NETWORKS PROJECT VECTOR CONTROL ASSESSMENT IN GREATER MEKONG SUB REGION

REVIEW OF

MALARIA PREVENTION

STRATEGIES

TOOLS

STAKEHOLDERS

TARGET GROUP SEGMENTATION

BEHAVIOURAL ISSUES

PRIVATE SECTOR DEVELOPMENT OPTIONS

May 2012

malaria consortium
disease control, better health

NetWorks

JOHNS HOPKINS BLOOMBERG SCHOOL of PUBLIC HEALTH
Center for Communication Programs

Table of Contents

List of Acronyms

(I) NGO	(International) Non-Government Organisation
3DF	Three Diseases Fund
3MDG	Three Millennium Development Goals
ACTs	Artemisinin-based Combination Therapies
AMDA	Asian Medical Doctor's Association
ANC	Antenatal Care
ARC	American Refugee Committee
AusAid	Australian Agency for International Development
BCC	Behaviour Change Communication
BMFG	Bill &Melinda Gates Foundation
BoP	Base of Pyramid
BVBD	Bureau of Vector Borne Diseases
CAP	Control and Prevention
CBOs	Community Based Organisations
CESVI	Cooperazione e Sviluppo
CHWs	Community Health Workers
CNM	National Centre for Parasitology, Entomology and Malaria Control, Cambodia
DFID	Department for International Development
DHS	Demographic and Health Survey
EC	European Commission
EPI	Expanded Program for Immunisation
FBOs	Faith Based Organisations
FHI 360	Family Health International 360
GFATM	Global Fund to Fight AIDS, TB and Malaria
GHAP	Global Health Access Program
GMI	Global Malaria Indicators

GMS	Greater Mekong Sub-region
GPARC	Global Plan for Artemisinin Resistance Containment
HSSP	Health Sector Support Project
IDPs	Internally Displaced People
IEC	Information, Education, and Communication
IGAs	Income Generating Activities
IOM	International Organisation for Migration
IPT	Intermittent Preventive Treatment
IRC	International Rescue Committee
IRS	Indoor Residual Spraying
ITMs	Insecticide Treated Materials
ITNs	Insecticide Treated Nets
JICA	Japanese International Cooperation Agency
KAP	Knowledge Attitude and Practice
KIA	Kenan Institute Asia
LLC	Labour Law Clinic
LLIHNs	Long Lasting Insecticidal Hammock Nets
LLINs	Long Lasting Insecticidal Nets
LLITks	Long Lasting Insecticidal Treatment Kits
LSHTM	London School of Hygiene and Tropical Medicine
M&E	Monitoring and Evaluation
M1	Migrant living in Thailand for 6 months or more
M2	Migrant living in Thailand for less than 6 months
M4P	Making Markets Work for the Poor
MAP	Migrants Assistance Program
MARC	Myanmar Artemisinin Resistance Containment
MBCA	Myanmar Business Coalition on AIDS
MC	Malaria Consortium

MCC	Myanmar Council of Churches
MCH	Maternal and Child Health
MHVs	Migrant Health Volunteers
MICS	Multiple Indicator Cluster Survey
MIS	Malaria Indicator Survey
MMA	Myanmar Medical Association
MMP	Mekong Malaria Program
MMWs	Mobile Malaria Workers
MoA	Memoranda of Agreement
MoH	Ministry of Health
MoL	Ministry of Labour
MOP	Malaria Operations Plan
MPWs	Malaria Post Workers
MSF	Medicins Sans Frontieres
NMCP	National Malaria Control Program
NMSP	National Malaria Strategic Plan
OD	Operational District
PDR	People's Democratic Republic
PEST	Political, Economic, Social, Technological
PFD	Partners for Development
PHD	Provincial Health Department
PMI	President's Malaria Initiative
PMS	Provincial Malaria Supervisors
PSI	Population Services International
RBM	Roll Back Malaria
RCC	Rolling Continuation Channel
RCM	Rapid Coverage Monitoring
RDTs	Rapid Diagnostic Tests

RHC	Rural Health Center
RMDA	Regional Development Mission for Asia (USAID)
RMIF	Regional Malaria Indicator Framework
SDC	Sustainable Development Commission
SEARO	South East Asia Regional Office (WHO)
SM	Social Marketing
SMRU	Shoklo Malaria Research Unit
SP	Sulphadoxine-Pyrimethamine
SR	Sub-recipient
SSF	Single Stream Funding
SSR	Sub Sub-Recipient
SWOT	Strengths, Weaknesses, Opportunities, Threats
UNICEF	United Nations Children's Fund
UNOPS	United Nations Office for Project Services
URC	University Research Co., LLC
USAID	United States Agency for International Development
VBDC	Vector Borne Disease Centre
VBDU	Vector Borne Disease Unit
VF	Vestergaard Frandsen
VHVs	Village Health Volunteers
VMWs	Village Malaria Workers
WHO	World Health Organisation
WHOPES	WHO Pesticide Evaluation Scheme

Executive Summary

Malaria Consortium (MC) was commissioned by NetWorks, a 5-year project funded by the President's Malaria Initiative, to conduct a rapid appraisal of the malaria prevention strategies in the 3 countries, Myanmar/Burma, Cambodia and Thailand (border areas). MC consultants, Karen Bulsara (Team Lead) and Mitra Feldman, travelled to Thailand, Cambodia and Myanmar/Burma between March 12th and 30th 2012, meeting with a number of key stakeholders and carrying out field visits to border towns and wholesale and retail markets. Support was provided by the regional team: David Sintasath, Diana Picón, and Muhammad Shafique, while the Cambodia based team members included Sara Canavati, Arantxa Roca-Feltrer and Sophal Uth. Sylvia Meek provided technical oversight from London.

The NetWorks team was tasked to conduct an assessment of current national program prevention strategies (including long-lasting insecticidal net (LLIN) and other personal protection measures) in Myanmar/Burma, Cambodia and Thailand with a focus on:

- ✓ Improved **LLIN distribution strategies** within both public and commercial sector tailored to national and sub-national context;
- ✓ **Private sector approaches** (e.g, bundled nets and possibly shifting the market to LLINs)
- ✓ **Alternative personal protection** approaches
- ✓ **Behaviour change strategies** that would promote consistent use of mosquito nets as well as improved net longevity
- ✓ **Monitoring and evaluation** strategies and methods to monitor net ownership and use;
- ✓ **Operational research** priority list

The key findings from desk reviews, interviews, discussions, and field visits conducted in Myanmar/Burma, Cambodia, and Thailand have been compiled into this document. Using a brief analysis of the total market approach, the importance of the relative roles of the public sector, civil society and private sector are stressed. In each country, current activities in these three sectors are outlined; an analysis of the key target groups is presented; and an overview of behaviour change communication (BCC) activities is provided.

As malaria transmission in the Greater Mekong Subregion (GMS) is steadily reduced to border areas and forest-fringes, prevention of outdoor malaria transmission is of particular focus in the region. Alternative personal protection measures, complementary and in addition to LLINs, are recommended for further exploration, including the use of topical repellents and other insecticide treated materials. In order to further define these special risk groups, a brief analysis of additional mobile target groups susceptible to outdoor transmission and the roles that various sectors can play in supporting these hard-to-reach groups with malaria prevention efforts is presented.

Since engagement with the private sector has been fairly limited to date, considerations to improve collaboration with the private sector include approaching and working with

manufacturers, retail sectors, and employer organizations to increase synergies at all stages from product development to product delivery. From this brief assessment, the private sector in the three countries seems to be able to supply adequate conventional nets to households which can afford to purchase them. However, innovative solutions are needed to convert these conventional nets into insecticide treated nets, including various options to harness the private sector to provide LLINs or insecticide treated nets (ITNs) for at-risk groups.

Monitoring and evaluation for malaria prevention activities primarily focus on the use of household surveys to capture the coverage and use of LLINs the previous night among household members. There may be a need, particularly in this region with critical issues of outdoor transmission and mobile populations, to expand monitoring and evaluation of personal protection tools beyond LLINs and ITNs and to explore other survey methods for mobile populations. Further considerations for improving monitoring and evaluation of malaria prevention in the GMS include but not limited to (1) conduct Rapid Coverage Monitoring (RCM) assessments following distribution campaigns in target areas to identify and address immediate gaps in coverage; (2) ensure large-scale, nationally representative surveys are complemented with well-designed qualitative research; (3) consider indicators for monitoring of intra-household coverage, universal coverage, and net tracking; and (4) look for possible entry points for consumer preference, net durability and use studies.

Key recommendations are suggested to improve synergies for public, private sector engagement, BCC and operational research:

Public Sector:

1. Develop clear **LLIN / LLIHN strategies** and distribution guidelines
2. **Increase engagement** with community-based organizations (CBOs) and faith-based organizations (FBOs)
3. Increase and improve use of innovative activities to reach **migrant workers**.
4. Support engagement and **collaboration with other non-health sectors**.
5. Taking lessons learned from HIV/AIDS advocacy efforts particularly in engaging employers, **top level advocacy** is required including among inter-sectoral government departments.

Private Sector Engagement:

1. Work with **manufacturers** for new product development;
2. Conduct Value Chain Analysis with the **retail sector** to identify areas where private sector can supply LLINs/ITNs more cost-effectively;
3. Partner with **employer organizations** to promote and to deliver malaria prevention commodities and messages

Behaviour Change Communication:

1. More **formative behavioural research** is required to better understand target at-risk segments, LLIN and/or other personal protection needs, preferences and use
2. Develop **culturally appropriate BCC prevention strategies** and interventions for target population (including migrant workers and ethnic minorities) and use **multi-pronged approaches** to reinforce messages

3. **Community engagement** is needed from key stakeholders in distribution and other malaria related activities to ensure ownership
4. Community-based workers and volunteers need more training in communication skills, prevention, and net retreatment, and should **emphasize interpersonal methods**. It will be important to ensure that BCC on retreatment of existing nets is properly timed and tested.
5. Taking lessons learned from HIV/AIDS advocacy efforts particularly in engaging employers, **top level advocacy** is required including among inter-sectoral government departments.
6. Increase **coordination between NGOs and governments** to develop and utilize harmonized BCC approaches and materials, particular for cross-border efforts
7. **Routine monitoring and evaluation** of the impact of BCC at community levels should be considered.

This rapid assessment aimed to provide some practical guidance and direction for personal protection strategies and priority areas in the GMS, whilst acknowledging the dynamic environment in the region, including significant malaria reduction towards elimination in some areas, the threat of the emergence and spread of artemisinin resistance, sustained outdoor malaria transmission, geo-political reform, rapid infrastructure and economic development, and rapidly expanding private sector.

Operational Research

The following priorities were identified:

1. Behavioural studies of target population segments
    - Consumer Preference Studies for nets and other prevention products
    - Product Acceptability Studies
    - Appropriate Product Use Studies
2. Alternative personal protection product preference and feasibility studies
3. Mapping and analysis of private sector employers and potential schemes
4. LLIN and ITM efficacy studies, including net durability and life of net studies in Asian context
5. Maintaining optimal coverage of nets following distribution campaigns and appropriate net replacement strategies
6. Strategies and approaches for replacement of ITNs with LLINs

Introduction

NetWorks is a five-year President's Malaria Initiative (PMI)-funded global malaria prevention project that partners with United States Agency for International Development (USAID) country missions to improve and establish sustainable access to and use of LLINs. Through its comprehensive and innovative programming, NetWorks aims to build sustainable LLIN systems that bridge the key technical areas of advocacy, policy, distribution, monitoring, and communications in malaria endemic countries. NetWorks has been designed to be flexible yet comprehensive and dynamic in order to help empower national governments, USAID missions and their partners (civil society and the private sector) to create sustainable systems that increase access, enable ownership and promote appropriate use of LLINs and other malaria prevention technologies.

USAID's Regional Development Mission for Asia (RDMA) has provided support for malaria control in the Greater Mekong Sub-region (GMS) for a number of years in the region for anti-malarial drug therapeutic efficacy studies, and in 2011 support began through PMI. A particular focus has been to ensure best control in areas known to be affected by artemisinin resistance in *Plasmodium falciparum*.

In early 2012, RDMA requested NetWorks to conduct an assessment of LLINs and alternative personal protection options for the GMS. NetWorks commissioned MC to carry out a rapid appraisal of malaria prevention activities in three countries, Thailand (borders areas), Cambodia and Myanmar/Burma. The Team Leader, Karen Bulsara, and Mitra Feldman travelled to each country between March 12thand 30th 2012, meeting with a number of key stakeholders and carrying out field visits to border towns and wholesale and retail markets. Regional based team members included: David Sintasath, Diana Picón, Muhammad Shafique, while the Cambodia based team members included Sara Canavati, Arantxa Roca-Feltrer, and Sophal Uth. Sylvia Meek provided technical oversight from London.

The focus of the visits were to highlight existing gaps in malaria prevention programs in each country and to draw up a series of recommendations for USAID/PMI to potentially fill some of these gaps through the NetWorks funding stream.

