The behaviour and ecology of highly insecticide resistant malaria vectors in south-western Burkina Faso.

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Abstract

Background: Long lasting impregnated nets (LLINs) are the most common and successful method of malaria vector control in Africa. However the continued success of this approach is being threatened by the emergence of insecticide resistance and/or behavioural changes in vector populations that reduce their contact with LLINs. Insecticide resistance has now been detected in malaria vectors throughout Africa, with exceptionally high levels occurring in Burkina Faso. Understanding the consequences of resistance for malaria control requires a detailed understanding of the ecology, behaviour and transmission potential of insecticide resistant vectors. Here we describe the establishment and initial results from a new surveillance study in Burkina Faso, designed to investigate the ecology of insecticide resistance vectors.

Methods: A 3-year longitudinal study was initiated in October 2016 to study the population dynamics, behaviour and ecology of malaria vector populations within 12 villages in south-western Burkina Faso where insecticide resistance levels are high. This study began just one month later deltamethrin based LLINs (Permanet® 2.0) were distributed to the population.

Resting mosquitoes and host seeking mosquitoes are being sampled monthly in each village using respectively resting Bucket and human landing catch both indoor and outdoor the houses. A new exposure-free Mosquito Electrocuting Trap (MET) is being evaluated as an alternative to the gold standard Human Landing Catch for measuring vector biting activity. Mosquito abundancy, time and location of biting, and location of resting (in/outside houses) were recorded.

Results: Results from the first 3 months of study indicate malaria vector abundance is high (an average 52 mosquitoes per night, SEM 9.50), and varies between sites (between 4 and

240 mosquitoes per night with respectively SEM between 1.54 and 66.36). Most malaria vectors were from the *An. gambiae* complex (~ 90%) and importantly *An. coluzzii* and *An. gambiae*. Whilst these species are typically considered to be indoor biters, high levels of outdoor biting were recorded at all sites (56.82%). The MET collected proportionately fewer mosquitoes than the HLC, but provided a similar representation of vector biting behaviour.

Discussion: Preliminary results indicate that insecticide resistant vectors can also exhibit behavioural avoidance strategies (outdoor biting) that limit their contact with LLINs. Longer-term investigation is required to evaluate the net effect of these strategies to malaria control.