MALARIA SUPPLY CHAIN
IN THE GREATER MEKONG SUBREGION
MALARIA SUPPLY CHAIN
IN THE GREATER MEKONG SUBREGION
ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACT</td>
<td>artemisinin-based combination therapy</td>
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<tr>
<td>AMTR</td>
<td>artemisinin monotherapy replacement</td>
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<tr>
<td>AS-MQ</td>
<td>artemether-lumefantrine</td>
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<tr>
<td>BVBD</td>
<td>Bureau of Vector-Borne Disease, Thailand</td>
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<tr>
<td>CHAI</td>
<td>Clinton Health Access Initiative</td>
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<tr>
<td>CMPE</td>
<td>Center of Malariology, Parasitology and Entomology, Lao People’s Democratic Republic</td>
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<tr>
<td>CMS</td>
<td>Central Medical Store, Cambodia</td>
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<tr>
<td>CMSD</td>
<td>Central Medical Store Depot, Myanmar</td>
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<tr>
<td>CMSSD</td>
<td>Mandalay Central Medical Store Sub-Depot, Myanmar</td>
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<tr>
<td>CNM</td>
<td>National Center for Parasitology, Entomology and Malaria Control, Cambodia</td>
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<td>DDF</td>
<td>Department of Drugs and Food, Cambodia</td>
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<tr>
<td>DHA-PPQ</td>
<td>dihydroartemisin-piperaquine</td>
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<td>DID</td>
<td>drug inventory database</td>
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<td>EDAT</td>
<td>early diagnosis and treatment</td>
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<td>FDA</td>
<td>Food and Drug Administration</td>
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<td>FDD</td>
<td>Food and Drug Department, Lao People’s Democratic Republic</td>
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<td>GMS</td>
<td>Greater Mekong Subregion</td>
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<tr>
<td>GP</td>
<td>general practitioner</td>
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<tr>
<td>GSP</td>
<td>good storage practice</td>
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<tr>
<td>IMPE</td>
<td>Institute of Malariology, Parasitology and Entomology, Viet Nam</td>
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<tr>
<td>IDA</td>
<td>International Dispensary Association, Thailand</td>
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<tr>
<td>IRS</td>
<td>indoor residual spraying</td>
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<tr>
<td>ITNs</td>
<td>insecticide-treated bed nets</td>
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<tr>
<td>JICA</td>
<td>Japan International Cooperation Agency</td>
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<tr>
<td>JSI</td>
<td>John Snow Inc.</td>
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<tr>
<td>LLIHN</td>
<td>long-lasting insecticidal hammock net</td>
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<tr>
<td>LLIN</td>
<td>long-lasting insecticidal net</td>
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<tr>
<td>LMIS</td>
<td>logistics management information system</td>
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<td>MC</td>
<td>malaria clinic</td>
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<tr>
<td>MIS</td>
<td>malaria information system</td>
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<tr>
<td>MMA</td>
<td>Myanmar Medical Association</td>
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Despite the considerable progress in malaria control across the Greater Mekong Subregion (GMS), malaria remains a significant public health concern, with growing resistance to antimalarial drugs threatening to undermine recent gains. The GMS countries of Cambodia, the Lao People’s Democratic Republic, Myanmar, Thailand and Viet Nam will continue to require appropriate interventions for prevention, diagnosis and treatment. Effective procurement and supply chain management systems are crucial to ensure the timely availability of commodities to address malaria prevention and treatment.

Across GMS, procurement and supply chain systems have evolved into complex mechanisms and processes that involve various stakeholders. These developments reflect significant efforts by countries to expand vector-control interventions, as well as efforts to improve the quality and availability of diagnosis and treatment, including focus on community-based services and improved integration with the private sector. Additionally, due to the continued presence of donor funding – in particular the Global Fund to Fight AIDS, Tuberculosis and Malaria – many external partners work directly in the procurement and supply chain process, alongside domestic agencies and organizations.

While all countries have developed systems that aim to procure quality-assured commodities and distribute them throughout the health system and on to patients, there are ongoing challenges with workforce capacity, storage conditions, delivery, quality assurance, and the collection and use of timely data. Additionally, the decreasing number of malaria cases across the subregion calls for efforts to sustain funding, resources and engagement.

GMS countries can continue to improve their supply chains through increased communication and collaboration among key stakeholders, greater clarity of roles and responsibilities, formalization of procedures and processes, and wider availability of data to support decision-making.

EXECUTIVE SUMMARY
While there has been significant progress in malaria control in the Greater Mekong Subregion (GMS) in recent years, malaria continues to be a major concern, primarily due to the development and possible spread of resistance to artemisinin and other antimalarial drugs. In order to achieve the GMS goal to eliminate *Plasmodium falciparum* by 2025 and all malaria by 2030 (1), the region requires strong services and systems for prevention, diagnosis and treatment, as well as effective supply chains to distribute commodities to carry out these activities.

<table>
<thead>
<tr>
<th>Table 1. Malaria Prevention, Diagnosis and Treatment in the GMS</th>
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<tbody>
<tr>
<td><strong>LLIN</strong></td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>IRS use</td>
</tr>
<tr>
<td>RDT type</td>
</tr>
<tr>
<td><em>P. f.</em> treatment</td>
</tr>
<tr>
<td><em>P. v.</em> treatment</td>
</tr>
<tr>
<td>Year of most recent treatment guidelines</td>
</tr>
<tr>
<td>Procured antimalarials</td>
</tr>
<tr>
<td>Village malaria workers</td>
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</tbody>
</table>

LLIN = long-lasting insecticidal nets; IRS = indoor residual spraying; RDT = rapid diagnostic test; *P. f.* = *Plasmodium falciparum*; *P. v.* = *Plasmodium vivax*; AS+MQ = artemunate-mefloquine; dha-PPQ = dihydroartemisinin-piperaquine; PQ = primaquine; AL = artemether-lumefantrine; CQ = chloroquine; WHO-PQ = World Health Organization prequalified.

Sources: WHO (2); President’s Malaria Initiative (3); interview notes.
The five countries of the GMS – Cambodia, the Lao People’s Democratic Republic, Myanmar, Thailand and Viet Nam – are distinctly different, but they also share a number of similarities. All countries support free mass distribution of long-lasting insecticidal nets (LLINs) and targeted indoor residual spraying (IRS) for the prevention of malaria, except for the Lao People’s Democratic Republic, where IRS is not a priority for prevention. Confirmatory testing with microscopy or rapid diagnostic tests (RDTs) is required in all countries before treatment is prescribed; microscopy is available at higher-level health facilities, while multispecies RDTs are used at the community level. All countries also recommend artemisinin-based combination therapies (ACTs) for first-line treatment of *Plasmodium falciparum*, although specific treatment regimens and drug choice differ by country. In the case of *Plasmodium vivax*, first-line treatment is chloroquine in most countries, with the exception of Cambodia and the Lao People’s Democratic Republic, where ACT is used as the first-line treatment.

All five countries have introduced village malaria workers (VMWs) and village health volunteers (VHVs) to provide community-based prevention, diagnosis and treatment, and extend the reach of services to remote and migrant populations. Additionally, the private sector can be a key source of services, providing a substantial amount of treatment in Cambodia and Myanmar, although it is less prominent in the Lao People’s Democratic Republic, Thailand and Viet Nam. Regardless of the size of the private sector, all countries except Viet Nam have introduced public–private partnerships to better integrate the private sector into national efforts to address malaria. However, in Viet Nam, there have been a number of successful public–private partnerships in other areas of health, such as family planning and tuberculosis, which can serve as foundations for improved collaboration in malaria.

<table>
<thead>
<tr>
<th>Table 2. Private Sector and External Funding in the GMS</th>
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<tr>
<td><strong>Private sector share of antimalarial market</strong></td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>60%</td>
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<tr>
<td><strong>Public-private partnerships</strong></td>
</tr>
<tr>
<td><strong>Main source of funding</strong></td>
</tr>
<tr>
<td><strong>Other key sources of funding</strong></td>
</tr>
</tbody>
</table>

PMI = President’s Malaria Initiative; USAID = United States Agency for International Development; WHO = World Health Organization. Sources: WHO (2); ACTwatch Group and PSI (4); ACTwatch Group and PSI/PSI Lao PDR (5); PSI/Myanmar (6); interview notes.

While all GMS countries have developed procurement and supply chain systems to ensure the availability of commodities at health facilities and within the community, these have evolved differently, with various stakeholders and processes. Due to the presence of donor funding – in particular the Global Fund to Fight AIDS, Tuberculosis and Malaria – across the GMS, many external partners participate in the supply chain management. For instance, the United Nations Office for Project Services (UNOPS) is heavily involved in procurement in a number of countries.
All countries have made efforts to improve data collection and analysis, including the development of logistics management information systems (LMIS), although in all cases there is room for further development. A comprehensive LMIS providing real-time information on stock levels does not currently exist in any of the GMS countries.

### Table 3. Agencies Responsible for Procurement and Supply Chain Management in the GMS

<table>
<thead>
<tr>
<th></th>
<th>Cambodia</th>
<th>Lao People’s Democratic Republic</th>
<th>Myanmar</th>
<th>Thailand</th>
<th>Viet Nam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Forecasting</strong></td>
<td>CNM</td>
<td>CMPE</td>
<td>NMCP</td>
<td>BVBD</td>
<td>NMCP</td>
</tr>
<tr>
<td><strong>Product selection</strong></td>
<td>CNM</td>
<td>CMPE</td>
<td>NMCP</td>
<td>BVBD</td>
<td>NMCP</td>
</tr>
<tr>
<td><strong>Procurement</strong></td>
<td>UNOPS</td>
<td>PMU (MOH)</td>
<td>UNOPS</td>
<td>ODPC/BVBD</td>
<td>NMCP</td>
</tr>
<tr>
<td><strong>Warehousing</strong></td>
<td>CMS</td>
<td>MPSC</td>
<td>CMSD</td>
<td>BVBD</td>
<td>NIMPE</td>
</tr>
<tr>
<td><strong>LMIS</strong></td>
<td>DDF/CMS</td>
<td>CMPE</td>
<td>MOH</td>
<td>MOPH</td>
<td>NIMPE</td>
</tr>
<tr>
<td><strong>QA/QC</strong></td>
<td>DDF/UNOPS</td>
<td>FDD/CMP</td>
<td>FDA</td>
<td>BVBD</td>
<td>NIDQC/NIMPE</td>
</tr>
</tbody>
</table>

LMIS = logistics management information system; QA = quality assurance; QC = quality control; CNM = National Center for Parasitology, Entomology and Malaria Control; UNOPS = United Nations Office for Project Services; CMS = Central Medical Store; DDF = Department of Drugs and Food; CMPE = Center for Malaria, Parasitology and Entomology; PMU = Project Management Unit (established by Ministry of Health); MPSC = Medical Products Supply Center; ODPC = Office of Disease Prevention and Control; MOH = Ministry of Health; FDA = Food and Drug Administration; BVBD = Bureau of Vector-Borne Disease; NIDQC = National Institute of Malariology, Parasitology and Entomology; BVBD = Bureau of Vector-Borne Disease; NIDQC = National Institute of Drug Quality Control.

