Introduction

While the overall malaria burden in Thailand has declined rather dramatically over the past 20 years, the disease remains an important public health problem along the Thai-Burma border.[1] The northern province of Tak has been Thailand's most malarious region for the past decade and includes areas with the highest prevalence of multidrug-resistant *Plasmodium falciparum* parasites in the world.[1, 2, 3] The high volume of cross-border migration in this area over the past few decades, placed against the backdrop of political instability in Burma, provides the driving force behind these epidemiologic trends.[3] Large numbers of migrants fleeing civil war in Burma who seek labor and refuge in Thailand often spend substantial amounts of time in malaria-infested forests, where health services and essential medications are largely unavailable.[4] Given the extensive problem of drug resistance, accurate and timely malaria diagnosis is essential in order to initiate appropriate, species-specific drug treatment. Nowhere is this concept more important than in the field, where transient patients with very few resources may only have one chance to visit a health care facility, and treatment decisions must be made at the time of presentation and initial evaluation.

The Mae Tao Clinic, located in the border town of Mae Sot, Tak province, is a field site that provides health care services to hundreds of thousands of internally displaced persons who cross the border from Burma, as well as mostly Burmese migrants living in Mae Sot[5]. Since the clinic must give urgent medical care to vulnerable patient populations in a resource-limited setting, a major challenge is trying to adhere as much as possible to the "best practice" standards of care while lacking many of the medications, technologies, and human resources available under more ideal conditions. The clinic attempts to meet this challenge by offering

the most highly recommended and updated treatments available within its means. As an example, its protocol for malaria diagnosis and treatment follows WHO guidelines for Thailand and the rest of Southeast Asia, which includes clinical diagnosis confirmed by microscopy and first-line treatment for *P. falciparum* consisting of 3 days of artesunate and mefloquine (MA3)[6*].

In order to ensure that the Mae Tao Clinic meets best practice standards for malaria diagnosis, its microscopy facilities should undergo quality control review at regular intervals, ideally by a qualified external agency. Mae Tao microscopists must detect malaria with high sensitivity in order to avoid missed infections, particularly *P. falciparum*, the most virulent of the malaria species, which requires a specific drug regimen. High specificity is also desirable in order to prevent unnecessary use of medications for *P. falciparum* that could promote drug resistance and incur extraneous expense. In the past, a well-established, local NGO performed quality control for the clinic on two occasions, but since September 2006, the clinic has been conducting its own internal review.[7, 8]

To address the current need for external quality control analysis, a blinded study assessing the accuracy of Mae Tao Clinic malaria diagnosis by microscopy was designed, implemented, and analyzed. While microscopy is the gold standard diagnostic method in the field, polymerase chain reaction (PCR) is a molecular-based test that can detect malaria parasites with higher sensitivity than microscopy and identify mixed infections (e.g. *P. falciparum* + *P. vivax*) that may be missed by slide diagnosis alone.[9] Though PCR is not feasible in the field due to time, facility, and financial constraints, it provides an appropriate reference standard with which to evaluate Mae Tao Clinic microscopists' performance. To help place the Mae

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* Fortunately, the three remaining malaria species, *P. vivax*, *P. ovale*, and *P. malariae*, are still largely susceptible to chloroquine and primaquine in this region[19].

Tao Clinic staff's diagnostic accuracy in an appropriate context, their performance was also compared to that of expert microscopists from the Thai Ministry of Public Health Laboratory for Vector-Borne Disease Control (Bangkok, Thailand), who perform quality control analysis for all government hospitals, clinics, and health posts throughout Thailand. By cross-checking both groups' results with PCR performed at the Malaria Unit, Institute of Health Research, Chulalongkorn University (Bangkok, Thailand), we aimed to compare the micrsocopy diagnostic performance between Mae Tao Clinic microscopists and Ministry of Public Health microscopists in order to assess whether the Mae Tao Clinic was indeed meeting the best practice standards attainable.