One of the aims of this assessment report was to consider strategies to complement continuous distribution systems of LLINs in the region and to identify ways for greater synergies between the public and private sectors. Malaria prevention efforts need to be coordinated in each country to benefit from effective utilisation of the various sectors, namely: public; civil society; and private. During the numerous meetings and presentations, it became clear that the malaria transmission patterns and burden of disease should also consider outdoor and residual vector transmission which called into question the focus on LLINs and encouraged further consideration for other malaria prevention interventions particularly in Thailand and Cambodia, both countries of which have orientated their programprograms towards malaria elimination.

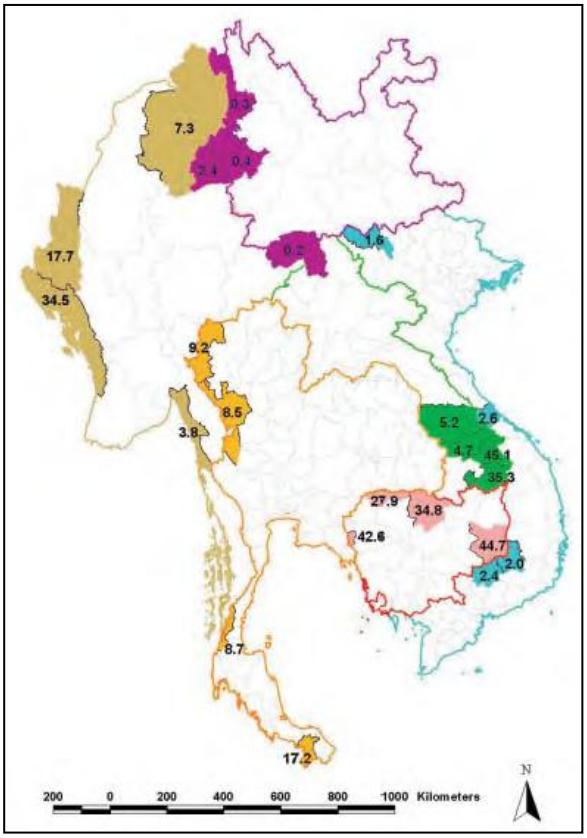
One of the aims of this paper is to provide guidance to the President's Malaria Initiative (PMI) MOP team on future directions of LLIN and personal protection interventions. To this end, this document has been prepared as a series of tables to highlight quickly the specific

in-country situations and to show clearly any gaps, where PMI could focus its activities. A PowerPoint presentation was made to the PMI / Malaria Operations Planning (MOP) team on 26th April 2012, summarising the content of this document.

Regional Overview

National estimates of malaria morbidity and mortality reveal that, to date the GMS has made considerable progress with regard to the goals set out during the launch of the Mekong Roll Back Malaria Initiative (now known as the WHO Mekong Malaria Program [MMP]). With a 60% drop in annual malaria deaths between 1998 and 2007, it has already met its objective on malaria mortality[1]. Myanmar/Burma and Cambodia experience the heaviest burden of malaria, with more than half of malaria deaths in the Sub-region occurring in Myanmar/Burma alone (see Map 1 for a breakdown of malaria incidence across countries). In these countries, malaria transmission remains concentrated along the borders and in the forested regions.

Map 1: Distribution of the highest malaria incidence rates within each country in the GMS *(Confirmed malaria cases per 1000 population, 2007)*



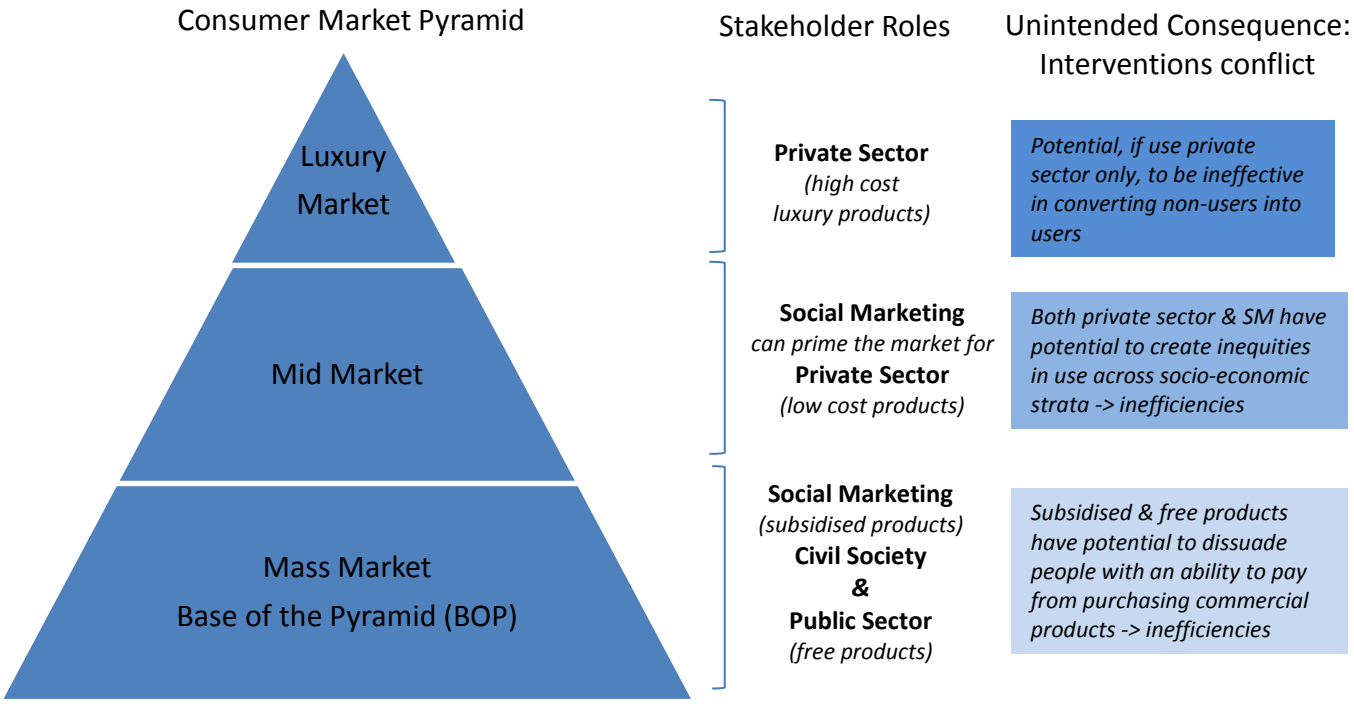
[1]http://www.searo.who.int/LinkFiles/Malaria_MAL-260.pdf

Malaria control efforts in Thailand have been largely successful, and malaria is no longer considered a public health concern for the general population. Transmission is now mostly limited to foci along the borders with Myanmar/Burma and Cambodia, including forested areas and the southern border of the country, where civil unrest has rendered implementation of effective malaria control difficult. Because of these conditions, one of the high-risk groups in Thailand is ethnic minorities inhabiting these regions and migrants from neighbouring countries. It is estimated that more than half of all malaria cases in Thailand occur among the non-Thai population. Recent evidence of prolonged parasite clearance times to artemisinin derivatives on the Cambodia-Thailand border, and even more recently along the Thailand-Myanmar/Burma border, has incited a global effort to contain and eventually eliminate artemisinin-resistant *P. falciparum* parasites and to delay the spread of naturally occurring artemisinin-resistant parasite strains.[2] This coordinated regional approach for malaria prevention and control is necessary and globally supported.

Synergising Roles of All Sectors

A key objective for this assessment is to identify gaps and opportunities for complementary LLIN distribution between the public and private sectors. This chapter gives the theoretical underpinnings for this approach. The chart below (figure 1) illustrates the rationale for planning complementary systems of LLIN distribution between the public, civil society (including social marketing) and private sectors.

Figure 1: Total Market Approach



[2] http://www.who.int/malaria/publications/atoz/9789241500470/en/index.html

Total Market Approach

It is important to recognise the relative strengths of each sector and utilise these strengths in the most cost-effective ways, in order to avoid unintended consequences as highlighted above, in the far right column. As the UK's Department for International Development (DFID)[3] has stated in its assessment of the total market approach, it is necessary to:

"…assess the characteristics of existing and likely future markets, and to define the comparative advantage of commercial, social marketing, non-governmental organization, and public sector actors in terms of competence and value for money in delivering a range of products or services to different market segments, including the poorest. It can enable closer and more structured linkages with commercial, public and non-governmental organizational sectors and aid the gradual shifting of consumers with sufficient purchasing power out of the public sector."

This assessment aims to highlight possible activities to enable the cost-effective use of public resources to support the most at risk populations, while, at the same time, harnessing the strong market systems that are in place in the region, through which the private sector is functioning well in supplying nets to people who value nets and are able and willing to purchase them. The major hurdle to overcome is that the nets available in the private sector are untreated – this issue will be addressed by this assessment.

PEST Analysis

Before assessing the private sector activities in each country, a *Political, Economical, Social* and *Technological* (PEST) analysis is recommended. A PEST analysis assesses a market, including competitors, from the standpoint of a particular proposition or a business. This captures information of relevance to establishing complementary systems, by taking into account the country-specific situations, before assessing the potential role of the private sector for LLIN distribution.

A 'Strengths, Weaknesses, Opportunities and Threats' (SWOT) analysis measures a business unit or proposition, whereas a **PEST analysis measures the market potential and situation**. Hence the PEST is used in this assessment for the net market as a whole. Table 1, below, is the template for a PEST analysis that will be applied in brief to all three countries.

[3]Madhavan & Bishai, 'Private Sector Engagement in Sexual & Reproductive Health….A Review of the Evidence', Dec 2010, JHU, HDRC report

Table 1: PEST analysis template

Political	Economic
• ecological/environmental current legislation • future legislation • international legislation • regulatory bodies and processes • government policies • government term and change • trading policies • funding, grants and initiatives • home market pressure-groups • international pressure-groups • wars and conflicts	• home economy • economy trends • overseas economies • general taxation • taxation specific to product/services • seasonality issues • market/trade cycles • specific industry factors • market routes trends • distribution trends • customer/end-user drivers • interest/ exchange rates • international trade and monetary issues
Social	**Technological**
• lifestyle trends • demographics • consumer attitudes and opinions • media views • law changes affecting social factors • brand, company, technology image • consumer buying patterns • fashion and role models • major events and influences • buying access and trends • ethnic/religious factors • advertising and publicity • ethical issues	• competing technology development • research funding • associated/dependent technologies • replacement technology/solutions • maturity of technology • manufacturing maturity and capacity • information and communications • consumer buying mechanisms/technology • technology legislation • innovation potential • technology access, licensing, patents • intellectual property issues • global communications

Market Segmentation

Segmentation takes the large, heterogeneous population and breaks it down into smaller more homogenous groups that can be targeted for specific interventions. Thus, it can be decided which sector: the public, non-governmental and/or commercial sector; can satisfy the specific preferences of one or more of these specific target segments. For this assessment, we have considered the stable population segments, identified by national malaria programs; and also further refined the mobile target groups (personal

communications, Bjorge S) as key mobile segments to be addressed as appropriate by all sectors.

Making Markets Work for the Poor

Overlaying this analysis, there should be an understanding of Making Markets Work for the Poor (M4P) as developed by DFID and the Sustainable Development Commission (SDC)[4]. The M4P concept addresses problem situations where a merit good[5] (the LLIN) is perceived to be sub-optimally supplied and consumed under existing marketing conditions. Sub-optimal consumption for LLINs in malaria programs would be where use is inconsistent in endemic areas. Sub-optimal supply is where publicly financed sources of supply crowd-out available or potential commercial sources of supply; and where access inequities exist across socio-economic strata. As in M4P, the general solution is to create and develop markets in order to widen access for LLINs for non-users.

Non-users are then segmented into groups in terms of their likelihood of adopting use, either through market solutions or public sector supply, through a five step method:

1) Define the market,
2) Determine the current usage level and trend,
3) Segment non-usage to determine current access and the limits of the market,
4) Assess future possible access in the medium term, and
5) Identify those who are beyond the reach of the market and require publicly financed sources of supply.

Base of the Pyramid

A further term, Base of the Pyramid (BOP) is a useful concept to define in the GMS situation. It is understood, according to Craig Lefebvre[6] and others, "that there is much untapped purchasing power among the World's poor, and that companies can make significant profits by selling to the poor with business models adapted to this unique market. Through selling to the poor, private companies can also…act as a positive force in alleviating poverty". It is proposed that with c90% of households owning a net that has been purchased, the value of the private market in reaching the poor cannot be underestimated, in this region.

An analysis of the current activities in each sector follows. It is important that follow-up exploration is undertaken to test some of the assumptions made during this assessment and to further fine tune the recommendations made.

[4] '*A Synthesis of the Making Markets Work for the Poor (M4P) Approach'* , DFID/SDC, October 2008

[5] Goods or services (such as education, vaccinations) provided free for the benefit of the entire society by a government, because they would be under-provided if left to the market forces or private enterprise.

