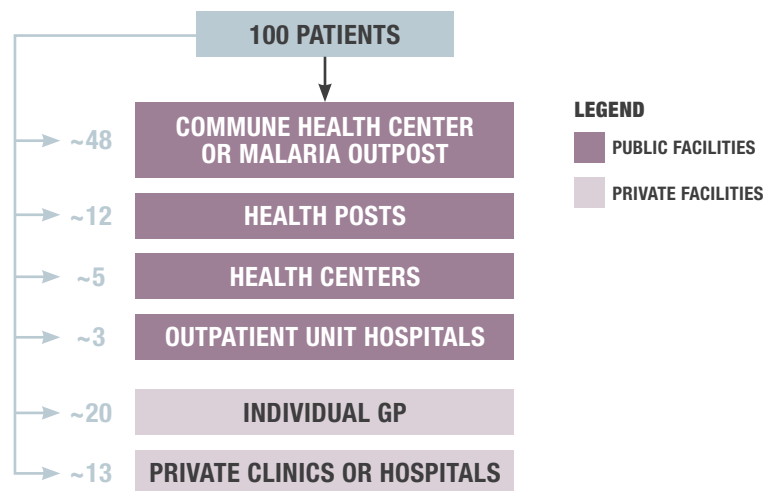


FEVER DIAGNOSTIC PRACTICES

PATIENT FLOW

PATIENT FLOW FOR INITIAL FEBRILE ILLNESS DIAGNOSTICS*



COMMENTS

Currently, Commune Health Centers remain the largest purvey of initial febrile illness diagnosis, but patient flows towards both private and district providers are expected to grow in coming years

- Private healthcare is growing as it is perceived to offer higher quality service, in particular for patients seeking care for non-emergency conditions
- Individual GPs are also increasingly consulted as family practices are encouraged by MoH and patients value the trusted relationship they have with their physician
- Since 2017, SHI regulations encouraging patients to seek initial diagnosis at commune level are being relaxed, so patients will no longer have a higher financial cost to seek initial diagnosis at District Hospitals

Due to the hybrid nature and deep public-private linkages in the healthcare system, a significant share of patients seeking diagnosis in the private sector may subsequently be referred to public facilities for testing

- Practitioners in public facilities are authorized to also have an independent practice as a private practitioner, while referring patients to their public facility for testing
- Private clinics with limited testing facilities have cooperation agreements with public facilities to refer patients for testing

Testing at commune level is usually done through microscopy, although 30 districts receive support from the Global Fund who provides RDTs where microscopy is not available.

Most patients with febrile symptoms go to community health centers

The share of patients visiting private providers and district hospitals is expected to increase in the coming years

Note: (*) Excluding self-diagnosis and traditional or alternative care providers. Sources: MoH, interviews, Advention



FEVER AND MALARIA DIAGNOSTIC ALGORITHM AND PRACTICES

DIAGNOSTIC GUIDELINES TREATMENT GUIDELINES

All suspected cases of malaria should be tested

Microscopy is preferred over RDTs:

- First-line malaria diagnosis at hospitals and health centers is microscopy
- First-line malaria diagnosis at health posts is microscopy + RDTs if microscopy is available otherwise RDTs only

Type of RDT used: Pf + Pv

First-line treatment of unconfirmed malaria: Dihydroartemisinin-piperazine (DHA-PPQ)

First-line treatment of Pf: DHA-PPQ

First-line treatment of Pv: Chloroquine + Primaquine (CQ+PQ)

Second-line treatment of Pf and Pv: Quinine +Clindamicina; Quinine+Doxycycline (QN+CL; QN+D)

Treatment of severe malaria: Artesunate+Quinine (AS+QN)