Sources: Cambodia Ministry of Health (7); USAID (8); National Center for Malaria, Parasitology Entomology (9); President’s Malaria Initiative (3); Center for Malaria, Parasitology and Entomology (10); Vectorborne Diseases Associates LLC (11); The Office of the Inspector General, Global Fund to Fight AIDS, Tuberculosis and Malaria (12); Myanmar Ministry of Health (13); Partnership for Supply Chain Management (14); Regional Artemisinin resistance Initiative (RAI) (15).

The following sections provide more detailed descriptions of prevention, diagnosis and treatment strategies in each of the five GMS countries, as well as procurement and supply chain management. These summaries are intended for a diverse audience to provide an overview of the current situation in each country. Each section also ends with a list of recommendations that may be particularly helpful for policy-makers, as well as other stakeholders involved in malaria funding, technical assistance and implementation, as they work to strengthen national procurement and supply chain systems.
CAMBODIA

Background

The number of malaria cases has halved over the last decade in Cambodia, which reported 33,930 cases and 10 deaths in 2015 (2). Nevertheless, malaria remains a significant public health concern and is currently endemic in 21 out of 25 provinces (7), with approximately half of the population (7.5 million people), at high risk (2). The north-eastern part of the country is particularly affected, accounting for 70% of the malaria burden, especially along the forested borders of the Lao People’s Democratic Republic, Thailand and Viet Nam (7). Cambodia was the first country to identify drug-resistant strains of Plasmodium falciparum in the GMS; resistance has now reached alarming levels, with drug failure increasing along the Cambodia–Thailand border (7).

Prevention, diagnosis and treatment

The National Strategic Plan for Elimination of Malaria in the Kingdom of Cambodia 2011–2015 calls for universal coverage and access to preventive measures among target populations (3). Mass distribution of LLINs and long-lasting insecticidal hammock nets (LLIHNs) has been implemented, particularly in western areas of the country with artemisinin resistance. The national strategy calls for one LLIN per person and one LLIHN per family provided to those living in villages at risk, as well as the retreatment of existing nets with long-lasting insecticide (7). IRS is used in targeted low-endemic areas, and may also be deployed in response to outbreaks in high-endemic areas.

Malaria diagnosis is free-of-charge in the public sector (2). While microscopy is the preferred diagnostic tool, RDTs are used when microscopy is unavailable (3). At the community level, VMWs are trained to use RDTs to diagnose malaria and guide treatment. There has been a marked shift from malaria microscopy to RDTs in recent years, particularly with the scale up of VMWs.

Due to growing artemisinin resistance, the Ministry of Health adopted new treatment guidelines in 2015 which identify different first-line regimens by province (3). The new policy recommends the reintroduction of the ACT artemunate-mefloquine (AS-MQ) in areas where treatment failures to dihydroartemisinin-piperaquine (DHA-PPQ) and atovaquone-proguanil have been identified, and continuation of DHA-PPQ in areas where treatment failures have not been identified. In regards to atovaquone-proguanil, Malarone will be registered in Cambodia for use in special situations with permission from the National Center for Parasitology, Entomology and Malaria Control (CNM), in combination with another antimalarial drug, such as artemunate. The Ministry of Health has banned the sale of oral artemisinin-based monotherapies (oAMTs) since 2008 (2).

Malaria treatment and referral services are provided by trained VMWs and mobile malaria workers (MMWs), health facilities, military medical services, and select border checkpoints and mobile clinics (7). Some 2350 villages are covered by VMWs who provide treatment and refer severe cases to health facilities (3). Particularly in rural areas, VMWs and VHVs (who, unlike VMWs, do not have malaria-specific training but cover a range of conditions) often serve as the primary source of health information and services. VMWs report to health centres that provide basic primary health care. These centres report to one of 79 operational district (OD) health offices, which each manage a referral hospital with microscopy services.

While the public health sector provides free access to malaria diagnosis and treatment, a substantial share of health-care services is provided through the private sector, which includes registered health outlets (pharmacies), non-registered health outlets (drugstores), and non-health outlets (grocery stores). Unlicensed outlets have decreased in recent years but continue to provide services, particularly in rural areas.

In partnership with Population Services International (PSI) and University Research Council (URC), CNM provides malaria services in collaboration with private providers (9). Under the Public–Private Mix (PPM) Programme, private providers are trained on early diagnosis and treatment according to national guidelines, provided with RDTs and ACTs, and incorporated into the national malaria surveillance system (7). CNM also collaborates with private enterprises, including mining and construction, with a focus on providing onsite malaria services for migrant workers.
Various partners across Cambodia have developed quantifications of malaria commodity needs separately from, and in addition to, those supported by CNM (8). These quantifications, leveraging different datasets and with different objectives, approaches, assumptions and tools, have produced different results. A standardized approach and quantification methodology is required to ensure a continuous and coordinated supply of commodities. In 2015, the Ministry of Health, with technical assistance from the USAID|DELIVER PROJECT, conducted a national Malaria Commodities Quantification Workshop to prepare a two-year forecast and supply plan of the total commodity and funding needs for 2016 and 2017. The selected method of forecasting used reported malaria cases from the national malaria information system (MIS), as well as central-level stock on hand from the public sector and from Population Services Khmer (PSK), PSI’s Cambodian affiliate, to represent the private sector.

Malaria commodities are selected by the CNM Technical Bureau and Pharmacy Unit in line with the World Health Organization (WHO) and Cambodia treatment guidelines. The Ministry of Health’s Department of Drugs and Food (DDF) is involved in the revision of the Essential Medicines List to ensure inclusion of CNM-suggested medicines. Going forward, RDT brands will be selected from among WHO-prequalified suppliers, and CNM will submit RDTs for lot testing upon arrival in country by sending samples to Institute Pasteur in Cambodia (7). UNOPS previously carried out postshipment testing of all antimalarials at a WHO prequalification lab in Nepal, but this is no longer required by the Global Fund because procured products are sourced from WHO-prequalified sources. Currently, UNOPS only performs quality control (QC) at a national level through DDF; samples are collected from the private sector and tested in the national QC lab.

Multiple partners are involved in the procurement of malaria commodities for the national malaria control programme (8). UNOPS, the Global Fund Principal Recipient, is the primary source for procurement and manages the entire procurement process for the Global Fund in regards to antimalarials, RDTs, LLINs, and other goods and services. The Cambodian Ministry of Health is involved in procuring second-line treatments, as well as treatment for severe malaria (8). The United States of America President’s Malaria Initiative (PMI) has regional and country funds that are used to fill commodity gaps when required. Additional partners including Médecins Sans Frontières (MSF) and WHO may also be involved in procuring goods. In the private sector, PSK, which operates a nationwide social marketing programme of RDTs and ACTs, is responsible for procurement, with support from UNOPS.

The importation of pharmaceutical products is regulated by the DDF, and only drugs registered with DDF can be legally imported in Cambodia. DDF requires importers to obtain an import permit for each shipment, and make the required payment to clear customs (16).

Logistic management functions for the malaria programme are integrated into the overall Ministry of Health system supply chain for all commodities (9). These flow from the Central Medical Store (CMS) to the provincial health departments (PHDs) and OD health offices, then to health centres or referral hospitals and finally to VMWs. CMS is responsible for distributing essential medicines and commodities to ODs on a quarterly basis. The supplies that arrive at the OD stores are stored in the OD warehouses and then distributed to health facilities based on a “pull” system, in which the OD provides medical commodities after receiving requests from health centres. If the OD store is severely overstocked with a particular commodity, some OD stores will switch to a “push” system to rebalance their inventories (3). CMS will also resort to “push” policies if it has commodities that are nearing expiry. Oversupply and undersupply occur at the health facility and community levels.

Storage capacity is currently inadequate, as products are frequently moved from one storage area to another due to a lack of space. There are no standard operating procedures (SOPs) for reception and storage, and the programme suffers from a lack of sufficient workforce dedicated to handling supplies that arrive at warehouses.

The Drug Inventory Database (DID), which is maintained by DDF and CMS, contains data on
stocks of medical supplies including commodities for malaria (9). At the health centre level staff use paper forms, while at the provincial hospital and OD levels data are entered into automated Drug Inventory Databases that feed into the national database. However, information cannot be accessed at the national level, which makes effective use of data for policy-making challenging. For example, while malaria commodity stock-on-hand and consumption data are entered into the DID at each level of the system, CNM only has access to quarterly data aggregated by ODs, hindering efforts to identify and mitigate shortages and stock-outs of malaria commodities for end users. CNM has plans to implement a mHealth-based stock management system at health centres across malaria-endemic ODs to monitor stock availability and ensure no commodity stock-outs occur (7).

DDF, the National Health Products Quality Control Center (NHQC), and CNM are involved in quality assurance (QA) and QC in Cambodia for the private sector. Since 2003, the U.S. Pharmacopeial Convention (USP) has been involved in strengthening medicine QA/QC systems, with financial support from the United States Agency for International Development (USAID) and PMI (17). To address the issue of counterfeit goods, in 2014 the Cambodian Government established a national Counterfeit Committee, which is a cross-sectoral task force comprised of representatives from the ministries of interior, justice, health, finance, commerce and defense (3). In 2015, the committee facilitated the development of an action plan to perform inspections in private markets to detect and combat counterfeit medicines and to regulate private pharmacies and providers to ensure the delivery of quality medicines.

Recommendations

The following recommendations are made to strengthen malaria procurement and supply chain in Cambodia:

- Develop a consistent process for forecasting and planning. Align all partners around a standardized approach and quantification methodology to ensure a continuous and coordinated supply of commodities. There should be an agreed use of specific datasets, as well as a shared understanding of objectives, approaches, assumptions and tools.

- Improve storage conditions at CMS by developing SOPs following good storage practice (GSP) and good distribution practice, building capacity for planning and stock management, and strengthening the capacity of CMS.

- Increase qualified human resources at CMS and other levels of procurement and the supply chain system. Develop a workforce plan and increase the number and capacity of staff involved in malaria procurement and the supply chain.

- Support CNM to enhance its LMIS system by ensuring greater accessibility to data at all levels of the supply chain. There is a need to streamline the DID, as current differences between the management and support of the DID at the national level and DID at the OD and hospital levels result in poor integrity control for both data and systems. Additionally, there is a need to ensure the availability of trained information technology (IT) staff in both CMS and DDF to support all electronic systems.
LAO PEOPLE’S DEMOCRATIC REPUBLIC

Background

The number of reported malaria cases in the Lao People’s Democratic Republic has fluctuated over the past decade, with outbreaks occurring in recent years (18), and in 2015 the figure stood at 36,056 (2). Malaria mortality has fallen dramatically, with only two deaths reported in 2015 (2). An estimated 2.1 million people, or approximately one third of the population, are at high risk of malaria (2); ethnic minority groups, forest-fringe inhabitants, migrants and new forest settlers are particularly affected (19). Artemisinin resistance has been detected in southern areas of the country bordering Cambodia and Thailand and is an ongoing concern (3).