[6] Lefebvre, 'Strategies for the Base of the Pyramid (BOP)', Effective Executive, Nov 2008

MYANMAR/BURMA

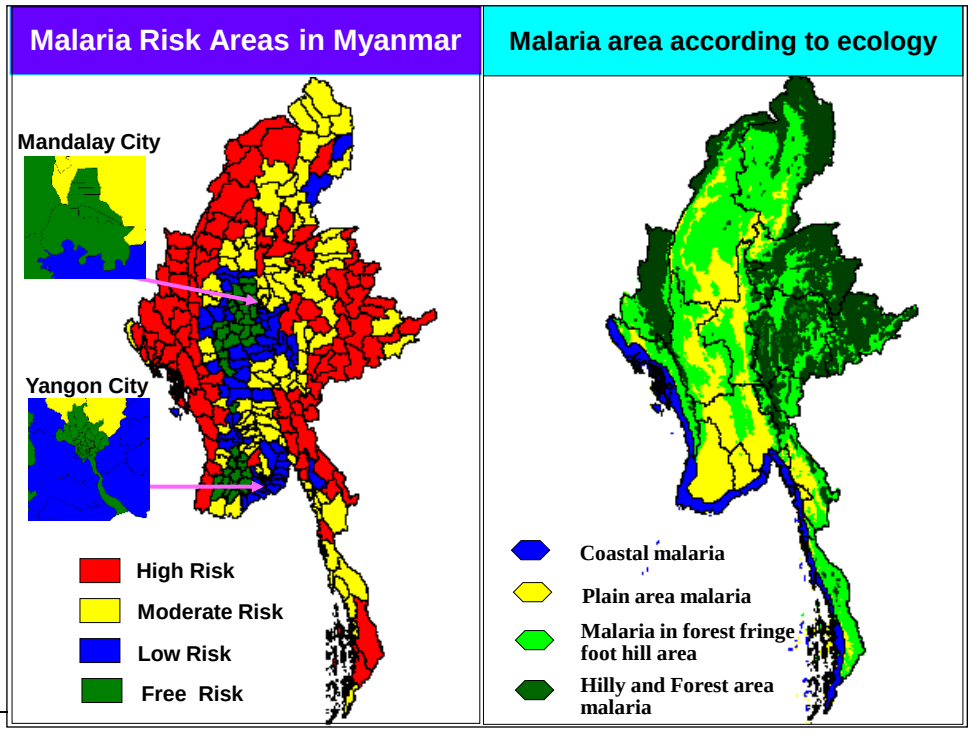
Overview

Although considerable progress has been made over the past 10-15 years in reducing malaria in Myanmar/Burma, it remains a leading cause of morbidity and mortality and is still a major public health problem. Reported malaria deaths peaked in 1991 at more than 5,000 and then fell steadily with 1,256 reported for 2007[7]. However, these figures are only related to malaria patients who seek care in the public health sector, since most cases are either self-treated or treated by the private sector, they are thought to only represent between 25% and 40% of the total. Despite this underreporting, Myanmar/Burma represents 55% to 60% of all reported malaria deaths in the GMS[8].

Although a slight decline has been noted in the occurrence of *P. falciparum* over the past decade, it still accounts for 70% - 80% of cases. The primary vectors are *Anopheles dirus* and *An. minimus,* both of which are generally anthropophilic and forest dwelling.

The country has been divided into areas of no risk and low, moderate and high risk for malaria, based on ecological determinants. However, even within the high risk areas there are villages with little or no transmission, and, similarly, within the low risk areas there are villages with high transmission. For this reason micro-stratification is being carried out. The proportion of the population living within high and moderate risk areas have fallen substantially in recent years. These changes may be one of the explanations for a declining trend in malaria incidence and mortality rates. Unfortunately, the high risk areas are most often the ones from which reliable data are most difficult to obtain.

Map 2: Malaria risk across Myanmar/Burma



[7]Myanmar Malaria Control Program, National Strategic Plan 2010 -2015
[8]http://www.searo.who.int/LinkFiles/Malaria_MAL-260.pdf

Like other countries in the region, Myanmar/Burma already has a culture of high net use. Rates are highly variable however, and the vast majority are untreated. A recent study by the Italian non-governmental organisation (NGO) Cooperazione e Sviluppo (CESVI) in Mandalay Division and Northern Shan State showed that 87.8% of households had at least one net and 68% - 85% of respondents had slept under a mosquito net the night before the survey. Approximately 86% of nets were purchased with private money, usually from the local market, at prices ranging from US$3.00 for a single net to US$5-6.00 for a family size net. A 2008 survey by the Myanmar Council of Churches (MCC) conducted in 160 malaria endemic and hard-to-reach villages in Chin State, Kachin State and Sagaing Division showed even higher coverage, with 91% of households owning any type of mosquito net (treated and untreated). However, there is very low coverage of mosquito nets treated with insecticide, with only an estimated 5.6% of the total population protected in this way in malaria risk areas.

Public Sector

ProgramMalaria control and prevention in Myanmar/Burma is the responsibility of the the Vector Borne Disease Control (VBDC) Program, which is part of the Department of Health of the Ministry of Health (MoH). At central level, the VBDC program formulates plans, policies, standards and norms related to malaria control. It also provides training, conducts operational research, controls outbreaks, and provides consultative and advisory services to implementing agencies.

At State/Divisional level, the VBDC is responsible for the control of malaria, under the supervision of the State/Divisional Health Director. Medical Officers lead the State and Divisional level VBDC teams which have responsibilities for supervision, and monitoring of implementation at lower levels. At District/Township level, the program is integrated into the Basic Health Services. Township Medical Officers supervise the implementation of malaria control and prevention interventions within the Townships, station hospitals, rural health centres (RHCs) and sub-centres. In each endemic Township, the VDBC staff comprises a malaria assistant, malaria inspector, malaria supervisor, malaria spray man and sometimes laboratory technician. However, nationwide, approximately only 60-70% of the allocated sanctioned posts for VBDC are filled.

Table 2: Public Sector Overview – Myanmar/Burma

Malaria Prevention Objective(s)	Ensure 80% of the population in moderate and high risk areas are protected by ITNs/LLINs by 2015
LLIN Distribution Strategy	284 Townships considered endemic, 180 targeted for scaling up LLINs/ITNs and retreatment of nets 2 LLINs per household, free to population of 15,512,158 with replacement after 3 or 5 years depending on type of net Mass treatment of mosquito nets scheduled every two years, in 115 other townships - approximately 8 million untreated mosquito nets thought to exist at household level Under GF: 1.8 million mosquito nets will be distributed to 55 priority townships. Overall, the coverage of LLINs/ITNs will increase from 2.33 million people in 2008 to 4.25 million people in 2011, 7.68 million people in 2012, and sustained at over 8.6 million people thereafter. Majority of mosquito net distribution supervised by NGOs Distributed at community and health facility level, depending on the NGO involved Village Health Volunteers carry out village census prior to distribution of LLINs Community Health Workers encourage use of LLINs/ITNS
Current Net Coverage (all nets)	Limited national data but recent study in Mandalay Division and Northern Shan State showed that 87.8% of households had at least one net. Survey in Chin State, Kachin State and Sagaing Division showed 91% of households owning any type of mosquito net
Current LLIN/ITN Coverage	Estimated 8 million nets in use in the country, but only 531,400 are treated Only 5.6% of the total population protected by treated nets in malaria risk areas (est.)

A national policy and implementation strategy to scale-up the appropriate use of ITNs or LLINs for malaria prevention and control was developed in 2003 and updated in 2009 to ensure that 80% of the population in moderate and high risk areas are protected by ITNs/LLINs by the year 2010.

Main activities include:

- Free mass treatment of existing mosquito nets before the start of the peak transmission season
- Free distribution of ITNs/LLINs to populations at risk
- Social marketing for demand creation and stimulating the local commercial market

Hard to reach communities in high risk areas, where retreatment of mosquito nets is difficult and ownership often low, are provided with LLINs. Identification and estimation of these groups for targeted distribution of LLINs is done through microstratification[9] in consultation with the Township and village health committees.

Table 3: Prevention interventions by stratification

Stratification		Key Interventions	
		Insecticide treatment of existing mosquito nets & promotion of their use	Provision & promotion of the use of LLINs
Stratum 1 : Malarious villages	Stratum 1a : High risk villages	Yes, 1st priority	Yes, 1st priority
	Stratum 1b : Moderate risk villages	Yes, 2nd priority	Yes, 2nd priority
	Stratum 1c : Low risk villages	Yes, 3rd priority	To encourage to buy their own LLINs
Stratum 2 : Potentially malarious villages		Yes, for those who will temporarily stay in malarious villages	To encourage those who would stay temporarily in endemic areas to buy their own LLINs
Stratum 3: Non-malarious villages		Yes, for those who will temporarily stay in malarious villages	To encourage those who would stay temporarily in endemic areas to buy their own LLINs

[9] Malaria Risk Micro-Stratification in UNICEF 80 townships

284 Townships are considered endemic, out of which 180 are targeted for scaling up LLINs/ITNs and retreatment of conventional nets[10]. 75% of the population in these 180 priority townships is thought to reside in malaria risk areas.

Mass retreatment of nets with long lasting insecticides (deltamethrin) are carried out once every two years just before the start of the high transmission season. Both retreatment and distribution are conducted at fixed points in each village, under the supervision of VBDC staff and carried out by basic health staff, trained volunteers, and local NGO members.

The provision and retreatment of LLINs are usually accompanied and followed by intensive community level Behaviour Change Communications (BCC), provided by volunteers, NGOs, Community Health Workers (CHWs) and health promoters. BCC activities focus on ensuring proper use and understanding of ITN/LLINs and, whenever possible, encouraging people who go to the forest to carry their ITN with them. However, there is a high attrition rate for CHWs and many of those who are still active need retraining on new malaria control protocols and guidelines.

The VBDC has good capacity at central level but generally is weaker at lower administrative levels, down to the village level. This is likely to become even more apparent as the country continues to decentralise. Central level staff has shown themselves capable of carrying out high quality research, but are limited by access to resources. This, along with the fact that NGOs are often not authorised to carry out independent research, means that there are large parts of country without any data. Both the NMCP and NGOs alike have no real picture of the situation in these inaccessible areas, referred to as 'black areas'.

Limited financing is a challenge in Myanmar/Burma, and has had a clear impact on the success of interventions to date. All public sector staff and facilities suffer from the lack of financial resources and training. This is appears to be apparent in the poor state of infrastructure and equipment, and the regular stock-outs at public facilities.

With the cancellation of the Global Fund to Fight AIDS, TB and Malaria (GFATM) Round 11, transition of the Three Diseases Fund (3DF) to the Three Millennium Development Goals program (3MDG) and funds for the Myanmar Artemisinin Resistance Containment (MARC) framework only committed to June 2012 (with possible no-cost extension through Dec 2012); major funding gaps are expected in Myanmar/Burma. This is a major concern to all involved.

[10] These Townships contributed 88% of malaria cases and 86% of malaria deaths reported from 2003 – 2007

Civil Society

There appears to be eight international NGOs that are conducting malaria control activities across Myanmar/Burma: Save the Children (USA) (SCF), CESVI, Malteser, Merlin, Medicins sans Frontieres (MSF)-Holland, MSF-France, MSF-Switzerland and Population Services International (PSI). University Research Co., LLC (URC), the prime for PMI's Control and Prevention (CAP) Malaria project, is working through Save the Children for implementation of activities in Myanmar/Burma. Inter-governmental agencies such as the World Health Organization (WHO) and the International Organisation for Migration (IOM are involved in many malaria related activities including having significant implementation roles in the MARC Project. Several local NGOs are also implementing malaria prevention activities, and some are highlighted in the table below.

Table 4: Civil Society Overview – Myanmar/Burma

Organisation	Malaria Prevention Activities
IOM	Community-based migrant health project (Mon State) Using repellents and LLINs Mapping of migrants
URC	Principal recipient for PMI's CAP-Malaria project (in process of registering in Myanmar/Burma) 133,000 LLINs in Myanmar/Burma in 2012; proposed target areas include Tanintharyi, Kayin, Bago, Kachin, Kayah, and Shan State BCC activities
SCF	Principal Recipient for GF, responsible for all INGO SRs. Working in nine states and divisions; implementing partner in Myanmar/Burma for CAP-Malaria project
PSI	Small scale social marketing of 'SupaNet' LLINs - 100,000 in 2012
Myanmar Business Coalition on AIDS (MBCA)	Provide prevention services to workers in large-scale forestry enterprises. (with the VBDC) Represent private sector on 'Myanmar Country Coordinating Mechanism'
World Vision	Mobilizing & strengthening capacity of community-based volunteers, Community Based Organizations and Self Help Groups to implement prevention and care and support activities.
Myanmar Council of Churches (MCC)	Community-based prevention and control in 160 hard-to-reach villages in eight townships across Chin State, Kachin State and Sagaing Division
Merlin	BCC for prevention. Focus on early diagnosis and treatment (EDAT)
MSF- Holland	No prevention. Focus on EDAT
Myanmar Medical Association (MMA)	Some sale of mosquito nets in social franchise clinics. Focus on EDAT
Cooperazione e Sviluppo (CESVI)	Community-based prevention and control project in 4 townships in Mandalay Division & Northern Shan State

Although civil society groups and NGOs appear to share information amongst themselves, formal coordination mechanisms are lacking and sharing of data with the MoH/VBDC is very limited. Efforts to improve this are underway; the Ministry of Health has requested that all NGOs report to VBDC on a regular basis, however no formal reporting tool has been introduced and it is unclear if this is meant to take place at the central or township level.

