Malaria markets in the Greater Mekong Sub-Region: 2015 - 2016
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Introduction

WHAT IS ACTWATCH?

ACTwatch is a multi-country research project implemented by Population Services International (PSI). Standardized tools and approaches are employed to provide comparable data across countries and over time. ACTwatch is designed to provide timely, relevant, and high quality antimalarial and malaria diagnostic testing market intelligence, including information on artemisinin-based combination therapies (ACT), the most effective treatment for malaria. The project was launched in 2008 with funding from the Bill and Melinda Gates Foundation (BMGF), and was funded through 2016 by the BMGF, UNITAID, and the Department for International Development (DFID). Research methods implemented include outlet and household surveys, supply chain studies, key informant interviews, and a module to document private sector fever case management practices using observation and client exit interviews.

GOAL

The goal of the ACTwatch project is to provide policymakers with actionable evidence to inform and monitor national and global policy, strategy, and funding decisions for improving malaria case management and elimination efforts.

RELEVANCE

ACTwatch data provide timely and practical evidence for national malaria programs and their partners. The project monitors antimalarial markets in the context of policy shifts and investments in the scale-up of first-line ACT and blood testing using malaria rapid diagnostic tests (mRDT). This has included adaptation of project methods for the evaluation of the Affordable Medicines Facility-malaria (AMFm) pilot.

In the Greater Mekong Sub-Region (GMS), the evidence informs malaria control strategies focused on the containment of artemisinin resistance and malaria elimination in the region by 2030. The emergence of malaria parasites resistant to artemisinin in the GMS is a serious threat to the recent gains and current ambition of eliminating Plasmodium falciparum in the region. ACTwatch provides market intelligence regarding the performance of both the public and private sectors, as well as provider readiness to adhere to national treatment guidelines. This information is critical for identifying gaps and opportunities within each country context.

OUTLET SURVEYS

Outlet surveys are the core component of the ACTwatch project. In the GMS, project countries include Cambodia, Lao People’s Democratic Republic (PDR), Myanmar, and Thailand. In sub-Saharan Africa (SSA), outlet surveys have been implemented in Benin, the Democratic Republic of Congo (DRC) (in Kinshasa and Katanga), Kenya, Madagascar, Nigeria, Tanzania, Uganda, and Zambia.

In 2015, with funding from the BMGF, ACTwatch expanded in the GMS. In late 2015, a nationwide outlet survey was conducted in Myanmar for the first time. Prior to this, three sub-national surveys had been implemented in the eastern part of the country, where surveys had been conducted on a yearly basis since 2012. In 2015 and 2016, studies were implemented for the first time in Lao PDR and Thailand, providing a snapshot of the antimalarials available in these markets. ACTwatch also conducted its fourth outlet survey in Cambodia in 2015, a follow-up from surveys implemented in 2009, 2011, and 2013.

This report presents outlet survey data from the GMS collected in 2015 and 2016.
ACTwatch

12 project countries in sub-Saharan Africa and the Greater Mekong Sub-Region

In the GMS in 2015 and 2016:
• 4 outlet surveys
• 76,168 outlets screened
• 11,437 antimalarials audited
WHAT QUESTIONS ARE ANSWERED BY THE OUTLET SURVEYS?

The outlet surveys address a number of key questions:

1. What types of outlets in the public and private sectors are distributing antimalarials and providing malaria blood testing?

2. What types of antimalarials and mRDT are available and distributed by the public and private sectors?

3. What proportion of public and private sector antimalarial medicine outlets are stocking: 1) quality-assured ACT; 2) non quality-assured ACT; and 3) malaria blood testing?

4. What is the antimalarial market share of quality-assured ACT relative to the market share for other types of antimalarials?

5. What is the consumer price for antimalarial medicines and malaria blood testing among private sector outlets?
Outlet survey methods

ACTwatch implements standardized methods and questionnaires that allow for comparisons between countries. A full census of all outlets providing malaria care and a full audit of all available antimalarials provides a complete picture of the antimalarial market.

**HOW IS THE SAMPLING CONDUCTED?**

A representative sample of outlets providing antimalarials to consumers is selected. Typically, a one-stage probability-proportional-to-size cluster design is used to select clusters within each stratum, with cluster population serving as the measure of size. The primary sampling unit, or cluster, is usually an administrative unit with 10,000 to 15,000 inhabitants. Specific sampling strategies are described in the country-specific section of the report.

**WHAT TYPES OF OUTLETS ARE SAMPLED?**

The main types of outlets sampled include public and not-for-profit health facilities, community health workers (CHWs), private health facilities, pharmacies, drug stores, and grocery stores/kiosks. In addition, a range of other outlet types are considered relevant in specific countries, including market stalls and mobile drug vendors.

**HOW ARE THE OUTLETS IDENTIFIED?**

The ACTwatch outlet survey includes all outlets with the potential to sell antimalarial medicines. As many of these outlets may be unregistered, mobile, or recently opened, official listings of these shops and their locations are not typically available. A census approach is therefore implemented, supported by the use of key informant interviews with local officials, local maps, and lists of registered outlets where available.