ADHERENCE TO GUIDELINES

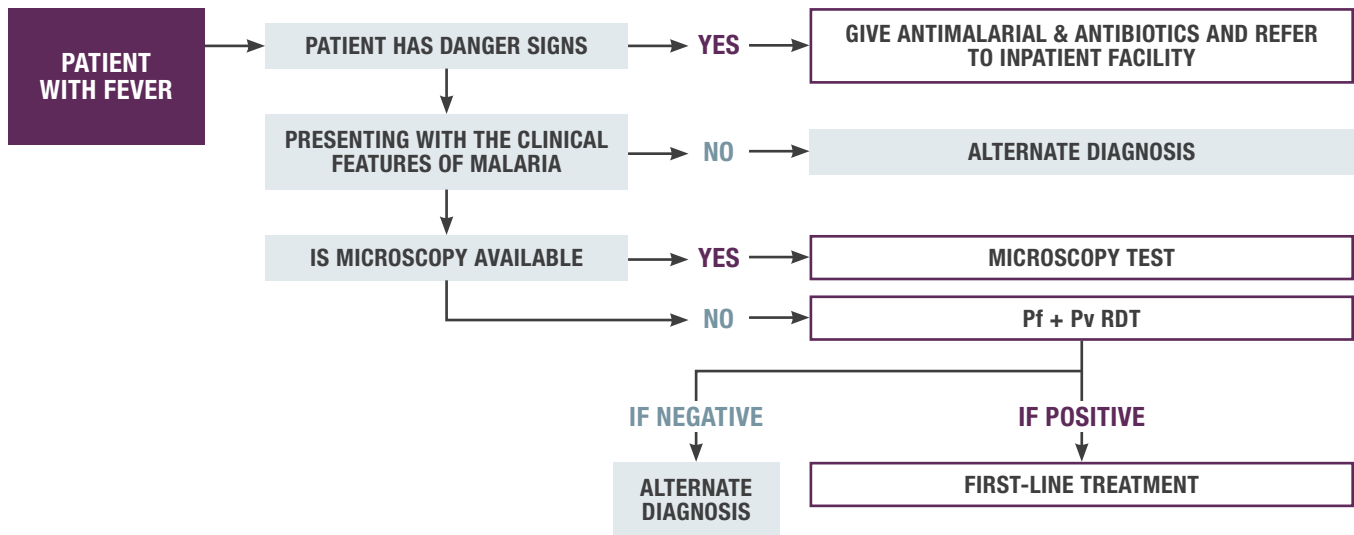
Treatment is overall compliant with international guidelines

Though, when available, both RDTs and microscopy are used to test all suspected patients; resulting in double testing, which is discouraged by the WHO

- LEGEND**
- ✓ FULLY ALIGNED
 - GENERALLY ALIGNED
 - ✗ RARELY OR NOT ALIGNED

FEBRILE ILLNESS DIAGNOSTIC ALGORITHM

Guideline algorithm for all health providers (public and private) for all patients



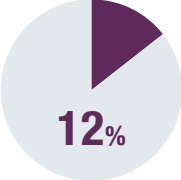
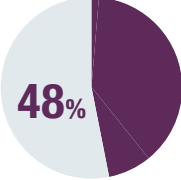
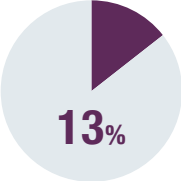



Viet Nam is not fully compliant with international guidelines as there is double-testing by microscopy when RDTs are used for initial diagnosis

Sources: WHO, interviews, Advention



MALARIA TESTING PRACTICES AT DIFFERENT HEALTH FACILITY LEVELS

HEALTH FACILITY*	NUMBER OF FACILITIES	SHARE OF FEVER PATIENTS (EST.)	PREFERRED MALARIA DIAGNOSTIC TOOL	LEVEL OF RDT USE (MALARIA DIAGNOSTIC)	
PUBLIC	Central Hospital	48	 3%	Microscopy	None / Limited
	Provincial Hospital	458	 5%	Microscopy	None / Limited
	District Hospital	1,173	 12%	Microscopy	None / Limited, mainly in Global Fund supported districts
	Commune Health Center	11,102	 48%	Microscopy or RDT depending on availability	Moderate, mainly in Global Fund supported districts
PRIVATE	Private Hospital or Clinic	~35K	 13%	Microscopy	None / Limited, mainly in Global Fund supported districts
	Individual GP	n.a.	 20%	Microscopy	None / Limited, mainly in Global Fund supported districts