Civil society groups and NGOs are limited in geographic coverage in Myanmar/Burma, with most organisations operating in the same few Divisions or States. Since the public sector is unable to provide services in all hard to reach areas, the same areas that are often remote and forested, it is very likely that there is a much higher incidence of malaria in the areas without any civil society/NGO support. For example, one national organisation, Friends for Health (affiliated with the Global Health Access Program [GHAP] in Thailand), which is operating in the Kayin District said they saw 90,000 malaria cases along the Thai border in 2011 alone, this is more than was seen in the entire GFATM supported areas combined[11].

[11]Interview with Kelland Stevenson, Country Director, Save the Children USA, Myanmar on 28th March, 2012 in Yangon, Myanmar

Private Sector

The following PEST analysis gives an overview and summary of the private sector environment within Myanmar/Burma.

Table 5: Myanmar/Burma 'PEST' Analysis

+ve/-ve:	**Political**	**Economic**	**+ve/-ve:**
Highly dynamic political situation, EU and US sanctions are due to be lifted, but unclear how the government will respond to the recent dramatic changes. There is still a very strong restrictive political structure in place. All aid is through NGOs. No direct government support has been possible to date. VBDC is quite weak, older officials retiring and no younger officials being groomed for replacement. It is very unclear how one could work with current structures to organize malaria prevention efforts inter-sectorally e.g. with business/industry support. MMA and Myanmar Business Coalition for AIDS are possible partners, but capacity unknown.	• Military rule relaxed in 2011; sanctions are now more likely to be lifted (EU review in April 2012) or suspended following the recent elections and NLD wins, including Aung San Suu Kyi's seat in Parliament. UK Prime Minister David Cameron to visit Myanmar/Burma in April 2012 – may result in increased foreign aid and reinstatement of trade privileges • Support from VBDC for both ITNs and LLINs. VBDC recognise the importance of the private sector. Need a clear policy articulation for the role of the private sector in malaria prevention • Free LLINs are being targeted to those most at risk (27m). This may have larger impact on commercial market, since this is still a significant volume • New regime may enable funds to flow into Myanmar/Burma for free LLINs supply from donors (e.g. GFATM, BMGF, USAID, PMI, DFID) • Procurement of WHOPES approved LLINs from outside the country • No government support for existing local producers. Government produces a net available through govt. Win	• There is no central bank and the first official exchange rate was only formerly established on April 1st 2012 • Kyat now fixed at Kks800 to the US$ (as of March 2012). Increased confidence in the currency – will lead to a more rational environment for foreign investment for the first time in 50 years • Current duties (?% duty, ?% VAT) for commercial purchase (0% if by Government). • Assume there is a steady demand for nets with an increase in seasonal demand for nets during rainy season • Unclear if major urban markets and distribution systems are well developed for the country. Little information available • There is a central wholesale market in Yangon – Insein. Still to be assessed if this functions as a hub for all distribution. • There is a social enterprise sewing nets on a small scale. Difficult to know if this model can be replicated • Majority of WHOPES approved LLIN brands are not registered in Myanmar/Burma – except PermaNet. Have to do so, before enter the retail	There is still a restricted market in existence There appears to be a good net market and there are a number of suppliers present The net market is a low-tech market with very low profit margins The neighboring, technologically advanced economies of Thailand, China and Vietnam appear to be dominating the net market with imported net Potential for sale of LLITKs

	Thuza shops. • Malaria is a priority health intervention, but very little top-level government advocacy or inter-sectoral support for malaria • Strong international influence on local policies • Both internal ethnic conflicts and conflicts on Thai Borders • Farming, Agriculture, Mining, Logging, construction etc run only with govt. approvals. Possible to identify stakeholders to work with, if government will release information – but still a seemingly closed system of government and information very difficult to attain.	market (may be lengthy registration issues) • Sales to date of LLINs have been institutional but retail LLIN market is in very early stages with PermaNet on sale in Myanmar/Burma • Limited retail selling of LLITks (some social marketing). Need further studies to back up qualitative findings of people being prepared to pay K300 for retreatment kits[12]	
+ve/-ve: There is a positive environment for malaria prevention in Myanmar/Burma The extent of knowledge, attitudes and awareness of nets to prevent malaria is variable. Consumer research is in Myanmar/Burma is very limited. There is more work to be done to fully understand consumer preferences and use of appropriate prevention tools among the most at-risk populations	**Social** • There is a good mosquito net use culture in Myanmar/Burma, but is likely to be variable. • Single size and shape of LLINs distributed for free has not considered user preferences for longer, softer opaque fabric, for privacy. CYC cotton popular. • Financial coping mechanisms within poor households may not allow for purchase of a larger no. of nets. Although evidence of different nets being used for summer (hot) and rainy (windy) seasons • Number of people sleeping under ITNs is still low • Opportunity for large-scale BCC campaigns to	**Technological** • Important to monitor consumer preferences for nets and other prevention tools e.g. clothing, repellents • Research into other interventions needed to prevent outdoor transmission at forest fringes • Need to identify if a greater range of media can be employed to promote the prevention message • No capacity established to produce LLINs in-country • Large capital investments would be required for changes in technology for local LLIN manufacture. No local manufacture begun. • Change to LLIN technology	**+ve/-ve:** Limited capacity and scale for local production has meant that the market is dominated by external suppliers even for untreated nets There may be opportunities to introduce appropriate technology to provide alternative prevention tools to prevent outdoor transmission e.g. clothing, topical repellents, spatial repellents

[12] Kyi Kyi Win Oo, 'Malaria in the Aftermath of Nargis', Graduate Institute of Geneva, Master's Thesis, March 2012

	reinforce treatment of existing household nets • Need to ascertain if there are still misconceptions causes of malaria e.g. dirty water and hygiene and the safety perceptions and use of insecticide for treating nets • Women are more disposed to purchase and use nets • Pregnant women and children under 5 are a priority target group. Children under 5 account for 13% of malaria cases. • Outdoor transmission focus required on migrant and mobile labourers, adult males • Adult males use of mosquito nets may be lower than women and children due to certain behavioural risks • Ethnic minorities are an underserved population group and very difficult to reach. Access restricted.	would cause most local net players to exit the market – with a resulting loss of consumer choice • Potential for local manufacture of LLINs/ITNs – using different end-of-line treatment technologies • No large scale production of untreated nets – only small cottage industries producing.	

Private Sector Activity in Myanmar/Burma

It was not possible, during the short time available in Yangon, to conduct any thorough analysis of the private net market in Myanmar/Burma. Data gathered was mainly from a brief field trip within Yangon with the PSI Sales Director. The central wholesale market, Insein, was visited and a trip was made to a local social enterprise, small scale production facility, just outside the city centre.

Although PSI has a significant presence in Myanmar/Burma, their focus has been on malaria treatment rather than prevention and the establishment of their social franchising with SUN clinics, therefore they do not have as much data on the retail net market in Myanmar/Burma, as their colleagues in Cambodia. PSI-Myanmar/Burma will be socially marketing 100,000 *SupaNet*s in 2012, procured from Yorkool, however, this is a very small volume of nets and many will be sold through the social franchise clinics, as this is a very small number to have any impact on the retail environment.

PSI-Myanmar/Burma also distributes a small volume (100,000) of LLITKs, branded as '*SupaTab3*'. They are priced at K1500 per kit in retail outlets. They are mainly being provided through their SUN clinic franchise and inter-personal communicators (IPCs), where

they are significantly subsidised at K100 per kit. PSI also sells LLITKs to other NGOs, e.g. Merlin and Pact, for free distribution.

The Burmese government produces and supplies nets in the private sector through special government supply shops known as 'Win Thuza'. The product (Images 1 and 2) is priced at K 12,000 for family size, is made from good quality heavy cotton material. It is available in pink, yellow, blue and white and is a luxurious, opaque product. However, it is expensive compared to other nets available. It is most probably used as the 'winter' net for warmth in cold temperatures. It was found from a consumer study undertaken by BusinessKind[13] that some communities purchase the lighter netting for summer use and the heavier fabric for rainy season use, when winds are stronger.

Image 1 Government produced net

Image 2 Heavy cotton material untreated net

At Insein Wholesale Market, the largest in Yangon (Image 3), a wide variety of nets were available, including the fabric CYC nets in multiple floral colours (Image 4).

[13] Kyi Kyi Win Oo, 'Malaria in the Aftermath of Nargis', Graduate Institute of Geneva, Master's Thesis, March 2012

Image 3 Wholesaler at Insein, wholesale market Yangon

Image 4 Variety of CYC and coloured untreated nets

B52s are readily available, from at least two Thai manufacturers (Netto and another unnamed brand with a bird/cloud logo). These Thai manufacturer inserts were placed in the familiar pre-printed bag. There is variable quality to the packaging for B52 nets. It is possible that this may be a franchised brand from China – available through Thailand and Vietnam net importers. Flying Lion was another popular B52 brand seen in the markets of larger size (Images 5-7).

Image 5 B-52 nets available in Yangon

Image 6: B-52s in a variety of colours/patterns, Yangon

Image 7: Thai manufacturer labelled net, Yangon

As mentioned, PSI is socially marketing their brand, SupaNet (Image 8), but did not sell well priced at K2,000. PermaNet (Image 9) is also available in the Yangon wholesale markets, priced at K7,000, and, according to wholesalers, it also sold poorly.

Image 8: Social Marketing of PSI's 'SupaNet', Yangon

Image 9: PermaNet on sale in Yangon

Locally produced bednets are on sale in the wholesale market, ‘Zarmani’, priced at K6,000 (Image 10)

Image 10: Myanmar/Burma locally produced net, Zarmani

The social enterprise, BusinessKind, produced their branded nets, 'Good Sleep', in Hlaing Thayar, and industrial area, just outside central Yangon. They produced a 'community' product (left), sold at the cheapest price (K5,000) and simplest design. There were 6 sewing workers (50% PWAs) producing about 50 nets per day. The women are trained and then found jobs in garment factories, with full references from BusinessKind.

Image 11: 'Good Sleep' - community net

Image 12: Good Sleep production facility, Yangon

Other products were made for more affluent consumers, with designer patterned netting (Image 13) and cotton tops (family size - K7,500) and the denser CYC (Image 14 to allow more privacy which is popular in Myanmar/Burma (K7,500), fabric imported from China. From their own market study[14], 800 households were interviewed and they found a

[14] Kyi Kyi Win Oo, 'Malaria in the Aftermath of Nargis', Graduate Institute of Geneva, Master's Thesis, March 2012

(see but if their

preference for CYC among 75% of their respondents Image 16 for in-situ use). These nets are sold untreated, required, the organisation can treat the nets and did so for Labutta study. Image 15 depicts the superior upmarket supermarket packaging and product, priced at K7,500.

Image 13: Variety of net patterns and colours, Yangon

Image 14: 'CYC' - opaque cotton china fabric opaque netting

Image 16 CYC net being used in-situ, Lambutta. *Courtesy of Kyi Kyi Win Oo, BusinessKind*

Image 15: GoodSleep 'up-market' net packaging

Table 6: Summary of nets found to be available in Myanmar/Burma (partial analysis only):

Brand /Type:	Description	Price (Kyat):
Government net	Large, heavy, opaque cotton, rectangular untreated net. Single (s) and	7,500 (s)

	family (f) size. Colours: white, blue, pink, yellow. All cotton roof and large borders. Available in Win Thuza, Government supply shops, yet also sold at Insein.	12,000 (f)
SupaNet SM brand	Social Marketing LLIN. Over branded (Yorkool) LLIN. Available as family size, white. Subsidised price and distribution through PSI.	2,200 (f)
PermaNet	Private sector LLIN. WHOPES approved. Factory treated. Imported.	7,000 (f)
Polynet	Quality net import from Thailand. States that it is an LLIN on packaging, although is an untreated net (*did not see this product*)	2,000 (f)
B-52	A family rectangular net imported from Thailand. There are many different types of B-52 nets: 'Bird' and 'Flying Lion' were most popular. The brand name is clearly printed on the plastic bag	4,500 (f)
Local net, *Zarmani*	A coloured untreated rectangular net. These come in single and family size. Made in Mingaladon township, home industry production. Wholesaler can provide netting and pay a sewing fee, if demand is high.	3,500 (s) 6,000 (f)
Good Sleep	Produced by social enterprise. Use of colourful, patterned netting and also CYC (cotton china fabric) denser, opaque, colourful floral fabric - favoured for providing privacy.	7,000 (f) 7,500 (f)
Covered frame net	A family or individual net, which has an inbuilt metal frame to set up easily rather than hanging with ties. Seen in supermarkets	D/K
Luxury nets	An upmarket net. Imported from abroad. The nets have an entrance. Various shapes – conical, rectangular etc. Various colours, designs. Seen in supermarkets	D/K

Other Prevention Products

There were many mosquito repellent coils and sprays available in a popular Yangon Supermarket (Image 17)

Image 17: Range of mosquito repellent products, Yangon Supermarket

IOM are supplying advanced Odomos in 60g tubes, free to migrants (three tubes per month) in their program on the Myanmar/Burma/Thai borders. According to an Indian Journal of Medical Research Article (January 4, 2010), this product offered 100% protection from malaria and dengue, for up to 11 hours, comparable with DEET (6 hours). Its primary ingredient is *N-diethyl-benzamide*. The other product (Image 18) was a locally produced repellent, available for only K450 in the same supermarket - contents unknown.