**WHAT IS AN OUTLET CENSUS?**

This involves a team of data collectors moving systematically through a defined area in order to identify all outlets that have the potential to sell or distribute antimalarials.

**WHAT HAPPENS AFTER AN OUTLET IS IDENTIFIED?**

The outlet is screened for availability of malaria medicines or diagnostic testing. Outlets are included in the survey if they have antimalarials or malaria diagnostic tests in stock at the time of survey or in the previous 3 months. Permission to conduct the interview is obtained from the main provider.

**HOW IS INFORMATION ON ANTIMALARIALS AND mRDT CAPTURED?**

Among outlets with antimalarials and/or malaria tests in stock, a full audit of the antimalarial and/or mRDT is conducted. Information is recorded for each unique antimalarial and mRDT identified in the outlet.

**WHAT INFORMATION IS RECORDED ON THE AUDITS?**

An audit sheet is completed for each unique antimalarial and mRDT in stock. The audit sheet captures product information from the product package, including the brand name, the manufacturer, country of manufacture, formulation, and strength.
The audit sheet also captures information from the provider, including the amount sold in the last seven days and the retail price. If a particular product is available in multiple package sizes, strengths, or formulations, an audit sheet is completed for each unique product.

Comprehensive product information and provider reports on amount distributed and retail price allow for calculating estimates of antimalarial availability, price, and relative market share.

**HOW WERE THE SURVEYS STRATIFIED IN THE GMS?**

**Cambodia:** Nationally representative sample with two domains defined according to WHO artemisinin resistance zones.

**Lao PDR:** Sub-national, with one study domain implemented in 5 provinces in southern Lao PDR with the highest malaria burden.

**Thailand:** Sub-national, with two study domains according to malaria risk and burden: Thai-Myanmar and Thai-Cambodia border areas.

**Myanmar:** Nationally representative sample across 4 domains: intervention and comparison areas in eastern/central Myanmar for the Artemisinin Monotherapy Replacement Project (AMTR) in operation since 2012; western border areas with India; and the Bangladesh border / Rakhine state.
Results

Sample

In 2015 and 2016, a total of 76,168 outlets across four countries in the GMS were screened for availability of malaria commodities. Surveys were conducted at the national level in Cambodia and Myanmar, and targeted sub-national areas with highest malaria risk and burden in Thailand and Lao PDR.

Of all the outlets screened, approximately 6,500 full interviews were conducted (Cambodia N=1,303; Laos N=724; Myanmar N=4,395; Thailand N=104), where 11,437 antimalarials and 4,043 mRDT were audited. The vast majority of outlets screened were private sector outlets, including health facilities, pharmacies, drug stores, general retailers, and itinerant drug vendors. A total of 4,163 completed interviews were conducted among private sector outlets, and 2,327 were completed among public sector outlets, including health facilities and CHWs.
Thailand’s sample:

13,651 screened outlets

stocked antimalarials
Antimalarial availability among all outlets

This section summarizes what types of outlets were in the business of stocking antimalarials, among all screened outlets.

Availability of any antimalarial among public health facilities was generally greater than 95 percent, with the exception of Cambodia. In Cambodia, a notable gap was observed in public health facilities, with fewer than 80 percent stocking antimalarials. Among CHWs screened, antimalarial availability was highest in Cambodia (74 percent) and lower in Lao PDR (34 percent) and Myanmar (45 percent). In Thailand, public health facilities designated as malaria case management facilities typically had antimalarials in stock. Sub-district hospitals typically did not have antimalarials available, and, according to national guidelines, should refer patients for malaria testing and treatment to malaria case management facilities.

In the private sector, antimalarial availability among all screened outlets was typically lower than 50 percent for all types of outlets. However, this varied across countries. For example, only 1 in 5 pharmacies in Cambodia had antimalarials available on the day of survey, compared to 70 percent in Lao PDR and nearly 50 percent in Myanmar. In Thailand, antimalarials were generally not available in the private sector.
Market composition

Market composition is the relative number of service delivery points stocking antimalarials for each outlet type

The majority of malaria treatment service delivery points were found in the public sector, with the exception of Myanmar. Over half of the market composition was public sector outlets in Cambodia (55 percent), Lao PDR (65 percent), and Thailand (88 percent). CHWs composed over one-third of service delivery points in Cambodia (40.9 percent), Lao PDR (43 percent), and Myanmar (42 percent).

However, the private sector market composition was substantial in Cambodia, Lao PDR, and Myanmar, where one-third or more of antimalarial service delivery points were found in the private sector. In Cambodia, these most commonly included private for-profit health facilities (19 percent) and itinerant drug vendors (14 percent). In Lao PDR, pharmacies made up close to one-quarter of the antimalarial market composition (23 percent). In Myanmar, general retailers were the most common outlet type, accounting for 28 percent of the market composition, followed by itinerant drug vendors. Drug stores were not a common source of antimalarials in all four countries.