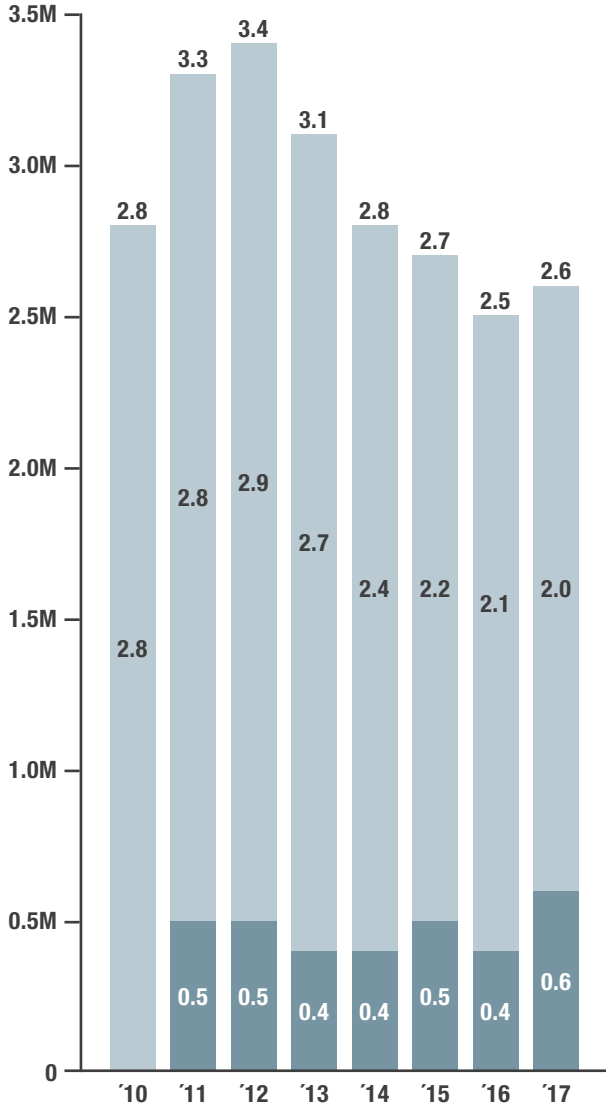
RDTs are mostly used in districts supported by the Global Fund, but remain less common than microscopy tests

Sources: interviews, National MoH, Advention



MALARIA TESTING PRACTICES

MALARIA TESTS PERFORMED



LEGEND

RDTs MICROSCOPY

IDENTIFIED MALARIA RDTs USED*

SD Bioline Malaria Ag Pf/P.v

Pf-HRP2 \$0.42 / test

Any malaria with pLDH-pan >1.3M RDTs since 2012



CareStart Malaria HRP2/pLDH Combo

Pf-HRP2 and Pf-pLDH \$0.65 / test

Any malaria with pLDH-pan >1.5M RDTs from 2010-2011



Currently, malaria testing is mainly done by microscopy, but is increasingly being replaced or complemented by RDTs (respectively 2M and 0.6M)
RDTs have low price points, and the majority are Pf and pLDH-pan

Note: (*) Most recent information available for specific tests. Sources: WHO, Global Fund, Advention



MALARIA TESTING LANDSCAPE

PRIORITY COUNTRIES*



VIET NAM CAMBODIA S. AFRICA INDIA PAKISTAN MYANMAR THAILAND

	VIET NAM	CAMBODIA	S. AFRICA	INDIA	PAKISTAN	MYANMAR	THAILAND	
HEALTHCARE INFRASTRUCTURE	Population (M)	95	16	56	1,324	193	53	69
	Healthcare expenditures per capita (\$)	115-120	65-70	84	60-70	35-40	55-59	217-225
	Health insurance coverage	~70%	-	~16% => NHI	~5-10%	~19%	Negligible	~98%
	Universal health coverage index	73	55	67	56	40	60	75
	Patients with fever being tested (%)**	80%	69%	82%	71%	68%	55%	83%
	Main distribution network	NIMPE	CNM	NDOH	State MoHs	Mix public/private	NVBDCP/CMSD	BVBD
MALARIA DIAGNOSTIC FUNDING & PROCUREMENT	Last year total malaria funding (\$M)	16	20	24	226	38	78	21
	Share of government funding (%)	~18%	~3%	~100%	~73%	~58%	~8%	~40%
	Main procurement decision maker	NMCP	CNM/UNOPS	NDOH / Malaria programme	National and state MoHs	GF / NMCP	NMCP/PMI	NMCP
	Procurement concentration level	High	High	High	Low	Medium	Medium	High
MALARIA DIAGNOSTIC PRACTICES	Health facilities performing RDTs	Health posts	Lower level facilities	Lower level facilities	Sub-Health/Primary HC	GPs, clinics	Lower level facilities, clinics	Lower level facilities
	Share of RDT in malaria diagnostic (% of patients)	~19%	~74%	~63%	~13%	~20%	~96%	~5%
	Community HCW RDT knowledge	Yes	Yes	Yes	No	Yes	Yes	Yes
	Quality management system performance	High	Medium	High	Medium	Medium	Low	High

NIMPE: National Institute of Malaria, Parasitology, and Entomology (also CNM); **NDOH:** National Department of Health; **MoH:** Ministry of Health; **NVBDCP:** National Vector Borne Disease Control Programme; **CMSD:** Central Medical Store Depot; **BVBD:** Bureau of Vector-Borne Disease; **NMCP:** National Malaria Control Programme; **UNOPS:** United Nations Office for Project Services; **GF:** The Global Fund; **PMI:** Project Management Institute