Image 18; Mosquito repellents available in Yangon Supermarket

Image 19: Candles, produced by BusinessKind

Goodnight Citronella candles (Image 19) were being produced by the social enterprise, BusinessKind, on the same site as their Good Sleep nets. It is another small scale operation, sold in supermarket packaging (K300) or community packaging (K230).

Stable Target Groups

Due to the nature of the two primary vectors, which are generally anthropophilic and forest dwelling, most transmission occurs in forested areas. For this reason the burden is particularly high among ethnic minorities living in remote areas. These people are usually subsistence farmers with supplementary forest activities, such as cutting bamboo or rattan or production of charcoal. At all ages below 75 years, males are reported with malaria more than females, with the sex ratio most extreme from 15-54 years. The predominance of adult males among malaria cases is a reflection of the high risk of malaria among them due to occupation (e.g. mining, forest related activities, construction, rubber tapping, etc) that exposes them to malaria.

The other major risk group is migrants, who are often attracted by economic opportunities such as logging or mining in forested areas or road or dam construction and maintenance. Migrant groups are often small, spontaneous and even clandestine or illegal, making access to and provision of malaria services difficult.

The estimated number of internal migrants in Myanmar/Burma is very high as a large number of people move for work, especially in the eastern states/regions along the Thai border[15]. There are an estimated 30,000 migrant workers in the Kawthaung and Bokepyin areas in Tanintharyi alone, where artemisinin resistance is suspected. This number is expected to increase as economic opportunities in the country continue to develop. Another important group of migrants in Tanintharyi Division are fishermen, who often go to Thailand.

[15] Interview with Greg Irving from IOM Myanmar/Burma, on 28th March, 2012 in Yangon, Myanmar/Burma

The Dawei Deep-sea Port project, an $8 billion construction project linking Kanchanaburi province in Thailand to Tanintharyi Division in Myanmar/Burma, is expected to attract up to 200,000 temporary workers. Population movement in Myanmar/Burma has not yet been mapped sufficiently for exact planning of health services targeting these risk groups.Pregnant women are known to be a vulnerable risk group for malaria infection. A review of 17 studies on malaria during pregnancy in Myanmar/Burma revealed that the prevalence of pregnant women with clinically suspected malaria was relatively low, contributing about 1-2% to the total burden of outpatients and inpatients[16]. However, the prevalence of malaria parasites was found to be 10.97% of all antenatal care pregnant women and 11.85% of all women during delivery in another study conducted in Tachileik, Eastern Shan state and in Thaton, Mon state[17]. The states and divisions reporting the highest incidence are Rakhine, Kachin, and Kayah, but even here wide variations were reported, ranging from 3% in Tanintharyi division to 37% along the Thai- Myanmar/Burma border. Unfortunately, the high level of parasite resistance to sulphadoxine-pyrimethamine (SP) in this area precludes the use of Intermittent Preventive Treatment (IPT), making the need for preventative tools even greater.

There are also a number of internally displaced people (IDPs) in the country, mainly along the Thai border region, and there is a lack of information available on this group. However, due to their situation, and the geographic area, it may be reasonable to assume that they have similar susceptibility and lack of access to quality services as many of the ethnic minority groups. Accessing IDPs is particularly difficult since they are not officially migrants, due to political the political situation and insecurity, they are forced to move from time to time and are therefore not very accessible by either the public sector or civil society.

[16] Myanmar National Strategic Plan Malaria Control, 2010 – 2015
[17] Ibid.

Table7: Stable Target Groups - Myanmar/Burma[18]

STABLE POPULATION TARGET GROUP	GROUP PROFILE		OUTREACH POSSIBILITIES	PUBLIC SECTOR INTERVENTIONS	CIVIL SOCIETY INTERVENTIONS	PRIVATE SECTOR INTERVENTIONS
1.Pregnant Women and children under 5 	Recognised as priority at risk due to low immunity. Priority to stratum 1 & 2 geographical areas. Children under 5 account for 13% of malaria cases		Outreach possible - home address is known if stable population group	EXISTING: Village Malaria Volunteers, BCC & dipping POTENTIAL: LLIN distribution via ANC clinics, TBAs, EPI outreach, schools	EXISTING: BCC POTENTIAL: Prevention BCC	EXISTING: Retail sale of nets, LLINs, SM POTENTIAL LLITKs
2. Ethnic minorities 	Conflict areas, insecure, less access to paid work 100 different languages spoken 135 distinct ethnic groups Grouped into 8 major national ethnic races:, according to region. Therefore multiple languages in each regional group Many unrecognised ethnic minority groups exist		Outreach difficult – locations hard to reach locations and often limited access from NGOs and / or govt.	EXISTING: Village Malaria Volunteers BCC & Dipping campaigns POTENTIAL: LLIN where identified	EXISTING: CBD & BCC LLIN distribution by NGOs/FBOs Backpack Medics (in insecure areas) POTENTIAL: Identify partners	EXISTING: Retail sale unknown POTENTIAL Possible sales in certain geographic areas Other PP Tools
4. Intern le (IDPs) 	Outreach difficult because of political situation/insecurity and limited access from civil society groups and / or gov		NGOs, CBOs, & FBOs, local rights based groups,	Ltd in these areas due to political situation. Possible role for ethnic minority groups that cover IDP areas	Backpack Medics BCC, distribution & dipping campaigns	Little role for private sector, unless able to access retail
5. Artemisinin Resistant Area inhal 	Tier 1: (21 Townships) *Tanintharyi, Mon, Bago E (1)*	Evidence of resistance. Widespread ecological & social risk factors. Intensive population movement. Ongoing big development projects	Outreach possible - home address is known	EXISTING: Village Malaria Volunteers BCC & dipping POTENTIAL: Population segmentation & LLIN	EXISTING: BCC POTENTIAL: Prevention BCC	EXISTING: Retail sale of nets & SM POTENTIAL Other PP Tools
	Tier 2: (31 Townships) *Kayin, Kayah, Bago E (13), Kachin*	Unclear evidence of suspected resistance but near suspected resistance areas in Burma, Thailand & China				

[18]This and the other target group tables, were developed further from segmentation exercise in Cambodia (Bjorge S, WHO), upon the suggestion of Wayne Stinson (RMDA) and Mike MacDonald (PMI Washington)

A consortium of backpacker health workers along the Thai-Myanmar/Burma border aims to increase access to malaria treatment and prevention services. Eighty-five teams made up of three to five people (including one person trained in general medical care, one in maternal and child health (MCH) and one in BCC) provide on the spot medical care over a specific geographical region. The teams travel for six months at time, then return to a base to restock. DFID provides funds through Christian Aid to two local groups along the Thai-Myanmar/Burma border, but based in Myanmar/Burma, who distribute LLINs in hard to reach areas through village health workers (VHWs) and provide BCC. Although the local groups are unregistered with the MoH, they are well established in the communities they serve[19].

An international palm oil plantation conglomerate in the MARC area is working with the MoH to pilot a screening and treatment program for its workers, to increase access to migrant labourers. The company has established its own hospital and some clinic posts staffed with retired MoH personnel to diagnosis and treat patients. The MoH has provided training for the staff on malaria and supplies them with appropriate treatment courses. LLINs are also distributed to the workers and conventional nets retreated with help of malaria volunteers at worker sites but it is not clear if these nets are bought by the company itself or provided by the MoH. The NMCP is hoping to work with the same company to pilot a screening intervention for seasonal workers returning to their homes, in which all workers will be screened before returning home. Their home addresses will be collected and those found positive for malaria will receive follow up visits from their local regional departments. Costs for the screening and treatment will be paid by the MoH's national budget, with the private company providing the space and coordinating their workers to cooperate. Families of long-term workers who are with them will also be covered by this scheme.

[19] Interview with Dr Jenny Hall, DFID, in Yangon Myanmar on 28th March, 2012.

Behaviour Change Communication

Current Activities:

- No private sector promotion of nets – some POS materials seen at Insein Wholesale market in Yangon.
- International Organization on Migrationis carrying out activities with migrants and offering free repellents ('Odomos')
- PSI carries out some social marketing, but not promotion of LLINs
- Myanmar Council of Churches (MCC) is a faith-based local NGO working on malaria prevention and control in Myanmar/Burma. MCC works on capacity building of community health workers to conduct the health education session on malaria prevention and control at the community level.
- Merlin has been working on malaria prevention and control in the Chin and Sagaing states for many years with the funding support from 3DF and GFATM. They conduct mobile clinics in hard-to-reach Chin and Sagaing communities through the use of mobile clinics. Merlin also works to strengthen the capacity of community health volunteers/malaria workers in malaria diagnosis and treatment and health education. Merlin also has distributed mosquito nets to the communities in Chin and Sagaing states.
- URC works through Save the Children under the CAP-Malaria project. Their current plans include support for malaria control interventions at the community level through Volunteer Malaria Workers (VMWs), Migrant Malaria Workers (MMWs) and private health providers in areas where NMCP does not operate. The key activities supported under the project will include:
    - Distribution of LLINs to targeted high-risk geographic areas and to migrant and mobile populations, possibly replicating the USAID-funded LLIN lending scheme in Cambodia. The project will also examine distribution of repellents, particularly among rubber plantation workers.
    - Conduct BCC to increase malaria prevention, early diagnosis, and adherence to treatment, tailoring messages to specific target audiences.

Image 20: BCC LLIN leaflet, Myanmar/Burma

Gaps Identified:

- **Behavioural research:**
  - Are women the main purchasers of nets – why are they buying, what do they look for etc?
  - Net preferences in terms of design, materials, colours, sizes etc
  - Price elasticity of demand – if want higher priced LLINs on market – people are unlikely to want to spend more without significant BCC
  - Alternative prevention tools – what are people prepared to buy and use?
- No real BCC strategy – rather a list of IEC interventions
- Need a greater emphasis placed on BCC efforts to promote a net treatment culture
- Lack of coordination among the implementing NGOs for BCC and the VBDC
- Engagement required with more Community Based Organisations (CBOs) Consistency of prevention messages

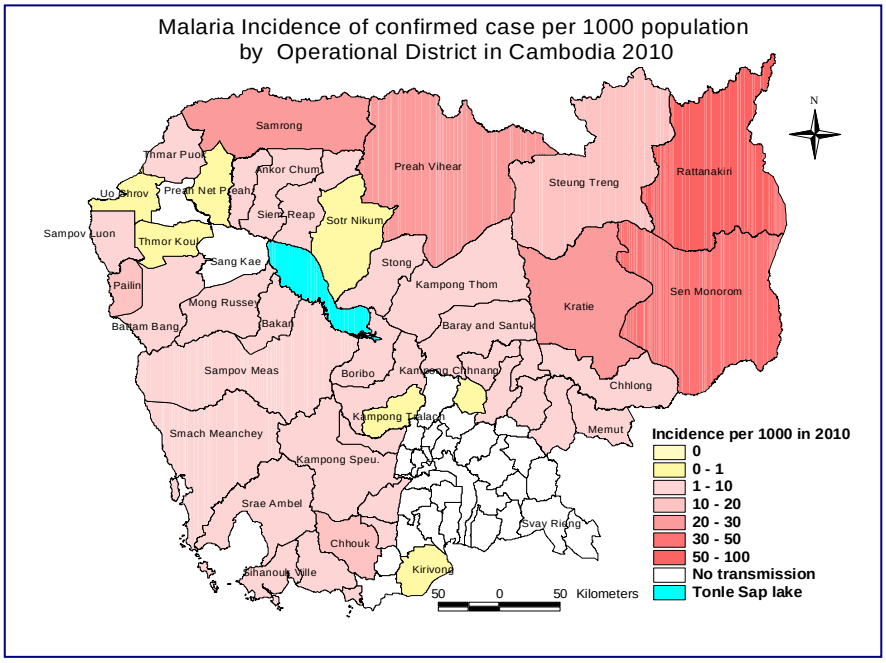
CAMBODIA

Overview

Decades of civil war left Cambodia with a limited health infrastructure, particularly in rural areas; however, over the last decade, many of Cambodia's key health indicators have improved as the country's economy has developed. Both malaria morbidity and mortality rates have declined due to an increased government commitment together with substantial additional financial and technical support from the international community. However, malaria continues to be a major public health concern, as well as an economic burden. Hence malaria control has been given high priority by the government and donor agencies.

