Characterisation of populations crossing formal and informal borders on the Cambodia-Laos border, including identification of malaria infection and artemisinin resistance infection

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Introduction

Malaria surveillance among cross border populations is instrumental in controlling the spread of malaria and artemisinin resistance across Great Mekong Subregion (GMS). Recent evidence identified malaria prevalence among cross-borders to be as high as 11.5% in Cambodia-Laos border. As information is available for international border posts, little is known about malaria prevalence and artemisinin resistance along the porous border between Cambodia and Laos.

The aim of this study is to estimate the potential contribution of cross border population movements to the spread of malaria and artemisinin resistance.

Srei Champa: Data collection activites, October 2015

Methods

Study design and location: A cross sectional study is being conducted at seven informal and one international Cambodia-Laos border posts, in Stung Treng province.

Sample size: A total of 4500 individuals are expected to be tested (10/day at informal border posts and 7/day at international Border), between April 2015 and February 2016. Effective field implementation and testing started in September 2015.

Data collection and ethical considerations: Participants are tested with a rapid diagnostic test (RDT) (SD Bioline Pf/Pv HRP2/pLDH). A dry blood spot is also collected for real-time polymerase chain reaction (RT-PCR) analysis. Each participant is interviewed using a structured questionnaire capturing demographic characteristics, history of travel/residence, occupation. All individuals crossing borders are eligible to participate. A written consent is required for participation. Treatment is provided to all positive cases detected according to guidelines.

Data analysis: Data from paper-based questionnaires is coded and double entered in an EpiData 3.1. Similarly, PCR data is entered in a Microsoft Excel database and then merged by unique identifiers in to STATA 12. A descriptive analysis of the first two months of data collection was conducted. Demographic characteristics of sample population were described together with results for malaria RDT and PCR analysis disaggregated by species. RT-PCR positive cases were also disaggregated and classified according to their fever status.

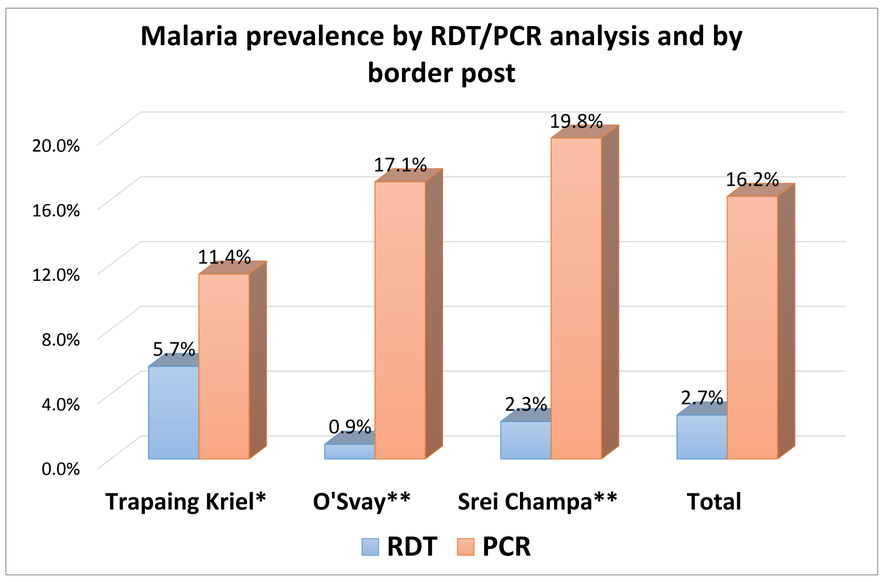
Results and Discussion

A total of 291 cross border individuals were tested; 66.3% were male and the majority had between 15 and 40 years old (63.2%). Their main occupation was related to agricultural work 68.7% but in Srei Champa Post, 20% of tested were security personnel *(Table 1).*

Based on PCR results, 16.2% of tested individuals were deemed positive. Informal border posts registered higher malaria prevalence than international border post (19.8% and 17.1% vs 11.4%) *(Figure 1).* Among the positive, 87.2% were Cambodian and 12.8% Laos. Regarding RDT results, 2.7% were positive. Prevalence at international border post was higher than informal posts (5.7% vs 0.9% and 2.3%). Differences registered between RDTs and PCR results may be explained by the small sample size, potential human error interpreting results, RDT quality and lack of RDT sensibility.

Disaggregation of positive PCR results indicated that 65.1% of cases were asymptomatic (T^o<37.5 ^oC). Among these, 16.3% were *P.f*, 69.8% *P.v*, and 13.9% *P.f* and *P.v (Figure 2).*

Despite sample size limitations, differences in malaria prevalence among different types of border seem to exist. If such differences are confirmed, cross border surveillance activities along informal border posts should be reinforced. This study is currently recruiting more participants and extending the number of targeted border posts. It is expected that it can provide strong evidence on malaria trends among cross border populations.