Notes: (*) Last available year; (**) As per Advention's assumption based on interviews (base case scenario). Sources: WHO, World Bank, GF, interviews, Advention



MALARIA RDT STAKEHOLDERS MAP

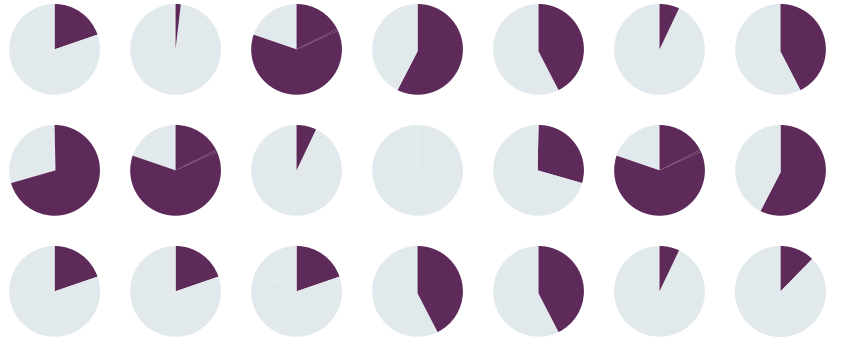


WHO IS PAYING FOR MALARIA RDTs?

Ministry of Health

Donors

Patients / Private insurances



WHO IS SELECTING MALARIA RDTs?

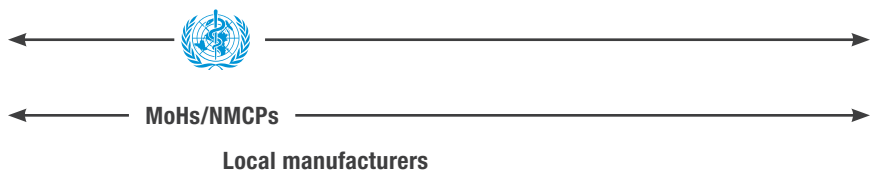
Ministry of Health / NMCP

Donors

Private sector

	VIET NAM	CAMBODIA	S. AFRICA	INDIA	PAKISTAN	MYANMAR	THAILAND
Ministry of Health / NMCP	++ ★	+++ ★	++	++	+++ ★	+++ ★	+++ ★
Donors	+	++			++	++	++
Private sector	+	+	+	++		+	+

WHO ARE THE MAIN INFLUENCERS REGARDING MALARIA RDT SELECTION?



LEGEND

★ HEAVY USE OF DONOR'S PROCUREMENT POOLING SYSTEM ☆ USE OF DONOR'S PROCUREMENT POOLING SYSTEM

Malaria RDTs are mostly financed by international donors, except in India, Pakistan and South Africa

NMCPs are key decision makers regarding RDT selection in all countries

Source: Advention



OTHER FEBRILE ILLNESSES TESTING PRACTICES

ARBOVIRUSES	Dengue	<p>Most large hospital labs perform dengue tests in-house, especially in epidemic areas</p> <p>Dengue is the most tested vector-borne disease in the country</p> <p>Patients tested for dengue are not systematically tested for malaria</p> <p>Most dengue tests are concentrated during the peak season (monsoon)</p>
	Chikungunya	<p>Testing for chikungunya is very rare and only performed at central hospitals</p> <p>Chikungunya tests are performed for patients already screened for dengue and malaria, as it is considered less likely and less dangerous than dengue or malaria</p> <p>Due to the low demand for chikungunya tests, availability is limited and costs of testing is high</p>
	Zika	<p>Zika tests are very rare and are only performed at central hospitals</p> <p>Testing appears to be done with PCR or ELISA depending on the facility</p>

BACTERIAL FEVER-INDUCING PATHOGENS	Melioidosis	<p>Melioidosis is usually tested for via blood culture when suspected clinically</p> <p>Blood cultures are relatively frequent at provincial or central level, but rarely specifically for Melioidosis</p>
	Leptospira	<p>Leptospirosis is usually tested for via blood culture when suspected clinically</p> <p>Blood cultures are relatively frequent at provincial or central level, but rarely specifically for Leptospirosis</p>
	Scrub typhus	<p>Diagnosis is usually clinical and based on the apparition of characteristic eschars</p> <p>Treatment for non-malarial fevers unresponsive to initial antibiotics is to prescribe doxycycline, which treats scrub typhus effectively</p>
	Murine typhus	<p>Diagnosis is usually clinical and supported by blood cultures</p> <p>Tests are only typically requested during localized epidemics</p>

Testing practices in Viet Nam for other febrile illnesses are mainly focused on bacterial pathogens via blood cultures

Sources: interviews, Advention