The Cambodia Malaria Survey (CMS) in 2010 (with technical support from Malaria Consortium) estimated a malaria prevalence of 0.9% in high-risk areas (<2km from the forest), a significant reduction from the 2.9% reported in 2007. Transmission is seasonal, in the forest and forest-fringe areas of the north, west and northeast, and also in the rubber plantations of the east and northeast. In the rice growing areas of the south and central regions, transmission is low or non-existent and there is no reported transmission in urban areas. Low intensity transmission is found locally in coastal areas. According to the health management information system (HMIS), confirmed malaria is predominantly observed in males aged 15-49 years (51%).

Map 3: Malaria Incidence in Cambodia



According to the CMS 2010, the provinces with the highest malaria prevalence are all in the north eastern part of the country[20], and are not easily accessible, particularly during the rainy season. This part of Cambodia (bordering Lao PDR and Vietnam) is largely forested and has

[20] Mondulkiri (2.7%), Ratanakiri (2.6%), Kratie (2.3%), Stung Treng (1.7%), and Kampong Thom (1.5%).

a large number of ethnic minority groups, many of whom have limited access to malaria treatment and prevention services.

Although several malaria vectors are reported, *An. dirus* and *An. minimus* are considered to be the major vectors and are not normally found in the heavily populated rice growing areas of central and southeast Cambodia. For this reason, malaria in Cambodia is characterized by its strong confinement to forested areas, although some shift has been noted toward fruit orchards and rubber plantations. Even in areas now rather sparsely forested, the prevalence of large numbers of asymptomatic infections is notable.

Cambodia has a strong “net culture”. The CMS 2010 survey indicated that 99% of households owned at least one mosquito net, and 85% of respondents reported sleeping under one the previous night. With the increased resources from various donors including Bill & Melinda Gates Foundation, GFATM, and USAID,, Cambodia has aggressively distributed ITNs and LLINs to at-risk populations. Of the households surveyed in 2010, 75% had an ITN, and 53% of all respondents reported sleeping under an ITN the previous night. However, 52% of households reported LLIN ownership (specifically, as opposed to an ITN), and only 32% of respondents reported sleeping under a LLIN the previous night.

Cambodia has a large number of privately-purchased untreated mosquito nets and PSI estimates approximately 900,000 untreated nets are imported every year. Unlike programs in Africa, where the guidance has been to supply only LLINs and not retreatment kits for the limited number of untreated nets, support has been provided to run a net treatment scheme for untreated nets in Cambodia. Supported by GFATM Round 9, PSI is piloting the ‘bundling strategy’ to ensure that a long-lasting insecticide treatment kit (ICON MAXX) is provided with 70% of all commercially available family-size and hammock nets *before* the nets are released onto the market. In 2010, over 795,000 of these bundled nets were distributed in the private sector in Cambodia. The average price of a bundled net to a consumer is reported to range from US$2.50 to US$5.00.

Public Sector

The National Centre for Parasitology, Entomology, and Malaria Control, formally referred to as the National Malaria Centre (CNM), sits within the MoH. The leadership of the malaria control activities rests at the central level, however the NMCP has in recent years, evolved considerably, changing from an essentially vertical program led by CNM to a more administratively decentralized and integrated program. Responsibility for the detailed planning of many activities has been devolved to provincial health departments (PHDs) and the actual implementation of activities relating to public sector malaria diagnosis and treatment are now more fully integrated into general health services at the health post, health centre and referral hospital level. Each province has a "Provincial Malaria Supervisor (PMS)" who may have additional responsibilities such as dengue and other communicable diseases. Although there are “District Malaria Supervisors” in some of the endemic districts, most district “malaria staff” are multi-functional. There are no specialized malaria staff at the commune level. Malaria specific activities are carried out at the village level by VHWs and VMWs.

Table 8: Public Sector Overview – Cambodia

CAMBODIA MALARIA PREVENTION OVERVIEW:	
Malaria Prevention Objective(s)	Universal access to preventive measures - specifically among target populations (including mobile/migrant populations) Universal awareness and behaviour change among the population at risk Containment of artemisinin resistant parasites Elimination of all forms of malaria through comprehensive BCC, community mobilization, and advocacy
LLIN Distribution	1 LLIN per person and 1 LLIHN per family to populations living in villages at risk 1 LLIN/LLIHN per person for military personnel LLINs/LLIHNs free or on loan from large scale employers to mobile/migrant populations Re-treatment of existing conventional nets with long-lasting insecticide. Approx 3.1 million people at risk and 2.9 million nets procured under GF9 A1 – High transmission area - 1.6 million A2 – Medium transmission area - 200,000 B1 – Low transmission area - 1.3 million Nets transported from central storage to OD (responsibility of CNM) Nets transported from OD to health centres (responsibility of OD) Household Cards list all members of each household in target areas and total nets allocated to each HH (census carried out by HC staff, local authorities and Village Health Volunteers) Nets distributed from HCs and villages (distribution time and place determined by HC but unclear how this is decided) Head of HH shows card when collecting nets CNM plans to do quick and dirty post- distribution evaluation in April
Net Coverage (all nets)	National malaria survey from 2010 indicated 99% of households owned at least one net
LLIN/ITN Coverage	75% of households surveys ad an ITN Temporary Bundling Strategy used to increase ITN coverage

Cambodia is implementing a National Strategic Plan for Elimination of Malaria (2011-2025), to ensure that no artemisinin resistant malaria parasites are detected in Cambodia by 2015, and to achieve the elimination of *P. falciparum* by 2020 and *P. vivax* by 2025. Two objectives relate specifically to malaria prevention:

- To ensure universal access to preventive measures and specifically prevents transmission of artemisinin resistant malaria parasites among target populations

(including mobile/migrant populations) by mosquito control, personal protection and environmental manipulation.

- To ensure universal community awareness and behaviour change among the population at risk and support the containment of artemisinin resistant parasites and eliminate all forms of malaria through comprehensive BCC, community mobilization, and advocacy.

Under the national elimination strategy, the country has been divided into two 'domains', Domain 1 includes 10 provinces in western Cambodia (where the Containment Project was implemented) and Domain 2 covers 10 additional provinces in the East and South. The initial phase of elimination targets not only the populations of the artemisinin resistance containment project but also more isolated populations such as security forces and remote populations of the northeast (largely ethnic minority groups). The CNM is in the process of updating their malaria risk stratification based on incidence and risk of transmission (Table 9) to implement vector control interventions.

Table 9: Proposed stratification by transmission

Category	Characteristics
A1	high transmission
A2	medium transmission SPR > 5%
B1	low transmission, SPR < 5%
B2	no transmission, < 1 / 1000
C	non-malarious, only imported cases

One LLIN per person and one long lasting insecticidal hammock net (LLIHN) per family will be provided free to charge to those living in villages at risk, as well as the re-treatment of existing conventional nets with long-lasting insecticide. Police and military personnel will also receive one free LLIN/ LLIHN per person. For mobile/migrant populations LLINs/ LLIHNs will be distributed either free or on loan from large scale employers.

Table 10: Target Groups for the Key Vector Control Interventions

Intervention	Target Groups	Comments
LLIN	Village populations at risk, police & military	
LLIHN	Village populations at risk, police & military	
Mobile population	Loaning scheme-seasonal migrants	Identify through existing VHV/VMWS
	New settlers-not recognized villages	Identify through mobile surveillance staff at each health centre w/motorcycle, establish

MMWs as needed

The CNM has struggled to reach vulnerable populations in remote areas. One of the strategies employed to address this is to increase the coverage of malaria services through VMWs. However, not all villages in malaria endemic areas currently have VMWs.

Although Cambodia has clearly segmented groups for targeted distribution, there there is clear need for more precise quantification tools to determine the number of LLINs and LLIHNs required. Although Cambodia expects to receive enough LLINs to cover their target population through the GFATM Round 9, it does not have any additional nets for implementing any continuous distribution strategies or to replace nets that may be torn or burnt or simply disappear, following the mass distribution campaigns. Data collected and analysed by Dr Albert Kilian (Malaria Consortium) from several African countries has been able to clearly show a rapid decline in coverage , however, there is currently no information to assist the CNM with predicting how quickly coverage of nets will drop after universal coverage is achieved.

While documents are in place to guide the distribution of LLINs/LLIHNs, there have been several setbacks in implementation, causing delays and increased costs. The main problem to date has been a lack of storage capacity once nets are delivered from the central store to the Provincial and Operational District (OD) level. Lack of funds for operational costs (particularly for activities covered by the GFATM) has also led to some complaints from the PHD and ODs.

Civil Society

Although distribution of LLINs/LLIHNs is carried out by the public sector staff and structures, several international and local partners are involved in supporting the implementation of malaria prevention activities, as outlined in Figure 6. Operational and research activities, including training through and for CNM, is also supported by various partners, such as NIH, AFRIMS, NAMRU, Wellcome-Trust-Oxford-Mahidol, Malaria Consortium, Tropical Institute of Antwerp and WHO.

Table 11: Civil Society Overview - Cambodia

Organisation	Malaria Prevention Activities
University Research Co. (URC)	Training Village Health Support Groups on the collection of LLIN/ITN data at the village level. Capacity building on prevention BCC Supporting farm loaning scheme – LLINs to farm workers
Family Health International (FHI)	Supporting farm loaning scheme – LLINs to farm workers Taxi Sensitization for mobile farm workers in Pailin Training of mobile malaria workers (MMWs) in Pailin/along the Thai border areas Development of BCC materials
Population Services International (PSI)	Bundling strategy for (re)treatment of conventional nets with LLITks
Malaria Consortium (MC)	Operational research on migrants, BCC strategies
BBC Media Action	BCC mass media, TV and radio - focus on containment
Partners for Development (PFD)	No prevention. Focus on EDAT
Health Poverty Action (HPA)	BCC/IEC among ethnic minorities (in Ratanakiri and Preah Vihear provinces) Training public health staff in community participation and mobilization
Women's Media Centre (WMC)	Gender-appropriate BCC/IEC, using radio and video programs for general malaria awareness
Wellcome-Trust-Oxford-Mahidol	Field testing spatial repellents (in collaboration with Liverpool School of Tropical Medicine)
Tropical Institute of Antwerp/WHO	Field study of topical repellents with CNM
Asian Medical Doctors Association (AMDA)	Recruiting / training community health volunteers BCC at villages level (mobile malaria media events)

Private Sector

The following PEST analysis gives an overview and summary of the private sector environment within Cambodia.