Prevention, diagnosis and treatment

Vector control in the Lao People’s Democratic Republic is at present mainly based on insecticide-treated bed nets (ITNs), although LLINs have been introduced and will gradually replace all ITNs (19). IRS is mostly limited to outbreak response and focal control. Active case detection of febrile cases in the community has been taking place since 2012.

RDTs are available at village and health centre levels, as well as at district and provincial hospitals, although emphasis is placed on microscopic diagnosis at hospital facilities (3). Since 2011, the Center of Malariology, Parasitology, and Entomology (CMPE), within the Ministry of Health, has taken a more targeted approach to the distribution of malaria control measures, directing RDTs, as well as ACTs and ITNs, towards villages with the highest burden of malaria.

National malaria treatment guidelines, issued by CMPE, were significantly modified in 2005 after reports of increasing resistance to chloroquine and sulphadoxine-pyrimethamine, resulting in current guidelines specifying the use of ACTs (20). There has been a ban on the sale of oAMTs since 2005 (2).

Malaria activities are centralized at CMPE, which oversees 18 Provincial Anti-Malaria Stations (PAMS) (3). Under the PAMS, there are 140 district and provincial hospitals, and approximately 850 health centres that cover nearly 2000 malaria-endemic villages. A national village-based early diagnosis and treatment (EDAT) strategy promotes the diagnosis and treatment at the village and health centre levels. VMWs provide care for patients within the community and use RDTs, prescribe ACTs and refer patients to health facilities, if necessary (3). In villages where there is little or no malaria, VHVs are available, although these multipurpose health workers are not usually trained to diagnose and treat malaria. Artesunate injectables are available at district and provincial hospitals for severe malaria (11).

The public health system is predominant, although an alternative private sector is growing (19). There are around 1865 private pharmacies and 254 private clinics, mainly located in urban areas.

A Public–Private Mix (PPM) programme was piloted in 2008, targeting eight districts and providing commodities to private pharmacies and clinics (3). This approach has now been expanded to 22 districts in eight provinces. Cases detected and treated through these private pharmacies and clinics have continued to rise, indicating that this may be an effective approach to reach populations that seek care from the private sector.

Procurement and supply chain management

CMPE is responsible for carrying out quantification, demand forecasting and supply planning of commodities (3). National procurement projections are based on historical needs and some consumption estimates, which do not take into account the effect of stock-outs (10).

CMPE conducts product selection in line with its national treatment guidelines (11). Twice each year, CMPE creates a distribution plan delineating the quantity of each commodity to be sent to each PAMS, central hospital and regional/provincial warehouse. A request letter is also received from each PAMS for products to supplement those included in the distribution plan.

The majority of the case management commodities are procured through the country Global Fund
grants (10). Generally, the Procurement Unit within Project Management Unit — established by the Ministry of Health to act as the implementing body of Global Fund-supported programmes — procures malaria commodities based on CMPE’s forecast.

Commodities are stored with the Medical Products Supply Center (MPSC) within the Ministry of Health (3). Once these are delivered to a warehouse in the capital, the supplies are distributed to the provinces. The provinces subsequently supply the districts, which supply the health centres that ultimately provide commodities to VHVs.

Transport mechanisms for commodities within the supply chain have not been formalized, with an ad hoc arrangement triggered by a tendering process that often results in supplies being transferred via public transportation networks (3). A bus system is often used and small quantities are transported using vehicles from PAMS to the districts and health centres.

With support from partners, CMPE has developed a LMIS to strengthen reporting of stocks of malaria commodities (10). Once a month, CMPE receives paper-based monthly summary reports from PAMS containing consumption information for each PAMS, as well as aggregated consumption data from all districts, hospitals, health centres and village health/malaria workers in the province. In addition, CMPE receives stock-on-hand data every other week from PAMS via an electronic web form, using the Open Data Kit (ODK) platform. This information can be downloaded into a dashboard that includes worksheets for analysing logistics data at the national, provincial, and district levels. Efforts are being made to improve data use for forecasting of commodities and to identify and address bottlenecks in data and logistics management at the provincial and district levels. There is also a focus on ensuring that LMIS tools are harmonized with other national information systems. MPSC has been working with the Clinton Health Access Initiative (CHAI) to pilot and scale up mSupply software in selected central and regional warehouses (3). At the time of the assessment, it was understood that while mSupply was being used more regularly at sites with higher volumes of stock, there remains duplication of efforts in the supply chain management of health products and that other processes such as distribution planning and distribution reporting, monitoring and supervision still needs to be strengthened concurrently.

There is no formalized system for postshipment QA, and there is no QC laboratory that is WHO prequalified (12). Before issuing products, staff at CMPE conduct a visual inspection to ensure that no products are damaged, expired or otherwise unusable (11). If damaged or expired products are found, these are sent for incineration to the Food and Drug Department (FDD). FDD has received Global Fund support to strengthen its QC of antimalarial drugs in recent years. No quality checks are performed at the intermediate warehouse level or dispensing level.

**Recommendations**

The following recommendations are made to strengthen malaria procurement and the supply chain in the Lao People’s Democratic Republic.

- Agree on purpose and functionality of ODK as a data aggregation tool for end-users (district level and below) to report data on epidemiology and stock status.

- Agree on purpose and functionality of mSupply as a warehouse management tool for store managers (central and provincial) to manage stock, while at the same time, establishing master databases on standardizing information and coding on all Ministry of Health items, health facilities, suppliers and storage facilities.

- Ensure procurement and supply chain systems and SOPs support field operations and programme needs in the southern and northern regions differently, rather than adhering to a one-size-fits-all approach. Epidemiologically, the country is divided into north and south zones that should have different strategies. In the north, transmission is already low and thus this region should be moving towards malaria elimination, with consideration of the possibility of scattered focal outbreaks. The south should focus on aggressive malaria control and outbreak response.
- Review malaria procurement and supply chain management indicators – consider changing “no stock-out at community/village level” to “no stock-out at health centre” (given lowest level of the health system).

- Conduct logistic network analysis – optimize storage facilities and distribution plan.

- Develop costed scale-up plan of mSupply.

- Focus on deployment of mSupply in 18 provinces. Building a “national picture” will increase confidence and enhance the value of both the system and the data collected.

- Consider ODK (data aggregator tool) feeding data into mSupply (supply chain management tool), which can then feed into DHIS2 (national data repository and dashboard tool).

- Develop costed human resources plan and operational plan for implementation of the Five-Year Strategic Plan for Drug Medical Product Supply and Medical Technology Management (2016–2020).

- Organize a MPSC-led National Supply Chain Design Workshop to achieve consensus on one master plan.

- Develop a formalized system for QA/QC: There is a need to put in place a formalized system for postshipment QA.

- Improve storage conditions by developing national guidance on storage and the effective management of commodities. Although the Global Fund has provided support to renovate part of the MPSC building, significant quantities of expired commodities requiring disposal have been observed. There is lack of clear guidance about how to manage expired commodities.

- Strengthen MPSC distribution system: The distribution system could be improved to rely less on ad hoc transportation mechanisms. This could potentially help to address issues with persistent stock-outs, and ensure the safe and regular delivery of commodities.

- Improve data collection and sharing by aligning and harmonizing all national information systems. While the Lao People’s Democratic Republic has made significant efforts to develop and improve its LMIS, poor data flow and reporting are ongoing challenges.

- Support the MPSC Luang Prabang project. Integrate stock at warehouses and stores, while strengthening data-driven decision-making of programme units.
Background

Myanmar has the highest malaria burden in the GMS and reported 77,842 cases and 37 deaths in 2015 (2), although this figure may only reflect 25–40% of the actual burden (3). Some 8.5 million people, or 16% of the population, are at high risk of malaria (2), which occurs mainly in or near forests, particularly among remote populations, ethnic minorities and migrants (13). The Myanmar–Thailand border is associated with the development of artemisinin resistance, although recent studies indicate that resistance now extends across the country (21).

Prevention, diagnosis and treatment

Rapid scale-up of bed nets is planned in malaria-risk areas, with the National Malaria Control Programme (NMCP) aiming to achieve a 90% target of the total population at risk; the target is 100% for the population living in risk areas based on the risk stratification (13). Going forward, NMCP has chosen LLINs for distribution through mass campaigns and a continuous channel. With evidence from 90% of communities using conventional bed nets, treatment of nets with insecticide tablets is also a clear strategy. IRS is focused on outbreak areas, as well as development projects in endemic areas and new settlements, and is also recommended in areas affected by artemisinin resistance.

The national policy calls for confirmatory testing with either microscopy or RDT before treatment is prescribed (13). In hospitals and higher-level facilities, microscopy is the preferred diagnostic method. However, although there are approximately 700 malaria microscopy centres nationwide, only around 60% are estimated to be fully functional (3). RDTs are being scaled up in lower-level facilities and at the community level through VHVs, and NMCP is now one of the biggest users of RDTs in the Myanmar. Private medical practitioners are also encouraged to use RDTs.

The national treatment policy, which was developed in 2002, was first updated in 2008 with further revisions in 2011, 2014 and 2015 (3). The policy is based on data on parasite resistance to antimalarial drugs, and updated in line with WHO malaria treatment guidelines that place RDTs and ACTs as the main pillars of diagnosis and treatment, respectively. Standby treatment is recommended among migrants in areas where diagnostic facilities are not available (13). While oAMT use has been banned, its ongoing presence in the market is a critical issue, with increasing availability undermining the gains achieved in recent years: although availability decreased from 67% in 2012 to 10% in 2014, this figure rose to 27% in 2015.

Public health services, including malaria treatment, are predominantly delivered to communities through the township health department (13). Each department manages a township hospital, a station hospital, approximately five rural health centres, and approximately five subrural health centres per station hospitals. VHVs complement health staff in the delivery of services for malaria prevention and control in high- and moderate-risk villages, hard-to-reach areas and in areas with a high concentration of migrant workers where access to health facilities is difficult.

Although diagnosis and treatment of malaria is free in the public sector, an estimated 60–70% of suspected malaria patients receive treatment from the private sector (3). Hospitals and clinics in the formal private sector, which is regulated by the Ministry of Health, are mainly located in urban areas. Informal private sector providers include unlicensed drugstores and pharmacies, retail shops and mobile drug vendors.

PSI supports a social franchise of licensed private general practitioners (GPs) located across the country (3). PSI is also implementing the artemisinin monotherapy replacement (AMTR) project that provides quality-assured ACTs to the private sector. Similarly, the Myanmar Medical Association (MMA) supports a network of private clinics, providing GPs with training, as well as quality-assured diagnostics and treatment. Growing support for malaria control activities is also provided by the corporate private sector, including a partnership between approximately 30 companies and the Myanmar Health and Development Consortium.
Procurement and supply chain management

NMCP is the Government body responsible for forecasting antimalarial medicines and other supplies based on epidemiological data and past consumption (13). Annual forecasting workshops are led by UNOPS, the Global Fund’s Principal Recipient, which receives input from NMCP, WHO and other Global Fund sub-recipients, including nongovernmental organizations. However, due to limitations in the availability of data, forecasts do not take into account the total number of reported malaria cases.