There is variation across countries in national policies regarding types of outlets that are authorized to test for and treat malaria. In Cambodia, 20 percent of antimalarial-stocking outlets were outlets that were not authorized to provide malaria commodities (itinerant drug vendors, general retailers, and drug stores). In Thailand, most private sector outlets are banned from distributing antimalarials, with the exception of certain private for-profit health facilities, yet 9 percent of antimalarial-stocking outlets were private sector outlets banned from providing antimalarials. In Lao PDR, drug stores, general retailers, and itinerant drug vendors are not allowed to test or treat, and these accounted for 8 percent of antimalarial-stocking outlets.

In Cambodia, certain private sector outlets including facilities and pharmacies are only allowed to test and treat if they are part of a Public-Private Mix program (PPM). One in five antimalarial-stocking outlets were these private sector outlets authorized to test and treat if part of the program. This speaks to the importance of ensuring that these facilities are indeed captured by the private sector initiatives. This is particularly important given the outlets represent a large number of the service delivery points for antimalarials in these countries.
Outlets that are allowed to provide malaria confirmatory testing or treatment, but only if they are part of the Public-Private Mix Program.

Outlets that are not authorized to provide malaria testing or treatment.

Legend: outer pie chart
- Cambodia, N=858
- Lao PDR, N=402
- Myanmar, N=3,859
- Thailand, N=87
Availability of authorized and unauthorized antimalarials

This section shows the availability of first-line and second-line antimalarial treatments according to national treatment guidelines, as well as antimalarials that were not indicated in the national treatment guidelines.

NATIONAL TREATMENT GUIDELINES (NTG)

In Cambodia and Lao PDR, first-line treatment for both *Plasmodium falciparum* (*Pf*) and *Plasmodium vivax* (*Pv*) malaria was an ACT. In contrast, in Myanmar and Thailand, first-line treatment for *Pf* malaria was an ACT while first-line treatment for *Pv* was Chloroquine. In all countries, primaquine was indicated as part of the treatment regimen for both *Pf* and *Pv* malaria.

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>First-line <em>Pf</em></th>
<th>First-line <em>Pv</em></th>
<th>First-line severe</th>
<th>Second-line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>2014</td>
<td>Fixed-dose ASMQ + primaquine or DHA PPQ + primaquine</td>
<td>Artesunate IV/IM or Artemether IV/IM</td>
<td><em>Pf</em>: Quinine + doxycycline or tetracycline</td>
<td></td>
</tr>
<tr>
<td>Lao PDR</td>
<td>2013</td>
<td>AL + primaquine</td>
<td>Artesunate IV/IM</td>
<td><em>Pf</em>: Quinine + doxycycline</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><em>Pv</em>: Chloroquine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Severe: Quinine IV/IM</td>
<td></td>
</tr>
<tr>
<td>Myanmar</td>
<td>2012</td>
<td>AL or ASMQ or DHA PPQ + primaquine</td>
<td>Chloroquine + primaquine</td>
<td><em>Pf</em>: Alternative first-line ACT or artemesunate + either doxycycline, tetracycline, or clindamycin</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Severe: Artemether IV/IM or Quinine IV/IM</td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>2014</td>
<td>ASMQ or DHA PPQ* + primaquine</td>
<td>Chloroquine + primaquine</td>
<td><em>Pf</em>: Quinine + doxycycline or artemesunate + doxycycline or clindamycin</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><em>Pv</em>: Chloroquine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Severe: Quinine IV/IM</td>
<td></td>
</tr>
</tbody>
</table>

*In late 2015, the Thailand malaria treatment guidelines changed in eight provinces to stipulate use of dihydroartemisinin piperaquine, with a single dose of primaquine (30mg) on day 1.*
Antimalarial availability, among all screened public health facilities

Nearly all public health facilities screened in Lao PDR were stocking the first-line ACT for both Pf and Pv malaria (97 percent). In Thailand, public health facilities designated as malaria case management facilities also had high availability for Pf first-line treatment (88 percent) and Pv first-line treatment (93 percent). In Cambodia, fewer than 80 percent of public health facilities had first-line ACT for Pf and Pv available. Availability of first-line treatments for severe malaria and second-line treatments was generally low. In Thailand, one in five public health facilities had an antimalarial available that was not indicated in the national treatment guidelines (NTGs). These typically included either artesunate without mefloquine or mefloquine without artesunate.

