Malaria Medicine & Diagnostic Markets in the Greater Mekong Sub-Region

The ACTwatch Group

19th September, 2016
International Congress of Tropical Medicine and Malaria
Brisbane, Australia
Background
ACTwatch is a research project implemented by PSI and Ministries of Health in 12 countries

- ~50 malaria outlet surveys conducted between 2008-2016
- Total market approach
- Outlet surveys measure availability, price, and market share in the public and private sectors for malaria medicines & diagnostics
Methods
Study Sites

- **Myanmar** (August 2015-January 2016)
- **Thailand** (February-March 2016)
- **Lao PDR** (November-December 2015)
- **Cambodia** (August-October 2015)

Stratification according to malaria risk and national program design
Outlet Survey Population

Study Population:

- Outlets with antimalarials or with malaria blood testing available

What is an outlet?

- Public health facility
- Community Health Worker
- Private for-profit health facility
- Pharmacy
- Drug store
- General retailer
- Itinerant drug vendor
Sampling

- Representative sample of clusters
- Complete a CENSUS of all potentially eligible outlets
- SCREEN for antimalarials in stock or malaria blood testing available
Audit: All Antimalarial Products in Stock
Results
2015/16 Outlet Survey Sample Sizes

Cambodia: 26,664 outlets screened
- 1,308 met screening criteria
  - N=1,303

Lao PDR: 7,586 outlets screened
- 725 met screening criteria
  - N=724

Myanmar: 28,267 outlets screened
- 4,416 met screening criteria
  - N=4,394

Thailand: 13,651 outlets screened
- 104 met screening criteria
  - N=104
Antimalarial Market Composition

Outlet type, among outlets stocking antimalarials

Cambodia
N=858

Lao PDR
N=679

Myanmar*
N=3859

Thailand
N=87

- Public Health Facility
- Community Health Worker
- Private Sector

* Public health facilities were not included in the Myanmar outlet census
Antimalarial Market Composition

Outlet type, among outlets stocking antimalarials

- **Cambodia**: N=858
  - Public Health Facility
  - Private For-Profit Health Facility
  - Drug Store
  - Itinerant Drug Vendor

- **Lao PDR**: N=679
  - Public Health Facility
  - Private For-Profit Health Facility
  - Drug Store
  - Itinerant Drug Vendor

- **Myanmar**: N=3859
  - Community Health Worker
  - Pharmacy
  - General Retailer
  - Itinerant Drug Vendor

- **Thailand**: N=87
  - Community Health Worker
  - Pharmacy
  - General Retailer

*Public health facilities were not included in the Myanmar outlet census*
Summary

The private sector for malaria case management varies across country contexts in the GMS.
Availability
Availability of 1st-Line ACT for *Pf* Malaria

Among all outlets with at least one antimalarial in stock

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<tr>
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</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>467</td>
<td>391</td>
<td>236</td>
<td>394</td>
<td>1263</td>
<td>2596</td>
<td>72</td>
<td>19</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>298</td>
<td>263</td>
<td>79</td>
<td>78</td>
<td>112</td>
<td>138</td>
<td>5</td>
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<td>134</td>
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<td>146</td>
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<td>2</td>
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</tbody>
</table>

*Note: DHA PPQ, FDC ASMQ, AL, Non-FDC ASMQ, DHA PPQ

*Not inclusive of public health facilities (CHWs only)
Availability of 1\textsuperscript{st}-Line ACT for \textit{Pf} Malaria

Among all outlets with at least one antimalarial in stock

- Cambodia: Public N=467, Private N=391
- Lao PDR: Public N=236, Private N=394
- Myanmar: Public* N=1263, Private N=2596
- Thailand: Public N=72, Private N=19

DHA PPQ, FDC ASMQ
AL
AL, DHA PPQ
Non-FDC ASMQ, DHA PPQ

*Not inclusive of public health facilities (CHWs only)
Availability of 1st-Line Treatment for \( P_v \) Malaria

Among all outlets with at least one antimalarial in stock

- **Cambodia**
  - Public: N=467
  - Private: N=391
  - Antimalarials: DHA PPQ, FDC ASMQ

- **Lao PDR**
  - Public: N=236
  - Private: N=394
  - Antimalarial: AL

- **Myanmar**
  - Public: N=1263
  - Private: N=2596
  - Antimalarial: CQ

- **Thailand**
  - Public: N=72
  - Private: N=19
  - Antimalarial: CQ

*Not inclusive of public health facilities (CHWs only)*
Availability of 1st-Line Treatment for *Pv* Malaria

Among all outlets with at least one antimalarial in stock

*Not inclusive of public health facilities (CHWs only)*
Availability of Primaquine

Among all outlets with at least one antimalarial in stock

*Not inclusive of public health facilities (CHWs only)
Availability of Antimalarials Not Indicated as First-Line Treatment