*International border post, **Informal border post

Figure 1: **Malaria Prevalence among cross border population in Cambodia-Laos border posts between September-November 2015**

Table 1: **Socio-Demographic information of cross border population in Cambodia-Laos border posts between September-November 2015**

Categories	Study Sites: Trapaing Kriel* n=88	Study Sites: O'Svay** n=117	Study Sites: Srei Champa** n=86	Total N=291
Gender				
Male	54.5% (43.9% - 65.2%)	68.4% (59.8%-76.9%)	75.6% (66.3%-84.8%)	66.3% (60.9%-71.8%)
Female	45.5% (34.8%-56.1%)	31.6% (23.1%-40.2%)	24.4% (15.2%-33.7%)	33.7% (28.2%-39.1%)
Age group				
<15 Years	6.8% (1.4%-12.2%)	3.4% (0.1%-6.8%)	12.8% (5.6%-20.0%)	7.2% (4.2%-10.2%)
15-40 Years	54.5% (43.9%-65.2%)	74.4% (66.3%-82.4%)	57.0% (46.3%-67.7%)	63.2% (57.7%-68.8%)
>40 Years	38.6% (28.3%-49.0%)	22.2% (14.6%-29.9%)	30.2% (20.3%-40.1%)	29.5% (24.3%-34.8%)
Mean (median)	36.9 (34)	32.0 (30)	32.7 (32)	33.7 (31)
Occupation				
Agriculture	72.7% (63.2%-82.2%)	73.5% (65.4%-81.6%)	58.1% (47.5%-68.8%)	68.7% (63.4%-74.1%)
Security personnel	4.5% (0.1%-9.0%)	6.0% (1.6%-10.3%)	20.9% (12.1%-29.7%)	10.0% (6.5%-13.4%)
Labour jobs	5.7% (0.7%-10.6%)	2.6% (-0.3%-5.5%)	5.8% (0.7%-10.9%)	4.5% (2.1%-6.9%)
Other/unemployed	17.0% (9.0%-25.1%)	17.9% (109%-25.0%)	15.1% (7.4%-22.8%)	16.8% (12.5%-21.2%)

*International border post, **Informal border post

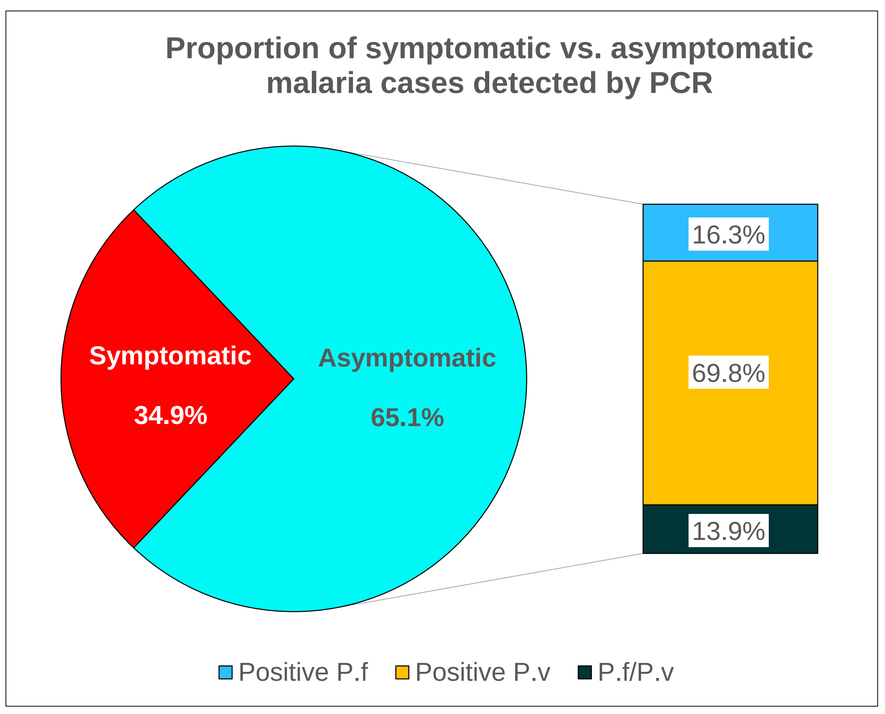


Figure 2: **Proportion of symptomatic vs asymptomatic malaria cases among cross border population in Cambodia-Laos border posts between September-November 2015**

For more information
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