Public sector availability of primaquine

According to NTGs, primaquine is part of the treatment regimen for both Pf and Pv infections. During the 2015 outlet survey, public health facilities in Cambodia were not stocking primaquine. In Lao PDR, primaquine was available in 5 percent of public health facilities. Implementation guidelines for primaquine are not yet in place in Cambodia or Lao PDR, and there are concerns about risks to patients with undetected G6PD deficiency. In Thailand, nearly 90 percent of malaria case management public health facilities had primaquine in stock. In Myanmar, nearly 30 percent of all screened CHWs had primaquine in stock. G6PD testing is not available at the community level in Myanmar, but implementation guidelines stipulate a longer course with a lower dose for Pv cases to minimize health risks to patients with G6PD deficiency.
Public health facilities were not screened in Myanmar. Outlets were considered to stock first-line treatment for *Pf* or first-line treatment for *Pv* even if they did not have primaquine in stock, although primaquine is indicated for both regimens in each country.
Antimalarial availability, among all screened community health workers

In Cambodia, approximately 75 percent of all screened CHWs had the first-line ACT for Pf and Pv in stock. Availability of first-line treatments was lower among CHWs in Lao PDR (less than 30 percent) and Myanmar (less than 40 percent). CHWs were generally not stocking treatments for severe malaria, second-line treatments, or antimalarials that were not indicated in the NTGs.
Community health workers do not provide malaria testing and treatment in Thailand. Outlets were considered to stock first-line Pf or first-line Pv even if they did not have primaquine in stock, although primaquine is indicated for both regimens in each country.
Antimalarial availability, among all antimalarial-stocking private sector outlets

First-line treatment availability: Availability of first-line Pf and Pv treatment among antimalarial-stocking private sector outlets was variable across countries. In Cambodia, Lao PDR, and Myanmar, availability of either first-line treatment for Pf or Pv malaria was highest in Cambodia (71 percent) and lowest in Lao PDR (41 percent). In Myanmar, where the first-line treatment for Pf and Pv malaria differed, availability of first-line treatment for Pv (chloroquine) was slightly higher (56 percent) than availability of first-line ACT for Pf malaria (43 percent).

In Thailand, the private sector is not authorized to sell antimalarials, with some specific exceptions. Of the 19 private sector outlets that were found to have antimalarials in stock, availability of the first-line treatment for Pf (ASMQ) was low, with around five of the 19 private sector outlets stocking an ACT (20 percent). Availability of first-line treatment for Pv (chloroquine), was much higher (73 percent). While chloroquine is the national first-line treatment for Pv malaria, it is also recommended by the government for treating rheumatic disease and gout.

Second-line treatment availability: Second-line treatments are indicated for use after treatment failure with the first-line drug. Second-line treatments should, therefore, be limited to public health facilities equipped to detect and manage first-line treatment failure. Availability of second-line treatment was highest in the antimalarial-stocking private sector in Lao PDR (75 percent). Second-line treatment availability was lower in Thailand (39 percent) and Myanmar (20 percent), and negligible in Cambodia’s private sector. In Lao PDR, the most common second-line treatment was locally manufactured chloroquine tablets (second-line for Pv), branded as Marquine®. In Myanmar, second-line treatment was typically quinine and artemether liquid injections (second-line treatment for severe malaria), and in Thailand, quinine and doxycycline tablets. Within Lao PDR, private sector availability of second-line treatment was higher than availability of first-line ACT treatment for Pf and Pv malaria.

Availability of treatment not indicated in the national treatment guidelines (NTG): Approximately one in three private sector outlets in Cambodia (34 percent) and Myanmar (36 percent) stocked medicines that were not included in the NTGs. These medicines were most commonly chloroquine tablets, artemisinin piperaquine tablets, and non-fixed dose combination artemesunate mefloquine tablets in Cambodia. In Myanmar, artesunate and artemether tablets were most commonly available, as well as non-artemisinin tablets, including sulfadoxine pyrimethamine (SP), quinine, and mefloquine. Second-line severe malaria treatments were also available in the private sector in Myanmar, including quinine and artemether injections.

First-line treatment for severe malaria: First-line severe malaria treatment should be utilized only in higher-level public health facilities that are authorized and equipped to detect and manage severe cases. Availability of treatment for severe malaria in the private sector may be indicative of potential mismanagement of malaria cases. Availability among private sector antimalarial-stocking outlets was negligible in Lao PDR, around 5 percent in Cambodia and Myanmar, and highest in Thailand (10 percent).

How does ACTwatch present availability of different antimalarial categories in the private sector?

In the private sector, the availability of specific types of antimalarials is restricted to those outlets that have antimalarials in stock. For example, the availability of ACT is measured as the proportion of outlets stocking ACT, among all outlets with at least one antimalarial in stock. Outlets were considered to stock first-line treatment for Pf or first-line treatment for Pv even if they did not have primaquine in stock, although primaquine is indicated for both regimens in each country.
Private sector availability of primaquine

Primaquine to be used as part of the treatment regimen for either Pf or Pv was generally not available in the private sector across countries. Private sector outlets stocking antimalarials did not stock primaquine at all in Cambodia and Lao PDR. In Myanmar, fewer than 10 percent of antimalarial-stocking private sector outlets had primaquine in stock. In Thailand, 1 in 5 antimalarial-stocking outlets had primaquine.