The national strategic plan states that only WHO-prequalified combination RDTs, and ACTs recommended as per the national treatment policy, should be procured (13). Additionally, pesticides recommended by the WHO Pesticide Evaluation Scheme (WHOPES) are selected.

UNOPS is responsible for procurement under the Global Fund, and is responsible for ACTs, RDTs and other malaria medicines for 291 malaria-endemic townships. Commodities are received by Global Fund subrecipients, including NMCP, for distribution in their respective supply chains to the central and regional warehouses, subdepos, hospitals and health centres (22). Health commodities may also be procured by the Vector-borne Disease Control Programme (VBDC), as well as by the Central Medical Store Depot (CMSD) (3). Other agencies involved in procurement and supply chain include PMI/USAID, Chemonics, John Snow Inc. (JSI), PSI, MSF and the Japan International Cooperation Agency (JICA), with a myriad of nongovernmental organizations involved in storage and distribution. The range of players participating in procurement and supply chain management has created a complicated landscape, with limited coordination.

Government- and donor-procured products are primarily cleared by the CMSD Customs Clearance Department (14). A formal customs management process is in place, although this process is lengthy and manual. Three levels of ministry approval (Ministry of Commerce, Ministry of Finance and Revenue, and the Ministry of Health) are required to obtain a letter of exemption, which can take a month. Clearance for shipping is reported to take seven to 10 days, and clearance for air takes two to three days.

The first point of warehousing can be in one of several locations including CMSD, Myanmar Pharmaceutical Factory (MPF), suppliers, vendor warehouses, the central cold room, VBDC central warehouse and nongovernmental organization central warehouses (14). The VBDC central warehouse in Yangon consists of two buildings – one for pesticides, and one for antimalarials, RDTs and other commodities. Warehouses and storerooms are generally overcrowded buildings with ageing infrastructure and intermittent power supply, although there are some exceptions including the Mandalay Central Medical Store Sub-Depot (CMSSD) and nongovernmental organization facilities, which are either new or refurbished.

In the public sector, health commodities are distributed through VBDC, within the Department of Public Health, and through CMSD, within Medical Care Services of the Department of Health (3). State and regional VBDC teams obtain RDTs, antimalarials and other commodities by either collecting the items themselves when traveling to Yangon for meetings, or by hiring transport. Township VBDC staff then visit the state and regional offices to collect commodities, and a similar process of retrieval is followed down to the lower levels of the health system. Transportation thus consists of a largely informal network of independent operators (14). There is no official fleet within the public supply chain, and the public passenger transportation system is a key transport mechanism.

A NMCP database using Microsoft Access is currently in place to capture data on diagnosis and treatment. Training on its use has been provided in over 100 townships, allowing staff to report locally. A LMIS is being developed, aimed at improving distribution processes and capacity at all levels (14). SOPs were jointly published by the Ministry of Health and UNOPS in 2015. However, while a portion of the facilities conducting procurement have some basic procedures in place to capture data to inform purchasing, limited access to computers and software constrains data capture and analysis. Stock recording remains largely paper based, with most facilities using stock ledgers and stock cards. Where computerized tools are present, Excel spreadsheets are often used for reporting but not for managing inventory. CHAI is currently developing an electronic LMIS based on the software mSupply. The system is being piloted.
in several states, with plans to scale this up by the end of 2017 to 69 sites, including all state-level VBDC warehouses and subdepots.

Postmarketing surveillance and testing are conducted by UNOPS for antimalarials procured under the Global Fund grant. The Department of Food and Drug Administration (FDA) is responsible for QA and QC of antimalarial products under the Regional Artemisinin-resistance Initiative (RAI) grant, although the number of samples currently being tested is low. In a move to improve the QA of drugs and prevent the sale of oAMT, RAI is funding support to strengthen FDA's capacity to conduct drug quality monitoring and regulation (15). Efforts are also being made to ensure that national pharmaceutical reference laboratories are able to conduct the necessary laboratory analyses for postmarketing surveillance of drug quality. Since 2013, USP has collaborated with the FDA to perform quality control of medicines including antimalarials (13). Some findings can be included from the malaria external programme review concluded in March 2016.

**Recommendations**

The following recommendations are made to strengthen malaria procurement and the supply chain in Myanmar. A caveat is made in this country given that this review mission had an overlap with the Global Fund grant negotiation mission, which resulted in a reduced amount of face time with key stakeholders. Limited observations were made based on meetings with NMCP, CHAI, USAID and WHO partners only.

- **Encourage greater coordination of stakeholders** as various partners currently undertake separate processes for procurement and the supply chain in malaria, with continued fragmentation. (See the “Partner and Donor Mapping” section of Myanmar Country Profile.) Improved communication is required to align all stakeholders and streamline processes.

- **Support current scale-up of the NMCP Access database on case management.** Local Access databases allow staff to report locally and synchronize to a central server where Internet access is reliable. However, the system is not yet integrated with logistic reporting and DHIS2 synchronization is being considered. There should be greater emphasis on ensuring that the various information systems are linked.

- **Increase awareness and mutual recognition of efforts made by partners (Chemonics, CHAI, JSI and UNOPS) in strengthening the overall supply chain system of the Ministry of Health is important for sustainability and efficiency.** There are clear opportunities for synergies to be realized:
  - The Ministry of Health national master databases for products, public health facilities and suppliers (developed by CHAI and Supply Chain Management System (SCMS)) is currently being used for the mSupply LMIS system, which supports the HIV, tuberculosis (TB) and malaria supply chains and Mandalay CMSSD warehouse. These databases could be also leveraged for the JSI/United Nations Population Fund- supported reproductive health supply chain, UNOPS-supported HIV, TB and malaria supply chains, Management Sciences for Health (MSH)/Three Millennium Development Goal Fund (3MDG) supported the Regional Supply Chain Strengthening (RSCS) Project in three states. This will allow standardized coding and naming of products and health facilities regardless of LMIS software or paper-based systems across different supply chains.
  - mSupply has the potential to support the Ministry of Health integrated national supply chain future state. There should be a concerted effort by partners to jointly put in place a costed transition plan to address issues related to financial sustainability, Ministry of Health staff capacity (central, regional and township levels), IT equipment and infrastructure investments, training and mSupply developers technical support costs. The future of the mSupply system should be a joint investment by donors and partners for the best interests of the Ministry of Health in a sustainable manner.
  - Coordination with next 2017–2020 Global Fund New Funding Model and other donor grants in the areas of procurement, and
supply chain management strengthening activities should also be a priority. Mainly, investments should focus on ensuring uninterrupted availability of HIV, TB and malaria commodities but at the same time, there should be consideration for prioritizing interventions that also benefit the entire Ministry of Health supply chain system, in line with the National Supply Chain Strategy recommendations and action plans.
Background

Thailand reported 14,755 malaria cases in 2015, the lowest number across the GMS. However, with 33 reported deaths, mortality was high relative to the number of cases (2). Some 5.4 million people, accounting for 8% of the total population, are at high risk (2), and malaria is now confined to international forest borders, particularly the Thailand–Myanmar border (23). Artemisinin resistance is also evident along border areas, and on the Thailand–Cambodia border *Plasmodium falciparum* has become resistant to almost all available antimalarial medicines (24).

Prevention, diagnosis and treatment

Bed nets are distributed during routine mass campaigns across Thailand, with the Bureau of Vector-Borne Disease (BVBD) targeting one LLIN per person in malaria-endemic villages. LLINs are distributed in specific locations where LLINs cannot be used, for instance among migrants in forest areas (3). IRS is used for vector control in endemic and receptive areas (25).

Malaria diagnosis is free-of-charge in the public sector, and diagnostic services are predominantly provided by BVBD’s network of malaria clinics (MCs) and malaria posts (MPs) in endemic areas (3). MCs are equipped with light microscopes and trained microscopists, while MPs, which are staffed by VMWs, utilize RDTs for diagnosis. Active case detection using microscopy and/or RDTs is carried out in high-risk villages and towns and in the artemisinin-resistance containment zones.

The malaria case management guidelines from 2015 call for the use of antimalarial first-line drugs to treat uncomplicated malaria and specify second-line drugs to be used in case of failure with first-line drugs (26). In 2015, dihydroartemisinin-piperaquine (DHA-PPQ) became the first-line treatment for *Plasmodium falciparum*, and its efficacy is currently being evaluated (27). The sale of oAMTs has been banned since 1995 (2).

Treatment for uncomplicated malaria can be provided at MCs, MPs and hospitals, as well as nongovernmental organization malaria units (26). In particular, MCs and MPs play a significant role in providing treatment in malaria-endemic areas and along international borders (3). Management of severe malaria, including the use of injectable artesunate, takes place at sufficiently equipped hospitals.

Most treatment is available in the public sector, although private hospitals offer care for malaria patients (3). Antimalarial drugs are not permitted to be sold in pharmacies or private clinics.

BVBD currently aims to better integrate the private sector by organizing a cooperative network of public and private sector organizations to coordinate national malaria control activities. Programmes such as the USAID Control and Prevention of Malaria Project (CAP Malaria) involve working with the Government to build partnerships between private providers and companies operating in malaria-endemic areas (28).

Procurement and supply chain management

BVBD, which falls under the Department of Disease Control within the Ministry of Public Health, uses a consumption-based forecasting method for malaria drugs, which incorporates a 20% buffer. The method takes into account the previous year’s consumption levels, number of malaria cases and a minimum usage amount for each province. The Global Fund Principal Recipient (Ministry of Public Health) is responsible for RDT forecasting, which is also based on the previous year’s consumption, with a 20% buffer.

Malaria commodities are selected based on whether they are recommended by the WHO and are FIND-prequalified (for RDTs). BVBD procures the newly selected first-line ACT (DHA-PPQ), and also procures RDTs under the Global Fund. For insecticide, BVBD receives requests from regional staff and, once approved, regional staff locally procure insecticide using the standard Government procurement policy. LLINs are procured with Government funding, as well as with Global Fund support. There are currently considerable delays in the procurement of malaria commodities, both through the Government and the Global Fund.
For foreign imports, companies manage customs clearance themselves based on the “hazardous substances trade” procedures. For LLINs procured through the Government budget, national rules are followed. For LLINs procured through donor funding, the Global Fund Principal Recipient office (Ministry of Public Health) will send an official letter to the Department of Customs. Once approved, a letter is sent to International Dispensary Association (IDA) (the procurement agent) to process the order. The Principal Recipient office is responsible for customs clearance and receipt of goods.

BVBD is responsible for storing commodities at its central warehouse. Regional offices of disease prevention and control (ODPCs) also have warehouses, but in some cases, the private rental of warehouses is necessary for temporary storage due to a lack of space at the regional level.

