENTRAL VIETNAM)**

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- Background:

In Vietnam, over the last ten years, malaria morbidity and mortality have been substantially reduced as a result of an effective control programme. However, success of malaria control is not stable and malaria continues to be an important health problem in forested, especially in remote areas, home of ethnic minorities. These mountainous and forested areas attract also many migrants from non-endemic provinces. Such population movements and specific ecological factors contribute to maintain efficiently malaria transmission in a number of foci and to reintroduction of malaria parasites where they had disappeared. An entomological study in specific forested environment was conducted in Ninh Thuan province to assess the behavioural patterns of forest and village vectors and to assess the spatio-temporal risk factors of malaria transmission in the province.

- Methods:

Five entomological surveys were conducted in three villages in Ma Noi commune and in five villages in Phuoc Binh commune in Ninh Thuan Province, South Central Vietnam. Collections were made inside the village, at the plot near the slash and burn fields in the forest and on the way to the forest. All collected mosquito species were subjected to enzyme-linked immunosorbent assay (ELISA) to detect *Plasmodium* in the head-thoracic portion of individual mosquitoes after morphological identification. Collection data were analysed by use of correspondence and multivariate analyses.

- Results:

The mosquito density in the study area was low with on average 3.7 Anophelinae bites per man-night. *Plasmodium* infected mosquitoes were only found in the forest and on the way to the forest. Malaria transmission in the forested malaria foci was spread over the entire night, from dusk to dawn but was most intense in the early evening as 9 of the 13 *Plasmodium* positive bites occurred before 21h. The annual entomological inoculation rate of *Plasmodium falciparum* was 2.2 infective bites per person-year to which *Anopheles dirus s.s.* and *Anopheles minimus s.s.* contributed. The *P. vivax* annual entomological inoculation rate was 2.5 infective bites per person-year with *Anopheles sawadwongporni*, *An. dirus s.s.* and *Anopheles pampanai* as vectors.

- Conclusion:

The vector behaviour and spatio-temporal patterns of malaria transmission in Central Vietnam impose new challenges to eliminate malaria from specific forest foci and urge to focus not only on the known main vector species. Moreover effective tools to prevent malaria transmission in the early evening and in the early morning, when the treated bed net cannot be used, need to be developed.