**Antimalarial availability, among the private sector antimalarial-stocking outlets**

![Graph showing antimalarial availability among private sector outlets in Cambodia, Lao PDR, Myanmar, and Thailand. The graph compares the availability of different antimalarials (First-line Pf, First-line Pv, First-line Severe, Second-line, Not NTG) across the four countries.](image-url)
Antimalarials available in the private sector that were not indicated in the national treatment guidelines

These pie charts show the types of antimalarials that were found in the private sector that were not indicated for malaria case management in the national treatment guidelines (NTGs).

In Cambodia, about half of non-NTG antimalarials audited in the private sector were chloroquine treatments, and the other half were ACT, including non-fixed-dose combination artemunate mefloquine and artemisinin piperaquine. In Lao PDR, nearly all non-NTG antimalarials found in the private sector were injectable chloroquine. In Myanmar, 70 percent of non-NTG antimalarials were oral artemisinin monotherapies, including artemunate and artemether tablets. Non-artemisinins were primarily SP and quinine tablets. In Thailand’s private sector, the very few non-NTGs audited were non-artemisinin therapies.
Tablets
- Atovaquone proguanil
- Chloroquine
- Hydroxycchloroquine sulphate
- Mefloquine
- Quinine
- SP
- Artemether
- Artesunate
- Artesunate amodiaquine
- Artesunate mefloquine (non FDC)
- Artemisinin napthoquine
- Artemisinin piperaquine

Injections
- Arteether/Artemotil
- Chloroquine

Myanmar, N=1,262
Thailand, N=4
Antimalarial market share

This section summarizes relative market share for different categories of antimalarials in the public and private sectors.

In Cambodia, Lao PDR, and Myanmar, the private sector accounted for more than 50 percent of all antimalarials distributed, ranging from 58 percent in Cambodia to 70 percent in Myanmar (however, as public health facilities were excluded from the sample in Myanmar, the private sector contribution is likely to be less than the estimate). Market share for Thailand is not shown due to the small number of outlets stocking antimalarials and the very low volumes distributed by these outlets.

First-line treatments, including ACTs for Pf and Pv in Cambodia, and ACTs (for Pf) or chloroquine (for Pv) in Myanmar, accounted for the vast majority of antimalarials distributed in these countries (94 percent and 82 percent respectively). In Lao PDR, first-line ACT was almost exclusively distributed through the public sector. The second-line treatment, chloroquine, accounted for more than 60 percent of all antimalarials distributed, and nearly all chloroquine distributed went through the private sector.

In Myanmar, 17 percent of the market share comprised treatments that were not in the national treatment guidelines. Oral artemisinin monotherapies alone accounted for 14 percent of the total market share. It is important to note that this figure is derived estimating relative numbers of full courses distributed. As most of the oral artemisinin monotherapy was sold as one or two tablets, in reality, oral artemisinin monotherapy accounted for a much higher proportion of patients treated.

First-line severe malaria treatment contributed to less than 1 percent of market share in all three countries.
Antimalarial market share

Legend
- First-line Pf/Pv (Cambodia and Lao PDR; ACT)
- First-line Pf (Myanmar; ACT)
- First-line Pv (Myanmar; CQ)
- First-line Severe
- Second-line
- Not in National Treatment Guidelines

% total market volume
Antimalarial market share for each outlet type

This section summarizes relative antimalarial market share for each outlet type.

In Cambodia, Lao PDR, and Myanmar, the private sector was responsible for distributing the majority of antimalarial treatments. Private sector outlets accounted for 62 percent of the antimalarial distribution in Cambodia, 68 percent in Lao PDR, and 70 percent in Myanmar.

There was notable diversity across countries with regards to the types of private sector outlets distributing antimalarials. In Cambodia, antimalarial distribution was primarily through private for-profit health facilities (27 percent) and itinerant drug vendors (23 percent). Pharmacies composed only 7 percent of the antimalarial market share. In contrast, in Lao PDR, pharmacies were responsible for more than half of antimalarial distribution (53 percent). Myanmar had the most diverse private sector market for antimalarial distribution. While pharmacies composed most of the market share (27 percent), general retailers, private for-profit facilities, and itinerant drug vendors also contributed around 15 percent of the market share.
The private sector distributed the majority of antimalarials in Cambodia, Lao PDR, and Myanmar. However, different types of private outlets were responsible for distribution in each country.
**Country Insights: Chloroquine Availability and Market Share in Lao PDR**

Chloroquine was replaced by Artemether Lumefantrine (AL) as the first-line treatment for Pf in 2005 and Pv in 2011. Ten years after the change in first-line treatment for Pf and five years after the change in first-line treatment for Pv from chloroquine to AL, chloroquine remained widely available and distributed, particularly in the private sector. Among antimalarial-stocking outlets in Lao PDR, availability of chloroquine was nearly 100 percent in general retailers and high among pharmacies (over 70 percent). Around half of private for-profit facilities had chloroquine in stock in 2015.

While chloroquine is now part of the national treatment guidelines as a second-line treatment for uncomplicated Pv, P. ovale and P. malariae infections, second-line treatment should be utilized only after treatment failure with the first-line drug. The availability of the second-line drug, chloroquine, should be limited to public health facilities authorized and equipped to detect and manage treatment failure.