The National Malaria Control Programme (NMCP) within BVBD manages the delivery of commodities to facilities, particularly to MCs and MPs (3). Medicines are delivered to the vector-borne disease centres (VBDCs) twice a year, while distribution from the VBDCs to the vector-borne disease units (VBDUs) and from the VBDUs to the MCs occurs on a monthly basis at regularly scheduled meetings where medicines are collected. In some cases, suppliers deliver directly to provinces. When there are problems with stock availability, antimalarial drugs are exchanged between facilities and districts. Although the principle of “first expired, first out” is applied, nearly expired drugs and nearly expired RDTs have been found in border areas. Stockpiles of medicines and diagnostics for potential epidemics are also limited.

There is currently no system in place that reports regularly on commodities, although once a year data on stock status, consumption and need are consolidated to decide on procurement levels for the following year. An online disease surveillance system for malaria gathers data on case rates, vector control and RDTs, and this system is used to verify requests from regional ODPCs and provincial health offices (PHO) to BVBD for malaria commodities. Excel spreadsheet files are also used to track stock status of RDTs every quarter, which are emailed from the PHOs to BVBD and then reported to the Global Fund Principal Recipient office (Ministry of Public Health). These figures are cross-checked with cases reported via the online surveillance system.

The Bureau of Drug and Narcotic, under the Department of Medical Sciences, conducts QA and QC on behalf of BVBD. Once a year, random sampling of antimalarials is conducted in the field, although this is not formalized through guidelines.

**Recommendations**

The following recommendations are made to strengthen malaria procurement and supply chain in Thailand.

- Identify and rectify bottlenecks in procurement to address currently delays in procurement funded by both domestic government and donors. Efforts to address bottlenecks may be of particular importance during the transition of first-line treatment for *Plasmodium falciparum*, and the effective roll out the newly selected drug (DHA-PPQ). Barriers to ensuring the timely delivery of appropriate commodities at the correct locations will hinder efforts towards malaria elimination.

- Improve data collection and monitoring to ensure effective monitoring and planning. Data on procurement and supply chain are not currently covered under the national malaria online system. Additionally, the database on insecticide use is incomplete, with large data gaps relating to procurement that result in the inability to track what is procured and at what quantities, and their usage.

- Develop an operational plan to transition to the new first-line regimen of antimalarials for *Plasmodium falciparum*, including:
  - establish and disseminate clear timelines and updated road map for the switch from national to provincial hospitals;
  - identify and support registration of additional suppliers for DHA-PQ;
  - provide clarity of BVBD support of drugs beyond first year to hospitals;
- engage with hospitals on budget planning, procurement, training and clinician support of a new regimen change based on scientific evidence;

- provide guidance on usage of DHA-PQ and management of existing AS-MQ stock for mutual understanding and willingness/confidence of new BVBD guidance;

- consider putting in place system of resupply and reordering for DHA-PQ given only one supplier at this stage, as compared to existing system of drug sales representatives topping up AS-MQ stock at hospitals given multiple suppliers of AS-MQ;

- consider the need for the provincial level to have a buffer stock to respond to unexpected outbreaks as currently at least one week is required for emergency stock which is not ideal for outbreaks; and

- support advocacy and the provision of country-wide information on the switch to DHA-PQ as the first-line treatment for uncomplicated malaria

- Consider sustainable solutions to fund the future procurement of LLIN by Government. Using Government funds may be a challenge due to high cost in current market conditions. The Ministry of Public Health may consider the use of international procurement agents such as IDA or the Global Fund Pooled Procurement Mechanism to avoid the low-volume, high-price barrier that the Government will face if it runs its own tenders. Another possible solution is to leverage the Global Fund E-Marketplace and Ministry of Public Health E-Marketplace. This will be increasingly important given the need to maximize Government resources and health spending efficiency after Global Fund grant support ends.

- Ensure advanced planning to respond to upcoming regulatory changes and prevent shortages of WHO-prequalified RDTs. Currently, RDTs are the “lowest” risk category for general medical devices, resulting in importers only needing basic certifications of safety. However, based on the future implementation of the Association of Southeast Asian Nations Medical Device Directive, RDTs will be reclassified as class 2 or 3. In this case, a change in Thai FDA regulations would be necessary. The key implication of this likely change in regulations would mean that existing and future suppliers/manufacturers would need to submit samples for FDA evaluation.

- Invest in human resources for procurement and supply chain management as currently there is no pharmacist in BVBD. There is also a need to review level of training for provincial and district stock management so as to build decentralized capacity to manage supply chains.
Background

The number of reported malaria cases has consistently declined in Viet Nam over the past decade, with 19,252 cases reported in 2015 — the second lowest figure in the GMS after Thailand (2). Only three malaria deaths were reported in 2015. Malaria is highly focal and mainly occurs in remote forest areas, disproportionately affecting migrant settlers, mobile populations and ethnic minorities (29). Some 6.4 million people, or 7% of the population, are at high risk of malaria (2). Artemisinin resistance is an ongoing concern, particularly in southern Viet Nam (3).

Prevention, diagnosis and treatment

ITNs are distributed free-of-charge to all age groups in moderate- and high-endemic areas, and during suspected outbreaks (2). The National Malaria Control Programme (NMCP) treats existing bed nets each year with insecticide and in recent years has introduced LLINs, particularly in hard-to-reach areas (3). The programme also uses IRS to cover the population residing in high endemic areas where ITN use is low, primarily concentrated in border areas with Cambodia and the Lao People’s Democratic Republic. Case detection and investigation may be conducted for imported cases, indigenous cases in low-endemic areas and when cases increase in high-endemic areas.

Viet Nam favours microscopy over RDTs, with plans to diagnose 95% of malaria cases in endemic areas using slide microscopy by 2020 (29). Communal microscopy centres for early diagnosis will be established and sustained, particularly in areas with artemisinin resistance. RDTs are provided in select remote villages.

Current treatment guidelines call for antimalarial drugs to be provided free-of-charge at public facilities (30). Mass screening and treatment are applied in epidemic settings only. New treatment guidelines are expected in late 2016 to update dosing requirements of ACT regimens and include new treatment options for treatment failure. The Ministry of Health has banned the manufacture and use of oAMTs since 2013.

Malaria focal points are designated at district and commune levels (29). District teams run inter-communal microscopy points, and malaria centres are also available at the provincial level. Commune health stations employ specialized malaria staff and serve as microscopy points. Village health workers (VHWs) work across all primary health-care programmes following basic training and provide community-based care; for malaria patients, they may prepare blood films, make referrals for severe cases, treat with antimalarials, manage cases discharged from higher levels, and assist with spraying and net impregnation (31). Standby treatment is provided for those entering endemic areas where medical services are not easily accessible.

The public sector provides most institutional and specialty care in the country, although the private sector delivers over 60% of outpatient care, particularly for young children (32). In the area of malaria, the private sector is relatively insignificant. In 2014, the availability of oAMT had reduced to less than 1% of private pharmacies.

Despite limited public–private partnerships in malaria to date and poor integration of the private sector, Viet Nam has a number of successful partnerships in other areas such as family planning and TB that can potentially serve as a foundation for improved collaboration in malaria (32). PSI is currently using social franchising strategies in other priority public health areas, and has been in discussions with NMCP.

Procurement and supply chain management

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**Recommendations**

The following recommendations are made to strengthen malaria procurement and the supply chain in Viet Nam. A caveat has to be made for this review mission given insufficient time to travel to lower levels of the supply chain system and meetings were only held with NIMPE in Hanoi.

- Consider conducting an in-depth analysis of lead times given that current times are long. While delays are in part due to the strict and lengthy process for procurement based on Government regulations and procurement law, the full system for procurement and the supply chain should be reviewed to identify how lead times can be reduced most effectively. Challenges may be due to low volumes, which is further split by NIMPE and IMPE requirements. There is also an overall decreasing need given reduction in malaria cases.

- Explore the feasibility of a consolidated national order for antimalarials as it would be more efficient in theory, but in practice there are other factors such as financial accounting and administration that may hinder the consolidation of needs across NIMPE and the regional IMPEs. It may help to identify clear benefits such as reduced pricing and reduced lead times.
In order to continue to achieve progress towards malaria elimination, countries in the GMS will require high coverage with appropriate interventions for prevention, diagnostics and treatment. As a result, all countries are making significant efforts to expand vector-control interventions such as LLIN distribution, as well as efforts to improve the quality and availability of diagnosis and treatment, including a focus on community-based services and improved integration with the private sector.

Supply chains – which have become increasingly complex due to the expansion of malaria programmes and an increase in the range and volume of products and stakeholders – are a critical component of such efforts to address malaria in the GMS. While all countries have developed supply chains that aim to procure quality-assured commodities and distribute these throughout the health system to the patient level, there are ongoing challenges with workforce capacity, storage conditions, delivery, quality assurance, and the collection and use of timely data. Additionally, the decreasing number of malaria cases across the GMS calls for efforts to sustain funding, resources and engagement, particularly with the emergence of artemisinin resistance, which threatens to undermine recent achievements.

Supply chain management of malaria products must be effective in providing the right commodities to the right recipients in the right locations at the right times. All GMS countries can improve their supply chains through effective communication and collaboration among key stakeholders, greater clarity of roles and responsibilities, and formalization of procedures and processes, as well as increased availability of data to provide a seamless link between demand and supply.
COUNTRY PROFILES

CAMBODIA
LAO PEOPLE’S DEMOCRATIC REPUBLIC
MYANMAR
THAILAND
VIET NAM
### Malaria Distribution in Cambodia

The map shows the distribution of malaria in Cambodia. The boundaries and names shown on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not be full agreement.

### Financial Contributions (2015) (1)

<table>
<thead>
<tr>
<th>Source</th>
<th>Public</th>
<th>Private</th>
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<tr>
<td>Government</td>
<td>US$ 692,698</td>
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<tr>
<td>PMII/USAID</td>
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<td>Global Fund</td>
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<td>WHO</td>
<td>US$ 406,393</td>
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### Malaria Burden (2015) (1)

- **Population at high risk of malaria**: 7,497,899
- **Malaria deaths**: 10
- **Confirmed malaria cases**: 33,930

### Proportion of *P.* falciparum vs *P.* vivax cases

- **Pf**: 61%
- **Pv**: 39%

### Malaria Prevention, Diagnosis and Treatment

- **Prevention efforts (3)**: The national strategy calls for one long-lasting insecticidal net (LLIN) per person and one long-lasting insecticidal hammer net (LLHNN) per family provided to those living in villages at risk, as well as the retreatment of existing nets with long-lasting insecticide. Indoor residual spraying (IRS) is used in targeted low-endemic areas, and may also be deployed in response to outbreaks in high-endemic areas.

