Myanmar Artemisinin Resistance Containment (MARC) survey: malaria diagnosis and treatment

Celine Zegers de Beyl[1], Myat Phone Kyaw,[2], Ohnmar[2], Thae Maung Maung[2] Sylvia Meek[1], Krongthong Thimasarn[3], Aye Yu Soe[4] , David Sintasath[5], Thar Tun Kyaw[6]

[1]Malaria Consortium, United Kingdom, [2]Department of Medical Research (Lower Myanmar), Myanmar, [3]World Health Organisation, Myanmar, [4]Three Diseases Fund, Myanmar, [5]Malaria Consortium, Thailand, [6]Vector Borne Disease Control, Ministry of Health, Myanmar

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Introduction

The shift over the last few years away from failing drugs to the highly effective artemisinin-based combination therapies (ACTs) has been a breakthrough, and it was hoped that the combination of two efficacious drugs with different modes of action would preserve them for many years of use.

However, recent evidence suggests that artemisinin resistant *Plasmodium falciparum* parasites have emerged along the Thai-Cambodian border and it is imperative to mount a vigorous response to stop spread from areas where artemisinin resistance has been identified, while simultaneously undertaking further research to define the nature and geographical extent of the problem.

In a region where resistance to chloroquine, sulfadoxine-pyrimethamine and mefloquine has previously emerged, the declining efficacy of artemisinin would indeed be a catastrophic setback for the progress achieved thus far in the global fight against malaria if it were to spread to Africa. Recent evidence through routine antimalarial drug efficacy monitoring suggests that artemisinin resistance may also be present in Myanmar and therefore an urgent response was needed to determine the extent of resistance, contain it, and prevent its spread across Myanmar and beyond.

Despite recent anecdotal evidence of declining malaria transmission in some parts, Myanmar has the highest burden of malaria morbidity and mortality in the Greater Mekong Sub-region. Myanmar is thus at the forefront in the hopes of containing and ultimately eliminating artemisinin resistant parasites.

The limited data available on malaria in Myanmar poses a tremendous challenge to address this global public health threat. In 2012, a malaria survey of households (hh) was conducted in the areas of known and suspected artemisinin resistance (ie: Tier 1: strong evidence of artemisinin resistance and Tier 2: suspected evidence of artemisinin resistance) to serve as a baseline for the Myanmar Artemisinin Resistance Containment (MARC) efforts.

Methods

The surveys were undertaken in Tier 1 and Tier 2 of the containment area, where there was evidence of delayed response to ACTs or they were at risk of spread of resistant parasites. Survey clusters were defined as 'villages' and selected from malaria risk areas defined as 1a = high risk village, 1b = moderate risk village, 1c = low risk village, 2 = potentially malarious villages, and 3 = non-malarious villages, which includes all of Tier 1 and a subset of Tier 2. The survey areas were located in the southeast part of Myanmar and include Kayah, Kayin, Mon, Tanintharyi and Bago States.

This was a cross sectional household survey using a multi-stage sampling design. The target sample size was 2,000 households in 80 clusters (1,000 in each Tier). A standard and pre tested questionnaire was administered to a respondent in each household. Individual informed consent was sought from all respondents before interviews were conducted.

Data entry for all survey data was done using EpiData 3.1. Double entry was done for all data and appropriate verification and validation carried out. All data was transferred to Stata 12.0 (StataCorp LP, College Station, TX USA) for data processing and analysis. After initial data cleaning and consistency checks, data were re-coded and key indicators generated using pre-defined definitions. All household data analysis was adjusted for the survey design, i.e. clustering, and sample strata and sample weights at the household level and individual level were applied as appropriate.

Results

Figure 1: Respondents confirmation of signs and symptoms (N=1605)

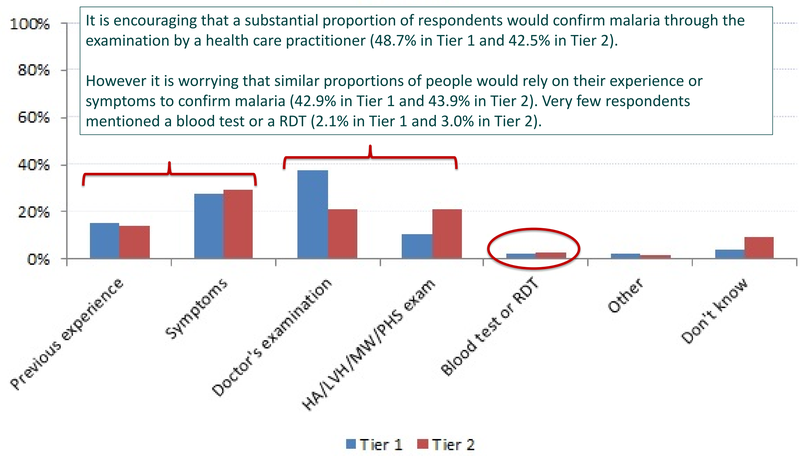


Figure 2: Knowledge of antimalarial drugs by Tier (N=528)