One driver of chloroquine popularity in Lao PDR could be the accessibility of Maraquine, an inexpensive chloroquine tablet pre-packaged for individual treatment and manufactured locally by CBF pharmaceuticals. The Lao script makes the packaging understandable and recognizable to providers and potential customers alike. Maraquine accounted for three-quarters of all chloroquine audited during the outlet survey and accounted for half of all antimalarials distributed in Lao PDR. As a widely available, locally manufactured product, Maraquine represents a roadblock to first-line uptake in Lao PDR's private sector.
One driver of chloroquine popularity in Lao PDR could be the accessibility of Maraquine, an inexpensive chloroquine tablet pre-packaged for individual treatment and manufactured locally.
Country Insights: Oral Artemisinin Monotherapy Availability and Market Share in Myanmar

Since 2007, the WHO has recommended that oral artemisinin monotherapy (AMT) no longer be manufactured, produced, or distributed, given that its use leads to resistance. The continued use of oral AMT has been shown to be one of the leading contributors to resistance of artemisinin and its derivatives among malaria parasites.

Availability and distribution of oral AMT remained widespread throughout Myanmar in 2015. Oral AMT products found in Myanmar were manufactured in Vietnam, China, or locally in Myanmar. Three-quarters of the available products were Artesunate®, manufactured by Mediplantex in Vietnam. Over 70 percent of Artesunate® by Mediplantex still had a shelf life of greater than two years at the time of the survey, suggesting that it had been manufactured quite recently and was imported no earlier than late 2013.

These products were imported after the ban on oral AMT product registration for importation had gone into effect in late 2012, though some product packages did include what seemed to be a valid import registration number. The importation of this medicine speaks to the gaps in policy surrounding oral AMT, either that the ban on importation is not being enforced, or simply that the importation of oral AMT products with an import registration license is still legal in Myanmar.

Consumer demand could be driving continued availability of oral AMT products. Providers reported that more than two-thirds of oral AMT products, such as artemunate tablets, were requested by name by consumers. Moreover, the median treatment price for a typical oral AMT treatment dose of two 50mg tablets was $0.32. This is comparable to, and slightly less expensive than, the median price for ACT in Myanmar ($0.36).

1 WHO 2007. World Health Assembly Mandate 60.18.
2 WHO-GMP 2014. Emergence and spread of artemisinin resistance calls for intensified efforts to withdraw oral artemisinin monotherapy from the market.
Availability of confirmatory blood testing for malaria

National guidelines indicate confirmatory testing prior to antimalarial treatment. This section presents availability of confirmatory testing among antimalarial-stocking outlets.

Across countries and sectors, there were notable gaps in the availability of confirmatory testing where antimalarial treatment is available. In the public sector, most public health facilities in Cambodia had confirmatory testing available (99 percent). Similarly, in Thailand, 95 percent of public health facilities designated as malaria case management facilities had confirmatory testing available. However, availability was slightly lower in Lao PDR (90 percent). Among antimalarial-stocking CHWs, confirmatory testing was generally available in Cambodia (91 percent) but less so across other countries, at around 80 percent availability in Lao PDR and Myanmar.

Public and private sector availability of confirmatory testing (mRDT or microscopy), among outlets stocking antimalarials, by sector and outlet type, Cambodia and Lao PDR
Gaps in the availability of confirmatory testing among antimalarial-stocking outlets were most prominent in the private sector, including among outlets authorized to test, such as health facilities, and outlets that were not authorized to test, including general retailers. Availability of confirmatory testing was generally relatively high among private for-profit health facilities, with the exception of a notable gap in Myanmar where availability was less than 60 percent. Outside of health facilities, availability was higher than 50 percent in pharmacies in Cambodia and Lao PDR, but much lower in Myanmar and Thailand. Finally, while more than 70 percent of itinerant drug vendors had testing available in Cambodia, availability was much lower among these providers in Myanmar (18 percent). Gaps in readiness to adhere to national guidelines were observed among both authorized outlets (e.g. facilities) and unauthorized outlets (e.g. general retailers).

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Public and private sector availability of confirmatory testing (mRDT or microscopy), among outlets stocking antimalarials, by sector and outlet type, Myanmar and Thailand

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Legend

- Public Sector Facility
- Private Sector Facility

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<table>
<thead>
<tr>
<th>Outlet Type</th>
<th>Myanmar</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHW</td>
<td>80%</td>
<td>90%</td>
</tr>
<tr>
<td>Private Facility</td>
<td>75%</td>
<td>85%</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>60%</td>
<td>70%</td>
</tr>
<tr>
<td>General Retailer</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Itinerant Drug Vendor</td>
<td>50%</td>
<td>60%</td>
</tr>
<tr>
<td>Public Health Facility</td>
<td>90%</td>
<td>95%</td>
</tr>
<tr>
<td>Private Facility</td>
<td>80%</td>
<td>90%</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>70%</td>
<td>80%</td>
</tr>
</tbody>
</table>
**Malaria diagnostic market share for each outlet type**

This section summarizes relative diagnostic market share for each outlet type.