#### National Strategic Plan

- **National Treatment Guidelines (December 2014)**
- **First-line treatment of *P.* falciparum**: AS-MQ; DHA-PPQ-PQ
- **Treatment failure of *P.* falciparum**: QN+T
- **Treatment of severe malaria**: AM; AS; QN
- **Treatment of *P.* vivax**: DHA-PPQ+PQ

- **Types of RDT**: Pf + Pv specific (combo)

- **Proportion of first-line regimens by province**: A total of 2350 villages covered by VMWs who provide community-based malaria diagnosis and treatment. VMWs report to health centres which in turn report to one of 79 operational district (OD) health offices, which each manage a referral hospital that provides microscopy services.

- **Types of treatment facilities (4)**: There are 2350 villages covered by VMWs who provide community-based malaria diagnosis and treatment. VMWs report to health centres which in turn report to one of 79 operational district (OD) health offices, which each manage a referral hospital that provides microscopy services.

- **Community case management (5)**: VMWs distribute LLINs, use rapid diagnostic tests (RDTs) and provide malaria treatment, and refer severe malaria cases to health facilities. The current target is to place at least one VMW in every village including cross-border sites considered at risk for transmission or importation of multidrug resistance.

- **Public vs. private sector (3)**: While the public health sector provides free access to malaria diagnosis and treatment, a substantial share of health-care services is provided through the private sector, which includes registered health outlets, non-registered health outlets, and non-health outlets.

- **Public-private partnerships (3)**: Under the Public-Private Mix (PPM) programme, private providers are trained on early diagnosis and treatment according to national guidelines, provided with artemisinin-based combination therapies (ACTs) and RDTs, and incorporated into the national malaria surveillance system.

### Registered Medicines

- **Registered WHO prequalified or stringent regulatory authority (SRA) approved medicines**

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<thead>
<tr>
<th>Antimalarial</th>
<th>Dose</th>
<th>Brand name</th>
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<tbody>
<tr>
<td>Dihydroartemisin + Piperaquine - FDC</td>
<td>40mg + 320mg - 3 - Blister-3</td>
<td>SD Bioline® G6DP RDT</td>
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<td>Artesunate + Mefloquine FDC</td>
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</tbody>
</table>

### Market Share (2014) (2)

- **Relative market volume of antimalarials**
  - **Public**: 40%
  - **Private**: 60%
PROCUREMENT AND SUPPLY CHAIN MANAGEMENT

Products are selected by National Center for Parasitology, Entomology and Malaria Control’s (CNM) Technical Bureau and Pharmacy Unit in line with WHO and Cambodia treatment guidelines. Going forward, RDTs and antimalarials will be selected from among WHO-prequalified suppliers. LLINs and LLINs will be procured from suppliers approved by the Global Fund to Fight AIDS, Tuberculosis and Malaria.

The United Nations Office for Project Services (UNOPS) is the primary source for procurement and manages the entire procurement process for the Global Fund for antimalarials, RDTs, LLINs, and other goods and services. The procurement cycle is based on the length of Global Fund grants. CNM provides the needs for commodities at the beginning of each year.

The Department of Drugs and Food (DDF), the National Health Products Quality Control Center (NHQCC), and CNM are involved in quality assurance and control (QA/QC). UNOPS carries out QC testing of private procured pharmaceuticals in collaboration with DDF.

While various partners across Cambodia have developed quantifications of malaria commodity needs, the Ministry of Health prepared a two-year commodity forecast in 2015 with support from JSI/USAID, using reported malaria cases, as well as stock data from the public and private sectors. To strengthen procurement and supply management, CNM aims to develop annual forecasts of all malaria commodities and submit procurement plans to the procurement partner.

The logistics management database, which is maintained by DDF and the Ministry of Health-operated Central Medical Store (CMS), contains data on stocks of medical supplies. At the health centre level, staff use paper forms while at higher levels, data are entered into drug databases.

UNOPS and the particular manufacturer are in charge of the customs clearance. All products are then stored at CMS warehouse facilities in Phnom Penh.

Public sector procured commodities are received and stored at CMS. Commodities are then distributed and stored at provincial and district levels.

Commodities flow from CMS to the provincial health departments (PHDs) and OD health offices, then to health centres or referral hospitals and finally to VMWs. CMS is responsible for distributing essential medicines and commodities to ODs on a quarterly basis. Distribution is based on a “pull” system.

PUBLIC SECTOR MALARIA SUPPLY AND DISTRIBUTION SYSTEM

The Global Fund

The Global Fund programme is implemented by UNOPS, the United Nations Office for Project Services. UNOPS is the primary source for procurement and manages the entire procurement process for the Global Fund for antimalarials, RDTs, LLINs, and other goods and services.

UNOPS (Public procurement)

UNOPS is responsible for the procurement of all commodities for the Global Fund. UNOPS partners with CNM to prepare annual commodity forecasts and submit procurement plans to the Ministry of Health.

National Malaria Program (CNM)

CNM is responsible for selecting commodities and preparing the annual commodity forecast. CNM partners with UNOPS to submit procurement plans to the Ministry of Health.

Central Medical Stores (CMS)

CMS is responsible for storing and distributing commodities. CMS is charged with ensuring that commodities are available in sufficient quantities to meet the needs of health centres and health posts.

Ministry of Health

The Ministry of Health is responsible for overseeing the procurement and distribution of commodities. The Ministry of Health partners with UNOPS to ensure that commodities are procured and distributed in a timely and efficient manner.

Department of Drugs and Food (DDF)

DDF is responsible for maintaining the logistics management database, which contains data on stocks of medical supplies. DDF partners with UNOPS and CNM to ensure that commodities are distributed and stored in a timely and efficient manner.

Logistics management information system (7)

The logistics management database, which is maintained by DDF and the Ministry of Health-operated Central Medical Store (CMS), contains data on stocks of medical supplies. At the health centre level, staff use paper forms while at higher levels, data are entered into drug databases.

Customs clearance

UNOPS and the particular manufacturer are in charge of the customs clearance. All products are then stored at CMS warehouse facilities in Phnom Penh.

Central warehousing facilities (2)

Public sector procured commodities are received and stored at CMS. Commodities are then distributed and stored at provincial and district levels.

Distribution system (7)

Commodities flow from CMS to the provincial health departments (PHDs) and OD health offices, then to health centres or referral hospitals and finally to VMWs. CMS is responsible for distributing essential medicines and commodities to ODs on a quarterly basis. Distribution is based on a “pull” system.

REFERENCES

7. Chuor C. Benefits to national malaria programs from regional support: the Cambodia case. Cambodia: National Center for Parasitology, Entomology and Malaria Control; 2014

ABBREVIATIONS

AM= artemether
AS-MQ = artesunate – mefloquine
DHA-PPQ = dihydroartemisinin-piperaquine
PO=primaquine; P+ = plasmodium falciparum;
P+ = plasmodium vivax
QN+T= quinine + tetracycline
MALARIA SUPPLY CHAIN SYSTEMS

MALARIA DISTRIBUTION IN LAO PEOPLE’S DEMOCRATIC REPUBLIC

The boundaries and names shown on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.


MALARIA BURDEN (2015) (1)

- Population at high risk of malaria: 2,125,078
- Malaria deaths: 4
- Confirmed malaria cases: 36,056
- Proportion of P. falciparum vs vivax cases: 42% vs 58%

FINANCIAL CONTRIBUTIONS (2015) (1)

- Government: US$ 211,874
- Global Fund: US$ 6,458,501
- PMII/USAID: US$ 198,357
- WHO: US$ 198,357

Market share (2015) (2)

- Public: 65%
- Private: 35%

PREVENTION, DIAGNOSIS AND TREATMENT

- Prevention efforts (3): Vector control is mainly based on insecticide-treated bed nets (ITNs), although long-lasting insecticidal nets (LLINs) have been introduced and will gradually replace all ITNs. Indoor residual spraying (IRS) is mostly limited to outbreak response and focal control.

- RDT policy (4): Rapid diagnostic tests (RDTs) are available at village and health centre levels, as well as at district and provincial hospitals, although emphasis is placed on microscopic diagnosis at hospital facilities.

- Treatment guidelines (5): National malaria treatment guidelines were significantly modified in 2005 after reports of increasing drug resistance, resulting in current guidelines specifying the use of artemisinin-based combination therapies (ACTs). There has been a ban on the sale of oral artemisinin-based monotherapies (oAMTs) since 2005.

- Types of treatment facilities (4): Malaria activities are centralized at Center for Malaria, Parasitology and Entomology (CMEP), which oversees 17 Provincial Anti-Malaria Stations (PAMS). Under the PAMS, there are 140 district and provincial hospitals, and approximately 850 health centres that cover nearly 2000 malaria-endemic villages.

- Community care management (6): A national village-based early diagnosis and treatment (EDAT) strategy promotes the diagnosis and treatment at village and health-centre levels. Village malaria workers (VMWs) provide care for patients within the community and use RDTs, prescribe ACTs and refer patients to health facilities if necessary.

- Public vs private sector (4): The public health system is predominant, although an alternative private sector is growing. There are around 1800 private pharmacies and 254 private clinics, mainly located in urban areas.

- Public-private partnerships (4): A public–private mix strategy was piloted in 2008, targeting eight districts and providing commodities to private pharmacies and clinics. This approach has now been expanded to 22 districts in eight provinces.

NATIONAL DOCUMENTS

- National treatment guidelines: Malaria Treatment Guidelines for Provincial and District Hospitals (October 2011)

REGISTERED MEDICINES

Registered WHO prequalified or stringent regulatory authority (SRA) approved medicines:

There is only one antimalarial (AML) manufactured and registered in the Lao People’s Democratic Republic (chloroquine phosphate 250mg). Other AMLs procured by NIS are not registered but imported through waivers.

Registered brands and availability:

<table>
<thead>
<tr>
<th>Brand names</th>
<th>Year of ban (1)</th>
<th>Availability in market (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005</td>
<td>No</td>
</tr>
</tbody>
</table>

RDTs

- ORAL ARTEMISININ-BASED MONOTHERAPIES

<table>
<thead>
<tr>
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<th>Year of ban (1)</th>
<th>Availability in market (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005</td>
<td>No</td>
</tr>
</tbody>
</table>

Source: Lao People’s Democratic Republic country profile, World Malaria Report 2015

LAO PEOPLE’S DEMOCRATIC REPUBLIC

<table>
<thead>
<tr>
<th>Population</th>
<th>GDP per capita</th>
<th>Total health expenditure per capita</th>
<th>Government expenditure on health per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>6,802,023</td>
<td>US$ 1,818</td>
<td>US$ 33</td>
<td>US$ 16</td>
</tr>
</tbody>
</table>

Source: World Bank Databank (January 2017) and Global Health Expenditure Database (January 2017)
CMPE conducts product selection in line with its national treatment guidelines. Generally, the Procurement Unit within the Project Management Unit – established by the Ministry of Health to act as the implementing body for programmes supported by the Global Fund to Fight AIDS, Tuberculosis and Malaria – procures commodities.

There is no formalized system for postshipment quality assurance, and there is no quality control laboratory that is WHO prequalified. Before issuing products, staff at CMPE conduct a visual inspection and if damaged or expired products are found, these are sent to the Food and Drug Department (FDD).