Table 12: Cambodia 'PEST' Market Analysis

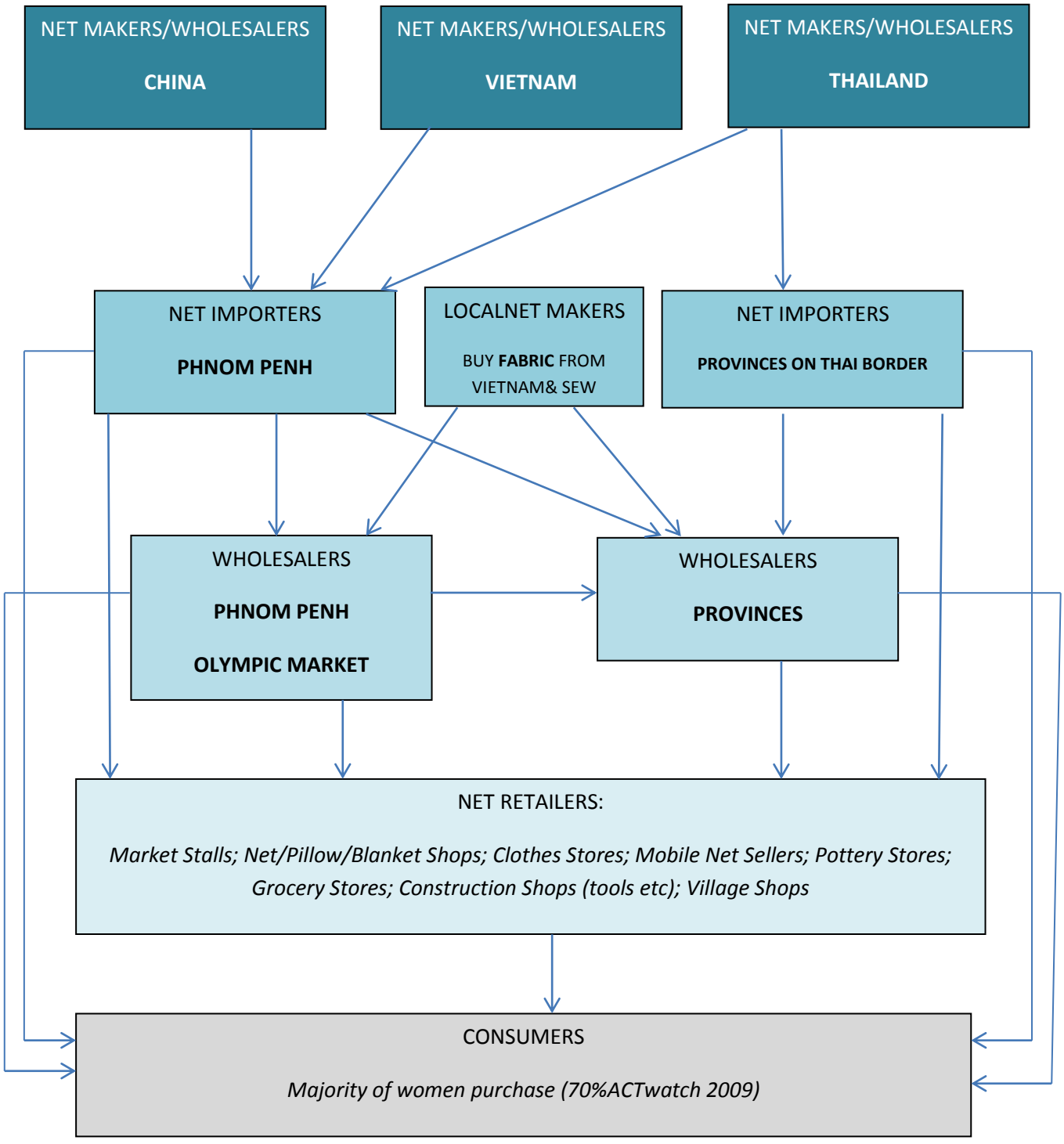
	Political	Economic	
+ve/-ve: There is strong political support from the Prime Minister for malaria elimination efforts in Cambodia There are few organizational structures in place to organize malaria prevention efforts inter-sectorally e.g. with business/industry support	• Strong support from CNM for both ITNs and LLINs. Need a clear policy articulation for the role of the private sector in malaria prevention • Free LLINs are being targeted to those most at risk (3m). This leaves the commercial market un-distorted by public sector programs • Significant funding still available for free LLINs supply from donors (e.g. GFATM, BMGF) • Procurement of WHOPES approved LLINs from outside the country • Upcoming elections – free LLINs may be used as a political commodity • No real government support for existing local producers, little capacity to monitor • Malaria is a priority health intervention, but little top-level government advocacy or inter-sectoral support for malaria • Strong international influence on local policies • Conflicts on Thai Borders • Farming, Agriculture, Mining, Logging, construction etc are all poorly regulated (or run by crony capitalism) and so difficult to identify stakeholders to work with	• Current duties (?% duty, ?% VAT) for commercial purchase (0% if by Government). Govt does not enforce tax collection and duties – lax economic environment, freedom for importers. • There is a steady demand for nets with an increase in seasonal demand for nets during rainy season • Riel has seen a small rise against the US$ (March 2012). Increased confidence in the currency. • Major urban markets and distribution systems are well developed for the country • Total net market size is likely to remain constant despite declines in donor funding. Thanks to buoyant private retail environment for nets • Bundling Strategy has shown reach of distribution systems into rural markets for nets • Local producers have shown to be downsizing numbers of net sewers, in favour of cheaper finished products from Vietnam. • No reports of leakage of free LLINs into retail market • Majority of WHOPES approved LLIN brands are not registered in Cambodia – have to do	**+ve/-ve:** There is a very free market in existence without capacity for regulation The net market is buoyant and there are a number of suppliers, currently meeting consumer demand and preference. Price does not seem to be a barrier to purchase. Nets are affordable to all wealth quintiles. The net market is a low-tech market with very low profit margins. The neighboring, technological advanced economies of Thailand, China and Vietnam appear to be dominating the net market

		so, before entering the retail market (registration issues) • Sales to date of LLINs have been institutional and retail LLIN market is non-existent.	
+ve/-ve: There is a very positive conducive environment for malaria prevention in Cambodia Knowledge, attitudes and awareness of nets to prevent malaria is high and favourable There is more work to be done to fully understand consumer preferences and use of appropriate prevention tools among the most at-risk populations	**Social** • There is a good net use culture in Cambodia. Almost 100% of households own at least one net. • Single size and shape of LLINs distributed for free has not considered user preferences for longer, softer fabric, colourful-design of nets. • Financial coping mechanisms within poor households may not allow for purchase of larger no. of nets. • Number of people sleeping under ITNs is still low. • Opportunity for large-scale BCC campaigns to reinforce treatment of existing household nets. • Still some misconceptions about dirty water and hygiene causing malaria and the safety of insecticide. • Women are more disposed to purchase and use nets. • Outdoor transmission focus required on migrant and mobile labourers, adult males.	**Technological** • Important to monitor consumer preferences for nets and other prevention tools e.g. clothing, repellents • Research into other interventions needed to prevent outdoor transmission at forest fringes • Greater range of media can be employed to promote the prevention message – possibility of using mobile phone technology • No capacity established to produce LLINs in-country • Large capital investments would be required for changes in technology for local LLIN manufacture. No local manufacture begun. • Change to LLIN technology would cause most local net players to exit the market – with a resulting loss of consumer choice • Potential for local manufacture of LLINs/ITNs – using different end-of-line treatment technologies • LLITks are not available commercially. This is cited as the main reason people don't treat their net (30-50%)	**+ve/-ve:** The low-tech environment in Cambodia has meant that the market is becoming more and more dominated by external suppliers even for untreated nets Opportunities to introduce appropriate technology to provide alternative prevention tools to prevent outdoor transmission e.g. clothing, topical repellents, spatial repellents

Private Sector Activity in Cambodia:

Cambodia has the most detailed analysis of the private sector in this region. PSI's bundling strategy, begun in December 2009, enabled detailed insights into the workings of the net market in Cambodia to be gathered. Figure 2, below, is an illustration of the Cambodian supply chain for nets, identified through the PSI Bundling Strategy. This is the fullest picture currently available of the net market in any of the three Mekong countries.

Figure 2: Cambodian Net Distribution Chain



There are six main brands or types of net available in Cambodia, as shown in Table 13.

Table 13: Net Brands/Types available in Cambodian Market*

Brand /Type:	
B-52	A family rectangular net imported from Thailand. There are many different types of B-52 nets: 'Bird' and 'Flying Lion' were most popular. The brand name is clearly printed on the plastic bag
Ordered net	A family rectangular net. These come in 2 sizes: 1) std size and 2) customised size. Some of the ordered nets are imported from Vietnam; others are produced in Phnom Penh and Battambang. They normally have no brand or other sign to identify them.
Ordinary net	They are similar to ordered nets, but do not have any specific or standard size. They are sewn by the maker without catering to customer requirements. The price of these nets is low compared to others (aside from std size) There are 2 types: 1) Sewn in Vietnam and 2) sewn in Phnom Penh
Covered net	A family or individual net, which has an inbuilt metal frame to set up easily rather than hanging with ties.
Pak Ya	An upmarket net. Most sewn in Battambang and Phnom Penh, with a few imported from abroad. The nets have an entrance. It is bought for newly-weds.
LLIN	A long lasting insecticide treated net (LLIN). WHOPES approved. Factory treated. Imported.

**Source: PSI Bundling Strategy Pre & Post Bundling Interviews with Net Importers & Wholesalers 2009/2010*

Table 14 details the purchase price and selling price of the nets available.

Table 14: Average Reported Purchase & Selling Price of nets by brand/type/size*

Brand/ Type	Purchase Price						Selling Price					
	Small		**Medium**		**Large**		**Small**		**Medium**		**Large**	
	Riels	**US$**	**Riels**	**US$**	**Riels**	**US$**	**Riels**	**US$**	**Riels**	**US$**	**Riels**	**US$**
B-52	7,700	1.90	14,200	3.50	18,600	4.50	9,200	2.20	15,300	3.70	19,500	4.80
Ordered net	7,500	1.80	13,200	3.20	18,200	4.40	8,800	2.10	14,000	0.30	18,700	4.60
Ordinary net	7,300	1.80	12,100	3.0	17,900	4.40	8,900	2.20	12,700	3.10	18,000	4.40
Covered net	7,800	1.90	12,900	3.10	19,300	4.70	8,400	2.00	14,400	3.50	21,500	5.20
Pak Ya	10,200	2.50	23,900	5.80	n/a	n/a	11,500	2.80	24,300	5.90	n/a	n/a
LLIN	8,900	2.20	15,300	3.70	19,500	4.80	13,800	3.40	16,800	4.10	20,300	5.0

**Source: PSI Bundling Strategy Pre & Post Bundling Interviews with Net Importers & Wholesalers 2009/2010*

Table 15 illustrates the fact that nets are an extremely low margin product; therefore volume selling is the only way to make a profit on net retail.

Table 15: Profit Margin by Net brand/type/size*

Brand/Type	Profit Margin					
	Small		**Medium**		**Large**	
	Riels	**US$**	**Riels**	**US$**	**Riels**	**US$**
B-52	1,500	0.37	1,100	0.27	900	0.22
Ordered net	1,300	0.32	800	0.20	500	0.12
Ordinary net	1,600	0.39	600	0.15	100	0.02
Covered net	600	0.15	1,500	0.37	2,200	0.54
Pak Ya	1,300	0.32	400	0.10	n/a	n/a
LLIN	4,900	1.20	1,500	0.37	800	0.20

**Source: PSI Bundling Strategy Pre & Post Bundling Interviews with Net Importers & Wholesalers 2009/2010*

Table 16 illustrates this point further with data from the 2010 CMS, which shows that the mark-ups between buying and selling prices are around 10 to 20% or 2,000 to 3,000 Riels ($0.50-$0.75).

Table 16: Cost to buy and sell nets for mosquito net providers (CMS, 2010)

		Buying Price (KHR)[21]			Selling Price (KHR)		
Type of Net	**Outlets (N)**	**Mean**	**Median**	**Min, Max**	**Mean**	**Median**	**Min, Max**
LLIN							
Olyset	8	13437	13000	8000, 20000	15312	15000	8500, 25000
PermaNet	11	14318	13500	8000, 20000	15864	15000	8500, 22000
Malanet – bednet	25	13580	1100	6500, 33000	15720	13000	9000, 35000
Malanet – hammock	27	9548	10000	4800, 24000	11370	12000	6500, 28000
NetProtect	0	-	-	-	-	-	-
GF/MoH logo	0	-	-	-	-	-	-
Conventional							
B52	125	18656	18500	8000, 48000	21528	21000	10000, 50000
No logo	93	11682	10000	4500, 44000	14204	12000	8000, 48000
Hammock	77	7799	7000	5000, 45000	9909	9000	6500, 50000
Other	49	25929	29000	6000, 55000	29663	32000	7000, 60000
Bundled							
B52	68	19568	18300	8500, 48000	22191	21000	10000, 50000

[21] KHR = Cambodia Riel; approximately $1USD = 4000 KHR

No logo	68	10507	9000	6500, 25000	12949	12000	7500, 27000
Hammock	30	7810	6900	5300, 20000	9743	8750	5800, 24000
Other	31	16774	9000	5500, 49000	19016	12000	7500, 52000

Local producers in Phnom Penh import cheap netting from Vietnam or China and employ teams of women scattered throughout the city as piece-workers to cut and sew the nets. One local producer, met in Phnom Penh during the assessment, Kong Hen, described her set-up with 10, piece-work stitchers, who each earn 800 riel producing nets sold at a rate of 100 per day. Originally she had 30 stitchers, selling 500 nets per day, but now tops up her supply using the cheap Vietnam ready-made imports. She believed that there were five or six local producers like her.

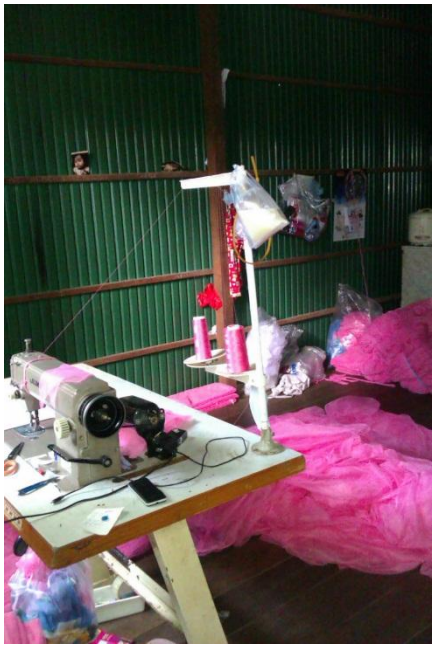


Image 21: Local piece-rate worker's home

ITN Bundling Strategy

The bundling strategy was devised as an interim measure to address the issue of untreated net use among at risk populations. The strategy aimed to show whether it was possible to gain the huge cost efficiencies of using the existing private sector retail channels to supply LLITks with the conventional nets. Cambodia has relatively few net importers and a highly centralised retail distribution system, that has one major wholesale market as the hub through which most products flow out to provincial markets and beyond – this is Olympic Market in Phnom Penh. Once the concept was devised, it became clear that one could not segment the retail market to cater only to the at risk population areas of the country, without incurring huge costs inefficiencies, therefore the program was designed to bundle all nets, reaching all areas of the country. Further, as there is migration around the country, it was considered that nets would be assured to reach migrant populations via this method before they moved to the at risk areas.