In Lao PDR and Myanmar, the public sector distributed the majority of malaria tests with approximately 75 percent of the diagnostic market share in these countries. In contrast, more than half of malaria testing in Cambodia was conducted by the private sector (58 percent).

Across all countries, private for-profit facilities held most of the private sector diagnostic market share. Total market share for private facilities ranged from 40 percent in Cambodia to 11 percent in Myanmar.
Antimalarial market share: Volumes distributed in outlets with and without confirmatory testing available

Outlet survey methods do not allow for determining whether antimalarials were distributed for confirmed or unconfirmed cases. However, the audit methodology can be used to summarize what proportion of antimalarials distributed were dispensed by outlets with testing available to the consumer.

In Cambodia, 90 percent of all antimalarials distributed were distributed by outlets that had confirmatory testing available. This includes all antimalarials distributed by public health facilities and most antimalarials distributed by CHWs. Most antimalarial distribution by outlets without confirmatory testing availability occurred in private for-profit health facilities and itinerant drug vendors.

Over half of all antimalarial distribution was by outlets that did not have confirmatory testing available in Lao PDR (54 percent) and Myanmar (59 percent). This suggests that the majority of antimalarials are being used for presumptive treatment. Antimalarial distribution by outlets without testing available occurred primarily in pharmacies. Other outlet types distributing antimalarials without confirmatory testing available included general retailers in Lao PDR and Myanmar, and private health facilities and itinerant drug vendors in Myanmar.
Private Sector Support and Engagement

To achieve national malaria elimination goals, it is critical to ensure that private sector providers adhere to national treatment guidelines and contribute malaria caseload data to national surveillance systems. This section summarizes findings on supervision of private providers and private outlet caseload reporting.

Questions related to private sector support and engagement were administered to providers in outlets currently or recently (within the past three months) equipped to test and/or treat for malaria in Cambodia, Lao PDR, and Myanmar.

Close to half of providers in Lao PDR (47 percent) reportedly received some form of supervisory or regulatory visit in the past 12 months compared to 20 percent of providers in Myanmar and 11 percent of providers in Cambodia.

Reporting of malaria caseload data was variable across countries but generally low. In Cambodia, Lao PDR, and Myanmar, less than 20 percent of private providers reportedly submitted malaria caseload data to a government authority or non-governmental organization. Caseload data reporting was highest in Lao PDR compared to Cambodia and Myanmar, with 41 percent of private sector providers reportedly submitting data.

Supporting private providers

Key strategies to ensure that private sector providers are contributing to national elimination goals include routine supervision and extending national surveillance systems to incorporate caseload data from private providers. In Cambodia, Lao PDR, and Myanmar, strategies have been developed to engage various types of private providers. Results from the 2015 outlet surveys show that strategies implemented in each country were not yet reaching the majority of private providers with supervision and caseload reporting.
Percentage of private sector providers who reportedly received a supervisory visit in the past year, and who report malaria caseload data into national systems.

Legend
- Received supervision in the past year
- Caseload reporting to government or NGO
Summary

The 2015 and 2016 outlet surveys conducted in the GMS provided comparable evidence across countries and within public and private sectors. Findings point to achievements as well as gaps that must be addressed to continue progress towards malaria elimination.

Public sector readiness to test and treat according to national guidelines

Nearly all public health facilities screened in Lao PDR were stocking the first-line ACT for Pf and Pv. Availability of first-line treatments was lower in Thailand, and notably in Cambodia, one in four public health facilities did not have the first-line treatment for Pf and Pv available. Among public health facilities with antimalarials available, more than 90 percent had confirmatory testing available.

Across the four countries, primaquine is indicated as part of the treatment regimen for both Pf and Pv infections. In 2015, primaquine was generally not yet available in public health facilities in Cambodia and Lao PDR. While indicated in national treatment guidelines, implementation guidelines were not yet finalized. There is need to close gaps in availability of first-line treatments at public health facilities, including primaquine availability, and to ensure consistent use according to national guidelines for Pf and Pv.