Among all outlets with at least one antimalarial in stock

*Not inclusive of public health facilities (CHWs only)
Availability of Antimalarials Not Indicated as First-Line Treatment

Among all outlets with at least one antimalarial in stock

*Not inclusive of public health facilities (CHWs only)
Types of Antimalarials Not Indicated for First-Line Treatment, Private Sector

<table>
<thead>
<tr>
<th>Country</th>
<th>N</th>
<th>Types of Antimalarials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>133</td>
<td>Chloroquine, SP, Artemether tablets, Artemisinin PPQ</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>360</td>
<td>Chloroquine, Quinine tablets, Mefloquine, Atovaquone Proguanil, DHA PPQ, Artemisinin Naphthoquine, ASAQ</td>
</tr>
<tr>
<td>Myanmar</td>
<td>1252</td>
<td>Chloroquine, Quinine tablets, Mefloquine, Atovaquone Proguanil, DHA PPQ, Artemisinin Naphthoquine, ASAQ</td>
</tr>
<tr>
<td>Thailand</td>
<td>14</td>
<td>Chloroquine, SP, Artemether tablets, Artemisinin PPQ</td>
</tr>
</tbody>
</table>

- Chloroquine
- Quinine tablets
- Mefloquine
- Atovaquone Proguanil
- Artemisinin Naphthoquine
- DHA PPQ
- ASAQ
- Artemether tablets
- Artemisinin PPQ
- SP
Availability of Oral AMT in Myanmar

Among all outlets with at least one antimalarial in stock

- Private Health Facility: N=314
- Pharmacy: N=522
- General Retailer: N=1341
- Itinerant Drug Vendor: N=419
Oral AMT Insights from Myanmar

- More than 10 manufacturers, however the vast majority of products were from Mediplantex (75%), Vietnam

- Stock levels were low (median = 1 package) with frequent re-stocking of low-volume wholesale purchases.

- Distribution of less than a full-course was common (median adult dose = 2 tablets), with a median price of $0.16/tablet.

- Most providers report high consumer demand for oral AMT.
Availability of Chloroquine in Lao PDR

Among all outlets with at least one antimalarial in stock

- Public Health Facility, N=91
- CHW, N=145
- Private Health Facility, N=56
- Pharmacy, N=309
- General Retailer, N=23
Chloroquine Insights

2nd line treatment for *Pv*, and may be used during pregnancy (1st trimester).

Most commonly available in tablet form, but syrups and liquid injections also available.

Maraquine tablets were most commonly available, and Maraquine was the only audited drug manufactured in Lao PDR.
Availability of Malaria Blood Testing

Among all outlets with at least one antimalarial in stock

<table>
<thead>
<tr>
<th>Country</th>
<th>Public N</th>
<th>Private N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>467</td>
<td>391</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>255</td>
<td>424</td>
</tr>
<tr>
<td>Myanmar</td>
<td>1263</td>
<td>2596</td>
</tr>
<tr>
<td>Thailand</td>
<td>72</td>
<td>19</td>
</tr>
</tbody>
</table>

*Not inclusive of public health facilities (CHWs only)
Availability of Malaria Blood Testing

Among all outlets with at least one antimalarial in stock

*Not inclusive of public health facilities (CHWs only)
Public sector readiness to test and appropriately treat malaria is high in Cambodia, Lao PDR and Myanmar, and moderate in Thailand. Gaps in availability of primaquine for Pf and Pv treatment.

Major gaps in private sector readiness to test and appropriately treat Pf and Pv, although moderate readiness in Cambodia.

Urgent need to address availability of oral AMT in Myanmar.

Persistent widespread availability of chloroquine in Lao PDR’s private sector.
Market Share
Antimalarial Market Share

Relative sale/distribution of antimalarials in the last week

% volumes distributed

Public | Private | Public | Private | Public* | Private

Cambodia | Lao PDR | Myanmar

*Not inclusive of public health facilities (CHWs only)
Relative sale/distribution of antimalarials in the last week

**Antimarial Market Share**

<table>
<thead>
<tr>
<th></th>
<th>% volumes distributed</th>
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</thead>
<tbody>
<tr>
<td>Public</td>
<td></td>
</tr>
<tr>
<td>Cambodia</td>
<td></td>
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<tr>
<td>Private</td>
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<tr>
<td>Lao PDR</td>
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<tr>
<td>Public</td>
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<tr>
<td>Myanmar</td>
<td></td>
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<tr>
<td>Private</td>
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*Not inclusive of public health facilities (CHWs only)
Private Sector Engagement
Supervisory Visit Received in the Last Year
Among private sector outlets

Among private outlets with at least one antimalarial in stock and/or malaria testing available.
Caseload Reporting to Government or NGO Among private sector outlets

Among private outlets w at least one antimalarial in stock and/or malaria testing available

N=737
Cambodia

N=459
Lao PDR

N=2915
Myanmar
The private sector is responsible for the majority of antimalarial distribution in Cambodia, Lao PDR and Myanmar.