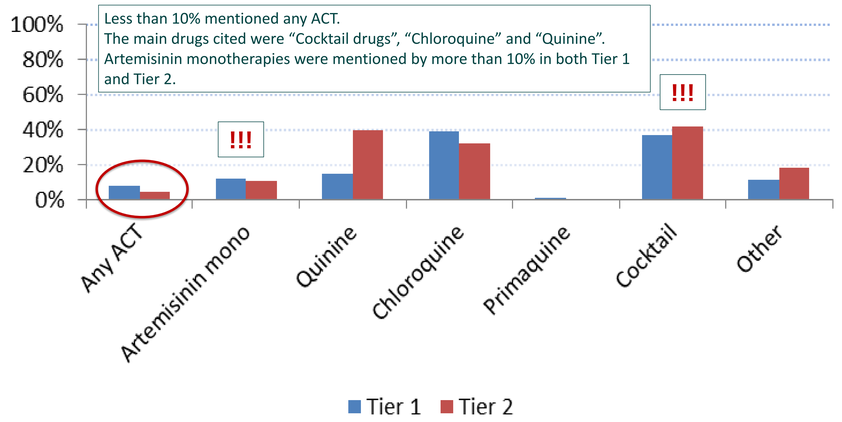
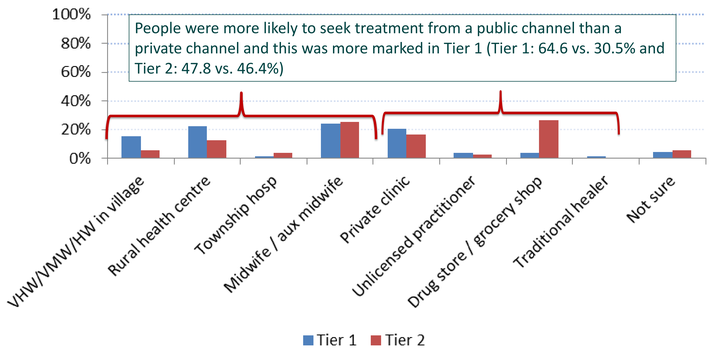


Table 1: Respondent knowledge of antimalarial drugs

	Tier 1	Tier 2	Total
Know names of any specific malaria drug (N=1898)			
Yes	32.0%	25.7%	28.9%
No	68.0%	74.3%	71.1%
Know duration of most of treatment (N=1073)			
Less than 3 days	!!! **8.8%**	!!! **6.9%**	!!! **7.8%**
3 days	46.6%	49.5%	48.1%
More than 3 days	44.6%	43.6%	44.1%
Know any malaria drug not recommended anymore (N=1898)			
Yes	0.8%	1.4%	1.1%
No	!!! **99.2%**	!!! **98.6%**	!!! **98.9%**

Figure 3: First source of treatment among reported fever cases in past two weeks (N=173)



Discussion and conclusions

General awareness of how to confirm malaria diagnosis was very low and more than 40% of respondents said they would rely on their own judgment to establish a diagnosis of malaria. Similarly, knowledge of appropriate treatment for malaria was insufficient in the MARC areas, and it is concerning that only a few respondents knew that some antimalarials were not recommended. According to the survey, the public sector was cited as the most popular source for treatment of malaria in both Tiers; however, more in-depth analysis of this and a separate health facility survey are needed to better delineate public-private sources.

Better targeted and innovative behaviour change communications are needed to improve malaria knowledge and treatment-seeking behaviours among community members living in containment areas.

Working with public and private (regulated and unregulated) providers is also necessary to ensure provision of quality care. Considering that the ban on artesunate monotherapies had not been fully implemented at time of the survey, there are still opportunities for improving knowledge and awareness of the use of quality artemisinin-based combination therapies for the treatment of malaria.

Acknowledgements

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