The role of the private sector in malaria testing and treatment

Most private sector outlets stocking and distributing antimalarials in the GMS were authorized to do so. However, most notably in Cambodia, one in five antimalarial-stocking outlets were drug stores, general retailers, or itinerant drug vendors, and these outlet types are not authorized to test for or treat malaria. Itinerant drug vendors are particularly important given that they accounted for nearly 25 percent of the national market share. There is need to further examine malaria case management under itinerant drug vendors and determine the most appropriate strategy for regulation and/or engagement. ACTwatch studies in Cambodia indicate that itinerant drug vendors often have some sort of health qualification and have in the past been or are currently affiliated with public or private health facilities or pharmacies. As such, it may be possible to formally engage these providers through mechanisms similar to those used to engage CHWs.
In Cambodia, Lao PDR, and Myanmar, the private sector was responsible for distributing the majority of antimalarial treatments. In Cambodia, the private sector was also responsible for providing more than half of all confirmatory testing. The types of outlets distributing antimalarials varied across countries. In Cambodia, private sector antimalarial distribution was primarily through private health facilities and itinerant drug vendors. In Lao PDR, pharmacies dominated the market, distributing more than half of all antimalarials. Myanmar had the most diverse private sector market for antimalarial distribution, with significant contributions from pharmacies, general retailers, private for-profit facilities, and itinerant drug vendors. Engaging the private sector to improve malaria case management must involve tailoring strategies that are appropriate for the different outlet types providing malaria treatment in each context.

Private sector readiness to test and treat according to national guidelines

In the private sector, fewer than half of outlets had first-line treatment for Pf in Lao PDR, Myanmar, and Thailand. In Cambodia, availability was approximately 70 percent. Across outlet types and countries, private sector availability of confirmatory testing among antimalarial-stocking outlets was generally moderate. However, gaps in testing availability were observed among outlets authorized to test, such as health facilities, and in outlets that were not authorized to test, such as general retailers. Closing gaps in availability of testing and first-line treatment in private sectors across the GMS is needed to ensure that people seeking treatment in the private sector are managed according to national guidelines.

The most widely available antimalarial medicine in Lao PDR's private sector was the second-line treatment for Pv, chloroquine. The most commonly available chloroquine product was manufactured locally in Lao PDR. One in three private sector outlets in Cambodia and Myanmar were stocking a medicine that was not in the national treatment guidelines. In Cambodia, these included chloroquine treatments no longer indicated for treatment of Pv, and ACT not indicated for treatment of Pf or Pv. In Myanmar, oral artemisinin monotherapies including artesunate and artemether tablets were commonly available. There is urgent need to address the private sector availability of antimalarial medicines not indicated in the national treatment guidelines, particularly the artesunate and artemether tablets widely available in Myanmar. Often dispensed in sub-clinical doses, these treatments pose serious threats to the ongoing efficacy of artemisinins.
Market share

First-line treatments, including ACT for Pf and Pv in Cambodia, and ACT for Pf or chloroquine for Pv in Myanmar, accounted for the vast majority of antimalarials distributed in these countries. However, in Lao PDR, first-line ACT was almost exclusively distributed through the public sector. The second-line treatment, chloroquine, accounted for more than 60 percent of all antimalarials distributed. Nearly all chloroquine distribution was through the private sector. In Myanmar, nearly one in five antimalarials distributed were treatments that were not in the national treatment guidelines. Oral artemisinin monotherapies alone accounted for 14 percent of the total market share. It is critical to address ongoing distribution of non-first-line treatments given the role of the private sector in distributing the majority of antimalarial treatments in these countries.

In Cambodia, antimalarial distribution in both the public and private sectors was typically occurring in outlets that have confirmatory testing available. However, in Lao PDR and Myanmar, the private sector appears to be a source for presumptive treatment. Most antimalarials were distributed by private sector outlets without confirmatory testing available. This is an important gap to close to ensure appropriate treatment and rational drug use as well as to track all confirmed cases towards a complete national surveillance system.

Private sector support and engagement

The achievement of malaria elimination goals in Cambodia, Lao PDR, and Myanmar could either be accelerated or hindered by practices in the private sector. Key strategies to ensure that private sector providers are contributing to national goals have included training, supervision, providing access to free or subsidized commodities, and ensuring that the private sector contributes caseload data to national surveillance systems. These strategies are being implemented in various forms across the region, including Public-Private Mix (PPM) programs in Cambodia and Lao PDR. In these countries, private sector engagement targets providers in private for-profit health facilities and pharmacies. In Myanmar, various strategies are targeted to engage all private sector outlet types, including general retailers and itinerant drug vendors. Results from the 2015 outlet surveys show that strategies implemented in each country were not yet reaching the majority of private providers. Fewer than half of providers reported receiving any sort of supervisory or regulatory visit within the past year and/or reporting malaria caseload data to government or non-governmental organizations. Supervision and caseload reporting were highest in Lao PDR and were the result of the current PPM program. These results from 2015 may serve as a baseline for the much-needed work of engaging private providers to ensure appropriate malaria case management and surveillance.
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ACTwatch is a multi-country research project designed to provide timely, relevant, and high-quality antimalarial market evidence. Launched in 2008 with funding from the Bill and Melinda Gates Foundation, it was implemented in 12 countries with additional funding from UNITAID and the DFID. Standardized tools and approaches were employed to provide comparable data across countries and over time.

Project achievements include the implementation of 50 outlet surveys, most of them nationally representative of the public and private sectors; a number of peer-reviewed publications; and a detailed catalogue of antimalarial medicines and rapid diagnostic tests available at www.actwatch.info. The project has informed malaria control and elimination strategies and priorities for national control programs and their partners.

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