CMPE is responsible for carrying out quantification, demand forecasting and supply planning of commodities. National procurement projections are based on historical needs and some consumption estimates, which do not take into account the effect of stock-outs.

CMPE receives paper-based monthly summary reports from PAMS, as well as stock on hand data every other week via an electronic web form. The Medical Products Supply Center (MPSC) is piloting the software mSupply in select warehouses.

FDD and the particular manufacturer are in charge of the customs clearance. All products are then stored at CMS warehouse facilities in Vientiane.

PAMs and the Provincial Food and Drug Division supply districts and health centres with malaria commodities, which in turn, provide supplies to VMWs. Arrangements for the transport of commodities within the supply chain have not been formalized, resulting in an ad hoc arrangement using public transportation networks.

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**REFERENCES**

7. Logistics management information system (LMIS) for malaria commodities: standard operating procedures. Lao People’s Democratic Republic: Center for Malariology, Parasitology and Entomology; 2016.

**ABBREVIATIONS**

AL = artemether-lumefantrine  
AS = artesunate  
DHA-PPQ = dihydroartemisinin-piperaquine  
PO = primaquine  
Pf = plasmodium falciparum  
Pv = plasmodium vivax  
QN+D = quinine + doxycycline
MALARIA SUPPLY CHAIN SYSTEMS

NATIONAL DOCUMENTS

National Strategic Plan for Malaria Control in Myanmar, 2016–2020 (2016)
Guidelines for Malaria Diagnosis and Treatment in Myanmar (2015)
First-line treatment of P.falciparum AL; AM; S+MQ; DHA-PPQ + PQ
Treatment failure of P.falciparum AS-MQ; DHA-PPQ + PQ (within 28 days) or AL+PQ (after 28 days)
Treatment of severe malaria AM; AS; QN
Treatment of P.vivax CQ+PQ(14D)
Types of RDT Pf, + all species (Combo)

REGISTERED MEDICINES

Registered WHO prequalified or stringent regulatory authority (SRA) approved medicines
No available information

RDTs ORAL ARTEMISININ-BASED MONOTHERAPIES

Brand name
No available information
Year of ban (1)
2012
Availability in market
Yes

PREVENTION, DIAGNOSIS AND TREATMENT

Prevention efforts
Rapid scale-up of long-lasting insecticidal nets (LLINs) is planned in malaria-risk areas, with a target of 100% coverage for the population living in artemisinin-resistance containment areas. Indoor residual spraying (IRS) is focused on outbreak areas, as well as development projects in endemic areas and new settlements, and artemisinin-resistance affected areas.

RDT policy
The national policy calls for confirmatory testing with either microscopy or rapid diagnostic test (RDT) before treatment is prescribed. In hospitals and higher-level facilities, microscopy is the preferred diagnostic method. RDTs are being scaled up in lower-level facilities and at the community level through village health volunteers (VHVs).

Treatment guidelines
The national treatment policy is based on data on parasite resistance to antimalarial drugs, and updated in line with international standards that place RDTs and artemisinin-based combination therapies (ACTs) as the main pillars of diagnosis and treatment. Oral artemisinin-based monotherapy (oAMT) use has been banned, although oversight of the private sector is limited.

Types of treatment facilities
Public health services, including malaria treatment, are predominantly delivered to communities through the township health department. Each department manages a township hospital, a station hospital, approximately five rural health centres, and approximately five subrural health centres per station hospital and rural health centre.

Community case management
VHVs complement health staff in the delivery of services for malaria prevention and control in high- and moderate-risk villages and in areas with a high concentration of migrant workers where access to health facilities is difficult.

Public vs private sector
Although diagnosis and treatment of malaria is free in the public sector, approximately 60–70% of suspected malaria patients receive treatment from the private sector. Hospitals and clinics in the formal private sector, which is regulated by the Ministry of Health, are mainly located in urban areas.

Public-private partnerships
Population Services International (PSI) supports a social franchise of licensed private general practitioners (GPs) and is also implementing the Artemisinin Monotherapy Replacement (AMTR) Project which provides quality-assured ACTs to the private sector. The Myanmar Medical Association (MMA) also supports a network of private clinics.

FINANCIAL CONTRIBUTIONS (2015) (1)

Government
US$ 5 527 824
PMII/USAID
US$ 6 500 000

Global Fund
US$ 31 629 898
WHO
US$ 25 000

MARKET SHARE (2012) (2)

Relative market volume of antimalarials
Public
35%
Private
65%

MALARIA BURDEN (2015) (1)

Population at high risk of malaria
8 448 712
Malaria deaths
92
Confirmed malaria cases
152 195
Proportion of falciparum vs vivax cases
Pf: 72%
Pv: 28%

MALARIA DISTRIBUTION IN MYANMAR

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PROCUREMENT AND SUPPLY CHAIN MANAGEMENT

REFERENCES

S/R, Health Facilities/VMWs, Private Facilities

Projects and Services; USAID = United States Agency for International Development

Programme; PMI = US President’s Malaria Initiative; PSI = Population Services International; UNOPS = United Nations Office for

Store Depot; DANIDA = Danish International Development Agency; DFID = Department for International Development; JICA = Japan

International Cooperation Agency; MOH = Ministry of Health; MSF = Médecins Sans Frontières; NMCP = National Malaria Control

Programme; PM = US President’s Malaria Initiative; PSI = Population Services International; UNOPS = United Nations Office for

Projects and Services; USAID = United States Agency for International Development

REFERENCES


2. Outlet survey baseline study - The Republic of the Union of Myanmar 2012 survey report. PSI/Myanmar; 2012.


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P.f. = plasmodium falciparum
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QN= quinine

PUBLIC SECTOR MALARIA SUPPLY AND DISTRIBUTION SYSTEM

Current major supply chains in the Myanmar health system (8)

Programme:

TB  Malaria  HIV  General Medicine  RH-Nutrition/CH  EPI  Leprosy

Store/ Warehouse:

Central NTBP store  VBCD  HIV Central Warehouse  CMSD  EPI Central Cold Store  Leprosy Center

State/ Region/ Division:

State/Division/Regional Store  CMSD Transit Camp  Sub-Depot

Township/ Hospital/ District:

Sub-Centre  RHIC, Urban Clinic, Station Hospital  Sub-Centre

RHIC/ Station Hospital:

DOTS Provider

Subcentre

CMSD = Central Medical Stores Depot; DOTS = TB Directly Observed Treatment, Short Course; NTBP = National TB program store; VBCD = Vector-Borne Disease Control Programme

PARTNER AND DONOR MAPPING

Funding source

Gates Fdn  DFID  USAID  DELIVER PROJECT  JICA  Global Fund  DANIDA  MOH

Procurement

PSI  3MDG  PMI/USAID  JICA  UNOPS  SAVE-PR  SAVE  S/R  MSF

Implementing agency

PSI  NGOs  CAP- Malaria  NMCP/UNOPS/NGOs  SAVE-PR  EPI/THAI/VR/UPC  NMCP  MSF

Storage and distribution

Private Providers  Health Facilities/VMWs  Private Facilities

Patients/End-users/Beneficiaries


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State/ Region/ Division:

State/Division/Regional Store  CMSD Transit Camp  Sub-Depot

Township/ Hospital/ District:

Sub-Centre  RHIC, Urban Clinic, Station Hospital  Sub-Centre

RHIC/ Station Hospital:

DOTS Provider

Subcentre

CMSD = Central Medical Stores Depot; DOTS = TB Directly Observed Treatment, Short Course; NTBP = National TB program store; VBCD = Vector-Borne Disease Control Programme

PARTNER AND DONOR MAPPING

Funding source

Gates Fdn  DFID  USAID  DELIVER PROJECT  JICA  Global Fund  DANIDA  MOH

Procurement

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Implementing agency

PSI  NGOs  CAP- Malaria  NMCP/UNOPS/NGOs  SAVE-PR  EPI/THAI/VR/UPC  NMCP  MSF

Storage and distribution

Private Providers  Health Facilities/VMWs  Private Facilities

Patients/End-users/Beneficiaries


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**MALARIA SUPPLY CHAIN SYSTEMS**

### NATIONAL DOCUMENTS

- **National strategic plan**
  - National Strategic Plan for Malaria Control in Myanmar, 2016–2020 (2016)
- **National treatment guidelines**
  - National Malaria Treatment Guidelines (April 2015)
  - First-line treatment of *P. falciparum*: DHA+PPQ
  - Treatment failure of *P. falciparum*: QN+D
  - Treatment of severe malaria: QN+D
  - Treatment of *P. vivax*: CQ+PPQ(14D)
  - Types of RDTs: *Pf. + all species* (Combo)

### REGISTERED MEDICINES

- Registered WHO prequalified or stringent regulatory authority (SRA) approved medicines
- No available information

### RDTs

- **ORAL ARTEMISININ-BASED MONOTHERAPIES**
  - **Brand names**: No available information
  - **Year of ban (1)**: 1995
  - **Availability in market**: No

### FINANCIAL CONTRIBUTIONS (2015) (1)

- **Government**
  - US$ 7 934 078
- **Global Fund**
  - US$ 13 830 845
- **PMII/USAID**
  - US$ 685 341
- **WHO**
  - None

### MARKET SHARE

- **Relative market volume of antimalarials**
  - **Public**: Majority
  - Antimalarial drugs are not permitted to be sold in pharmacies or private clinics.
  - **Private**: Minimal

### MARKET SHARE (2015) (1)

- **Population at high risk of malaria**: 5 436 749
- **Malaria deaths**: 33
- **Confirmed malaria cases**: 14 755
- **Proportion of *falciparum* vs vivax cases**
  - *Plasmodium falciparum*: 81%
  - *Plasmodium vivax*: 19%

### MALARIA DISTRIBUTION IN THAILAND

[Map showing distribution]

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### MALARIA BURDEN (2015) (1)

- **Proportion of *falciparum* vs vivax cases**
  - *Plasmodium falciparum*: 81%
  - *Plasmodium vivax*: 19%

### PREVENTION, DIAGNOSIS AND TREATMENT

- **Prevention efforts (2)**
  - Bed nets are distributed during routine mass campaigns with a target of one long-lasting insecticidal net (LLIN) per person in malaria-endemic villages. Long-lasting insecticidal hammock nets (LLIHNs) are distributed in specific locations where LLINs cannot be used, for instance among migrants in forest areas. Indoor residual spraying (IRS) is used for vector control in endemic and receptive areas.

- **RDT policy (2)**
  - Malaria diagnosis is free-of-charge in the public sector, and diagnostic services are predominantly provided by a network of malaria clinics (MCs) and malaria posts (MPs) in endemic areas. MCs are equipped with light microscopes and trained microscopists, while MPs, which are staffed by village malaria workers (VMWs), utilize RDTs.

- **Treatment guidelines (4)**
  - Malaria treatment guidelines were updated in 2015 with a change in first-line treatment of *Plasmodium falciparum* to dihydroartemisinin-piperidine (DHA-PPQ). The sale of oral artemisinin-based monotherapies (oAMTs) has been banned since 1995.