Relative distribution of first-line treatments is high in Cambodia and moderate in Myanmar.
- More than half of antimalarials distributed in Lao PDR were chloroquine (2nd line treatment).
- Oral AMT distribution in Myanmar remains a serious problem.

The majority of private sector outlets are not routinely supervised and do not contribute case data to national systems, with notable moderate engagement in Lao PDR.
Conclusions
The private sector plays an important role in antimalarial distribution in Cambodia, Lao PDR, and Myanmar.

- Need to address availability and distribution of non-1\textsuperscript{st}-line drugs in Lao PDR and Myanmar, most urgently oral AMT in Myanmar.
- Need for increased coverage of private sector engagement, including passive surveillance to track and respond to all cases.

Progress towards elimination will require:

- Closing gaps in public sector readiness.
- Addressing low availability of primaquine for \textit{Pf} and \textit{Pv}.
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Availability of Any Antimalarial

Among all screened outlets

Cambodia

Lao PDR

Myanmar

Thailand
# Refusal Rates

<table>
<thead>
<tr>
<th>Country</th>
<th>Refused Screening</th>
<th>Eligible, Refused Drug Audit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>50 / 27,201 (&lt;0.01%)</td>
<td>0 / 1,308 (0%)</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>10 / 7,662 (&lt;0.01%)</td>
<td>0 / 725 (0%)</td>
</tr>
<tr>
<td>Myanmar</td>
<td>88 / 28,664 (&lt;0.01%)</td>
<td>10 / 4,416 (&lt;0.01%)</td>
</tr>
<tr>
<td>Thailand</td>
<td>126 / 13,952 (0.01%)</td>
<td>0 / 104 (0%)</td>
</tr>
<tr>
<td>Country</td>
<td>Pf first-line</td>
<td>Pf second-line</td>
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<tr>
<td>--------------</td>
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<td>----------------</td>
</tr>
<tr>
<td>Cambodia 2014</td>
<td>DHA PPQ or ASMQ FDC + PQ</td>
<td>Quinine + doxy or tetra</td>
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<tr>
<td>Lao PDR 2013</td>
<td>AL</td>
<td>Quinine + doxy</td>
</tr>
<tr>
<td>Myanmar 2012</td>
<td>AL, ASMQ or DHA PPQ + PQ</td>
<td>Other ACT, or artemether + doxy, tetra, clinda</td>
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<tr>
<td>Thailand 1995</td>
<td>ASMQ non-FDC + PQ *2016: DHA PPQ + PQ</td>
<td>Quinine + doxy or clinda + PQ</td>
</tr>
</tbody>
</table>

*At the time of data collection*
Availability of Testing and Treatment Among public facilities and CHWs

Among all outlets with at least one antimalarial in stock.

<table>
<thead>
<tr>
<th>Location</th>
<th>Facility N=137</th>
<th>CHW N=330</th>
<th>Facility N=137</th>
<th>CHW N=330</th>
<th>Facility N=91</th>
<th>CHW N=164</th>
<th>Facility N=91</th>
<th>CHW N=164</th>
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<tbody>
<tr>
<td></td>
<td>Testing</td>
<td>Pf/Pv Treatment</td>
<td>Testing</td>
<td>Pf/Pv Treatment</td>
<td>Testing</td>
<td>Pf/Pv Treatment</td>
<td>Testing</td>
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<td>Cambodia</td>
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Itinerant Drug Vendors

Cambodia

- Typically currently or previously were employed at a public or private facility or pharmacy, and often have some sort of medical training.
- Operate from their homes, and/or provide mobile services.
- Tend to have testing available, and stock and distribute ACTs.

Myanmar

- Typically do not have medical training or affiliation with a facility or pharmacy.
- Provide mobile services.
- Tend to stock non-artemisinin therapies, and 1 in 5 have oral AMT; nearly half of antimalarials distributed are ACTs.
Availability of Treatment for Severe Malaria in Facilities

Among all facilities with at least one antimalarial in stock

*Not inclusive of public health facilities (CHWs only)
Among all outlets with at least one antimalarial in stock

Availability of Blood Testing and 1st-Line Treatment for *Pf* (ACT) and *Pv* (ACT or CQ)

- **Cambodia**
  - Public: N=467
  - Private: N=391

- **Lao PDR**
  - Public: N=255
  - Private: N=424

- **Myanmar**
  - Public*: N=1263
  - Private: N=2596

- **Thailand**
  - Public: N=72
  - Private: N=19

*Not inclusive of public health facilities (CHWs only)