- **Types of treatment facilities (3)**
  - Treatment for uncomplicated malaria can be provided at MCs, MPs and hospitals, as well as nongovernmental organization malaria units. Current national efforts aim to integrate malaria services into local primary health services. Management of severe malaria should take place at sufficiently equipped hospitals.

- **Community case management (4)**
  - Community-based MCs and MPs have been introduced to serve malaria endemic areas and populations along international borders and remote areas, and have effectively increased access to malaria early diagnosis and treatment.

- **Public vs private sector (2)**
  - Most treatment is available in the public sector, although private hospitals offer care for malaria patients. Antimalarial drugs are not permitted to be sold in pharmacies or private clinics.

- **Public-private partnerships (4, 5)**
  - Government efforts aim to better integrate the private sector by organizing a cooperative network of public and private sector organizations to coordinate national malaria control activities. Partnerships are also being established with private providers and companies operating in malaria endemic areas.
PROCUREMENT AND SUPPLY CHAIN MANAGEMENT

PUBLIC SECTOR MALARIA SUPPLY AND DISTRIBUTION SYSTEM

Responsible agency BVBD
Malaria commodities are selected based on whether they are recommended by the WHO and FIND-prequalified (for RDTs).

Product selection

Responsible agency BVBD
The Bureau of Vector-Borne Disease (BVBD) procures the newly selected first-line artemisinin-based combination therapy (ACT) and also procures RDTs under the Global Fund. Regional staff locally procure insecticide using standard government procurement policy, with approval from BVBD. LLINs are procured through GFATM. Procurement occurs on an annual basis.

Procurement

Responsible agency BVBD/BDN
Quality assurance and control (QA/QC) is led by BVBD. Once a year, random sampling of antimalarials is conducted in the field, although this is not formalized through guidelines. The Bureau of Drug and Narcotics (BDN), under the Department of Medical Sciences, conducts testing on behalf of BVBD.

Quality assurance and control

Responsible agency BVBD
BVBD conducts forecasting annually, and uses a consumption-based method for malaria drugs, which incorporates a 20% buffer. The Global Fund Principal Recipient, the Ministry of Public Health, is responsible for RDT forecasting, which is also based on the previous year’s consumption, with a 20% buffer.

Forecasting and quantification

Responsible agency MOPH
Companies manage customs clearance themselves based on the “hazardous substances trade” procedures.

Customs clearance

Responsible agency BVBD
BVBD is responsible for storing commodities at its central warehouse. Regional offices also have warehouses, but in some cases, private rental of warehouses may be necessary for temporary storage if there is a lack of space at the regional level.

Central warehousing facilities

Responsible agency NMCP
The National Malaria Control Program (NMCP) within BVBD manages the delivery of commodities. Medicines are delivered to the Vector-Borne Disease Centers (VBDCs) twice a year, and distribution to the Vector-Borne Disease Units (VBDUs) and to MCs occurs monthly at scheduled meetings where medicines are collected.

Distribution system (2)

Responsible agency BVBD
Forecasting annually, and uses a consumption-based method for malaria drugs, which incorporates a 20% buffer. The Global Fund Principal Recipient, the Ministry of Public Health, is responsible for RDT forecasting, which is also based on the previous year’s consumption, with a 20% buffer.

Flow of information

Components manage customs clearance themselves based on the “hazardous substances trade” procedures.

Central warehousing facilities

Distribution system (2)

Responsible agency NMCP
The National Malaria Control Program (NMCP) within BVBD manages the delivery of commodities. Medicines are delivered to the Vector-Borne Disease Centers (VBDCs) twice a year, and distribution to the Vector-Borne Disease Units (VBDUs) and to MCs occurs monthly at scheduled meetings where medicines are collected.

Flow of information

Flow of commodities

BVBD = Bureau of Vector-Borne Disease; NMCP = National Malaria Control Program (within BVBD); ODPC = Offices of Disease Prevention and Control (regional level); PHO = Provincial Health Office; MC = malaria clinic; MP = malaria post; VBDC = Vector-Borne Disease Center (provincial level); VBDU = Vector-Borne Disease Unit (district level)

REFERENCES


ABBREVIATIONS

CQ = chloroquine
DHA-PPQ = dihydroartemisinin-piperaquine
PQ = primaquine
P.f. = plasmodium falciparum
P.v. = plasmodium vivax
QN+D = quinine + doxycycline

GFATM = Global Fund to Fight AIDS, Tuberculosis and Malaria; MOH = Ministry of Health
MALARIA SUPPLY CHAIN SYSTEMS

VIET NAM

<table>
<thead>
<tr>
<th>Population</th>
<th>GDP per capita</th>
<th>Total health expenditure</th>
<th>Government expenditure on health per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>92,477,601</td>
<td>US$ 2,111</td>
<td>US$ 142</td>
<td>US$ 77</td>
</tr>
</tbody>
</table>

Source: World Bank Databank (January 2017) and Global Health Expenditure Database (January 2017)

MALARIA DISTRIBUTION IN VIET NAM

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not be full agreement.

FINANCIAL CONTRIBUTIONS (2015) (1)

Government PMII/USAID Global Fund WHD
US$ 2,666,667 None US$ 5,528,000 US$ 560,000

MARKET SHARE

Relative market volume of antimalarials

Public Private
No data available

NATIONAL DOCUMENTS

- National strategic plan
- National treatment guidelines

REGISTERED MEDICINES

Registered WHO prequalified or stringent regulatory authority (SRA) approved medicines

No available information

RDTs ORAL ARTEMISININ-BASED MONOTHERAPIES

Brand names
SD Bioline Malaria Ag Pf/Pv

Year of ban (1)
2013

Availability in market
No

MALARIA BURDEN (2015) (1)

Population at high risk of malaria
6,352,108

Malaria deaths
3

Confirmed malaria cases
19,252

Proportion of falciparum vs vivax cases
Pf 49% 51% Pv

PREVENTION, DIAGNOSIS AND TREATMENT

Prevention efforts (1, 2)
Insecticide treated bed nets (ITNs) are distributed free-of-charge to all age groups in moderate and high-endemic areas, and during suspected outbreaks; long-lasting insecticidal nets (LLINs) are also increasingly used, particularly in hard-to-reach areas. Indoor residual spraying (IRS) is targeted at the population residing in hyper-endemic areas where ITN use is low, particularly border areas.

RDT policy (3)
Viet Nam favours microscopy over rapid diagnostic tests (RDTs), with plans to diagnose 95% of malaria cases in endemic areas using slide microscopy by 2020. Communal microscopy centres for early diagnosis will be established and sustained, particularly in areas with artemisinin resistance. RDTs are provided in select remote villages.

Treatment guidelines (4)
New treatment guidelines are expected in late 2016 to update dosing requirements and include new options for treatment failure. A ban on oral artemisinin-based monotherapy (oAMT) has been enforced since 2013.

Types of treatment facilities (4)
Malaria focal points are designated at district and commune levels. District teams run intercommunal microscopy points, and malaria centres are also available at the provincial level. Commune health stations employ specialized malaria staff and serve as microscopy points.

Community case management (5)
Village health workers (VHWs) work across all primary health-care programmes and provide community-based care; for malaria patients, they may prepare blood films, make referrals for severe cases, treat with antimalarials, manage cases discharged from facilities, and assist with spraying and net impregnation.

Public vs private sector (6)
The public sector provides most institutional and specialty care in the country, and in the area of malaria the public sector is relatively insignificant.

Public-private partnerships (6)
Despite limited public–private partnerships in malaria to date and poor integration of the private sector, Viet Nam has a number of successful partnerships in other areas such as family planning and TB that can potentially serve as a foundation for improved collaboration in malaria.

Source: Viet Nam country profile, World Malaria Report 2016

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The National Malaria Control Programme (NMCP) oversees product selection, and its policy development body is comprised of multiple stakeholders. Products are listed in the national treatment guidelines. NMCP is responsible for the tender annually. Current lead times are long, taking approximately six months from submission of forecast to receiving goods in Vietnam at the National Institute of Malariology, Parasitology and Entomology’s (NIMPE) warehouses. NIMPE is responsible for random sampling of drugs, and there are 17 mini-laboratories for quality assurance (QA) testing. Suspected samples are sent to the National Institute for Drug Quality Control. NIMPE leads annual forecasting, with support from NMCP for technical inputs, and requests from provinces. Consumption data, epidemiological factors, and requests from provinces are used to develop forecasts that are consolidated nationally by NMCP. NIMPE is responsible for receipt and storage of procured goods. Two warehouses are available in central NIMPE for drugs, equipment and insecticides. Each regional Institute of Malariology, Parasitology and Entomology (IMPE) also has its own warehouse. Antimalarials are procured locally and shipped to NIMPE’s warehouses. The Global Fund Project Management Unit conducts custom clearance for internationally procured RDTs. NIMPE is responsible for the tender annually. Current lead times are long, taking approximately six months from submission of forecast to receiving goods in Vietnam at the National Institute of Malariology, Parasitology and Entomology’s (NIMPE) warehouses. NIMPE is responsible for random sampling of drugs, and there are 17 mini-laboratories for quality assurance (QA) testing. Suspected samples are sent to the National Institute for Drug Quality Control. NIMPE leads annual forecasting, with support from NMCP for technical inputs, and requests from provinces. Consumption data, epidemiological factors, and requests from provinces are used to develop forecasts that are consolidated nationally by NMCP. NIMPE is responsible for receipt and storage of procured goods. Two warehouses are available in central NIMPE for drugs, equipment and insecticides. Each regional Institute of Malariology, Parasitology and Entomology (IMPE) also has its own warehouse. Antimalarials are procured locally and shipped to NIMPE’s warehouses. The Global Fund Project Management Unit conducts custom clearance for internationally procured RDTs. 

The system of distribution is a needs-based “pull” system. Once a year, provincial staff visit their respective NIMPE/IMPE and collect their commodities for the year. District-level distribution takes place at meetings and involves the hand carry of commodities.

REFERENCES

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NMCP = National Malaria Control Programme
NIMPE = National Institute of Malariology, Parasitology and Entomology
IMPE = regional Institute of Malariology, Parasitology and Entomology
VHWs = Village Health Workers

FLOW OF INFORMATION
- NIMPE
- IMPEs
- Provinces
- Districts
- Communes
- Flow of information
- Flow of commodities

FLOW OF COMMODITIES
- NIMPE
- IMPEs
- Provinces
- Districts
- Communes
- Flow of information
- Flow of commodities

Partner and donor mapping
- Funding source
  - GOVT.
  - GFATM
- Procurement
  - MOH/NMPC
- Implementing agency
  - NIMPE
- Storage and distribution
  - NIMPE

GFATM = Global Fund to Fight AIDS, Tuberculosis and Malaria
MOH = Ministry of Health
NMCP = National Malaria Control Programme
NIMPE = National Institute of Malariology, Parasitology and Entomology
IMPE = regional Institute of Malariology, Parasitology and Entomology
VHWs = Village Health Workers
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