PSI was identified as the partner to implement the strategy due to their significant experience of working in the private sector with social marketing. PSI had attempted to socially market an over-branded LLIN, Malanet, for two years, but was only able to achieve 9% market share and so it was decided to withdraw the product in this already competitive market.

PSI approached and gained buy-in from the existing net traders (importers and wholesalers) operating in Phnom Penh. PSI claim to have signed up 100% of the net traders. The few who were sceptical at the beginning subsequently approached PSI and asked to be included, saying that they were losing customers by not being part of the program.

Conventional nets were bundled at the top of the supply chain, where possible. IconMaxx[22] LLITks were over-branded as, 'SuperMalatab' to build on name recognition of the brand already established.

Image 22: Kim Neng, small net importer, Phnom Penh

Image 23: Bundled Nets, Phnom Penh

PSI initially engaged Blitz teams at the start of the project to work with retailers to ensure that the nets were bundled or given freely with nets as they were bought.

There was a mass communications strategy, which included television and radio spots, based upon thanking mums for their daily activities in looking after their families, including buying a bundled net and dipping the net in the insecticide. In addition, billboards and mobile video units were used to reach a wider audience. The strategy aimed to reach both net retailers and their clients to encourage the uptake of ITks by retailers, demand for them by their clients, and use of the LLITK in the household to treat the net.

Results were:

[22] IconMaxx is bought at $1.45 per kit

- In 2011, PSI hit its targets and delivered **700,015** LLITks to relevant stakeholders across the country.
- In 2012, they aim to distribute an additional 700,000 LLITks
- 72% of outlets were selling bundled nets (according to PSI MAP Survey data)

Image 24: Olympic wholesale market, Phnom Penh

Image 25: Variety of nets including Hammock Nets, Olympic Market

Whilst visiting Phnom Penh, it became clear that the Bundling Strategy employed by PSI was not popular with CNM. Some viewed the strategy to be profligate, since it was not targeted at the high risk groups. PSI countered this by saying that the strategy had not been clearly understood and in fact, there were no distribution costs associated with this intervention, since distribution is undertaken by the private sector wholesalers themselves.

To clarify, PSI-Cambodia supplied a breakdown of the expenditure on the Bundling program (see Table 17). These estimates of expenditures were made using the information given and show that the vast majority of the expenditure is made on procurement of LLITks (60%) and packaging (7%). An expenditure of 29% went to BCC. Only 4% of expenditures were distribution costs and c$50,000 of this expenditure was spent on the blitz team activity. Budgeted figures were higher and the 2012 procurement of an additional 700,000 LLITK's are budgeted to cost a further c$1m.

Table 17: PSI Bundling Expenditure

Activity: (% of total exp)	Detail:	Expenditure GF 6 (USD)	Expenditure GF 9 (USD)	TOTAL (USD)
Procurement of LLITks (67%)	IconMaxx	875,731		875,731
	Packaging	78,945	17,546	96,491
Distribution to W/S (4%)	Planning, Admin, Transport, Blitz team activity	51,376	5,336	56,712
Behaviour Change Communication (29%)	Radio, TV & MVU (shared with other ACT,	367,750	29,014	396,764

	RDK activities)			
	IEC and POS materials	11,749	15,535	27,284
M&E (negligible)	M&E costs	1,042	928	1,970
TOTAL				1,454,952

PSI undertook a rapid assessment survey of net use in three communes to explore behaviours of those that had purchased a bundled net. The assessment took place in three communes in Banteay Meanchey, Kratie and Kampong Cham. The goal of the assessment was to determine the extent to which LLITks were properly used, and perceptions of the kits.

Of those that purchased and slept under their net, 60% were dipped according to instructions on the kit. Two key reasons were given for not dipping:

1) a fear of side effects from the insecticide: 29% of respondents reported concerns about the product kept them from using the nets, and
2) A reported lag between purchasing the net, and sleeping under it. Respondents indicated that they often purchase nets to have on hand for example for use by future guests, but the net is not used immediately

There were key lessons learnt from the activity, as detailed by PSI:

1) Ensure sufficient product supplies to avoid stock-outs of LLITks - to prevent lack of trust developing amongst partners and frustrations for consumers. PSI had 10 months of activity and was then stocked out of LLITks for a further seven months.
2) Lengthy procurement procedures hampered program implementation and BCC efforts were not well coordinated with actual program activities.
3) Intensified BCC efforts are required to ensure that nets are treated soon after purchase and to allay any misconceptions about insecticide safety.
4) Blitz teams are useful to engage at commune level to deal with supplies of nets affected by stock-outs and to ensure that LLITks are bundled for delivery to more remote rural areas
5) Wholesalers at top of supply chain are better to work with than net importers.
6) Flexibility is required to package different products from different suppliers – some nets are pre-packaged well and some remain unpackaged and therefore bags needed to be provided. Tight bale packaging prevents all nets bundled at the wholesaler, hence Blitz teams bundled the products further down the supply chain, or retailers just gave the LLITks with each nets as they were sold.

Hammock Nets are widely available in the private sector markets and were bundled with LLITks too. From our market site visits, we were able to see whole market stalls devoted to hammocks and hammock net sales, see Image 26.

Image 26: Hammock nets, Olympic market, Phnom Penh

There is some concern over the future of the bundling strategy, and there is a need for more robust monitoring and external evaluation of the program to determine whether is a cost-effective intervention. It remains unclear where the process now stands. The bundling strategy pilot is due to run until mid-2013.

LLIN Lending Scheme

- Private Farm Employers supply LLINs to seasonal migrant labourers
    - Subsidise the full cost of the LLINs, which are supplied free to farms
    - Monitoring and administration provided with NGO support (FHI/URC)
    - BCC provided by VMW and MMWs with support from FHI/URC
- Gaps:
    - Mapping of all employers in risk area and the number of migrants employed
    - Orientation and proper sensitization of the landowners on their potential role and involvement in the malaria prevention and elimination
    - Capacity building of landowners in communication and health education skills
    - Acknowledgement of the role model farm owners working on the lending scheme to motivate and encourage other land owners to follow the same strategy

Image 27: Farm labourers accommodation, Pailin

Image 28: Farm workers with LLIN, Pailin

Both URC and FHI have been involved in the employer ‘Loan Schemes’ or ‘Lending Schemes’ begun in Pailin and now being extended to other parts of the country through URC’s work for CAP Malaria.

FHI identified the farm owners within the high risk areas and recruited 40 farms out of 86 farms in the region.

This is possibly a highly replicable scheme. Migrants do not always carry their nets and some farms are situated far from markets. FHI data show this to be an efficient intervention. Further M&E is needed to evaluate from the user/consumers perspective, especially on use of the LLINs. Farm owners appear to be able to keep track of nets and retain loaned nets.

Each farm has a MMW who is incentivised by FHI for $10 per month. The MMW is a current employee of the farm, and reports to the nearby Health Centre wherethey have regular meetings and gatherings.

Image 29: New rubber plantation, with hammock, Pailin

Image 30: Rubber tapping, Pailin

From the informal survey of farms done during our visit to Pailin, it was clear that the relationship between the farm owner and seasonal migrant labourer is reciprocal and indeed there are relationships formed between employer and employees. These relationships are nurtured and often farm owners call up known and trusted workers to come for the particular work that is required. It is a natural extension then to expect that farm owners would want to protect their labour force from malaria. When asked if farm owners would be prepared to buy nets for their workers rather than be given them for the loan scheme – owners said that having participated in the scheme they can see the advantage of nets being used by their workers and some would indeed buy nets to loan to workers; other said that they would be prepared to advance labourers wages to enable workers to buy nets from the local markets at the beginning of their stay.

There is a new retail market opened up in Pailin–Phant Rolim. Retailers here get their supplies of nets and hammocks from Battambang and the Thai borders. It is still quite a new market - only 1 year old. Mobile migrants and farmers shop here. There were 3 net retailers in this market. This market is not as big as the Pailin central market, Sam Maki – but easier access for farm workers.

Migrant Taxi Service Program

Whilst in Pailin, FHI were able to show us the Taxi strategy in situ and we were able to talk to a few participant Taxi drivers – malaria sensitizers. These drivers are paid an incentive of

$10-$15 per month for participation in the program. The aim of the strategy is to enable taxi drivers bringing new migrants from the neighbouring city of Battambang to Pailin and back, to sensitize the newcomers to the area about malaria prevention, diagnosis and treatment messages. Cars are outfitted with 'Ask me About Malaria' external car stickers; sun visors and music tapes with the 'Ayay' malaria song and program (of malaria messages) to play in the car.

Image 31: Taxi with malaria prevention messaging, Pailin

On average each taxi takes about four passengers a day from Pailin to the remote farm locations. A journey from Battambang to Pailin would cost $5 per person. Renting the whole taxi would cost 114,000 Riel ($35-$40). When pressed it was clear that the driver training was quite limited (only one day), as drivers were not too clear about insecticide treatment and the benefits of LLINs, for example. There was no reminder sheet with detail for the driver to impart. It was apparent that the message recall of drivers varied considerably.

FHI is considering moving from taxi's to trucks – as more migrants are likely to use the cheaper transportation of trucks rather than taxis. Methods to identify truck drivers are still unclear.

Monitoring and evaluation is done through a variety of means: direct observation via program staff, VMWs, and traffic police, as well as exit interviews with migrants. No results of this monitoring were seen during this assessment. This is necessary before an assessment can be made about project effectiveness.

Table 18: Summary of observations and insights from Pailin field visit (22-24 Mar):

Location:	Interviewee:	Observations:
1. Phnom Chrouk Village Immature Rubber plantation 10 hectare farm Permanent staff 7-10 people Additional 4-5 tappers taken on (skilled) [NOT PART OF LOAN SCHEME]	Female Owner Husband trained in rubber tapping by Ministry of Agriculture	• Malaria no longer seen as big problem • Received and happy with free issue LLINs • Before the free issue, bought and used untreated nets • Unclear as to benefits of LLIN • Aware of dipping net treatment schemes during BCC concert/event. • Migrant workers are long term residents from Pursat and Kampon Thom. • Same workers for last 5 years. Return home once a year. • No access to TV or radio (no electricity)
2. Andong Thmor Village	Female owner	• Malaria not as big problem, since deforestation

Mature rubber tapping and cassava farm. Have 10 hectares in use 40 hectares still growing 15 permanent staff 15 migrants workers 2 rubber tappers (skilled) [NOT PART OF LOAN SCHEME]	Male farm manager	• Migrant workers come from Battambang • Migrants are known to farm manager and come twice a year, when called via mobile phones • Many mosquitoes seen in the rubber plantations – seen as nuisance (not malaria risk) • Would like to be part of Loan Scheme, but owner lends nets supplied by NGO (30) two years ago • Understands benefits of LLINs • Permanent staff paid $100 per month • Tappers (skilled staff) paid $200 per month • Migrants (piece-work) paid $5 per day • Have satellite dish and access to TV and radio
3. Malaria Consortium (NGO)	Sophal Uth	• Operational research • Prepared to do further mapping of migrant patterns • MC conducting BCC evaluation (due in June 2012)
4. FHI 360 (NGO)	Lim Kimseng	• Strategic behavioural communications • IEC materials development • Reviewed BCC/IEC materials • Flipchart (developed Dec 2011) – noted that there was no mention of LLIN, or LLIHN. Benefits of long-lasting insecticide treated products appear to not be clearly articulated • Suggested more training required of VMW and MMW for interpersonal communication • Monitor Loan Scheme and Taxi Program
5. Pailin Provincial Health Department (PHD)	Dr Sovan	• Participate in Loan Scheme – first a census register of migrants is undertaken • Farm Owners sign agreement with FHI and PHD • PHD provides nets for loaning (7000 nets distributed) • Recruitment and retention of VMW and MMWs difficult • Concurs that concept of long lasting and insecticide treatment is not fully understood • Complaints about Olyset nets, holes too big, too short • At provincial govt. level – believes Dept. of Planning & Rural Development could carry out mapping of farm migrants etc. • Distribute free LLINs without packaging because nets were either being stored or sold on (leakage) to other provinces • Government considering community based health insurance • Dengue is also a big issue and problem in the country
6. Taxi Program, main street, Pailin.	Taxi Owner. Owns 4 taxis, drives 1 himself Taxi Driver	• Averages 14 passengers per day • Charge $5 per passenger or $35 for whole taxi • Migrants pay (farm owners don't) • Knowledge of prevention messages was vague – not clear about LLIN benefits • Complaints re Olyset (holes and short length). Does not use the LLIN received, uses untreated net wife bought at market • New in job – only 5 months • Unclear about biting time 5pm-8pm - stated incorrectly • Knows about net retreatment – and how insecticide repels • Uses LLIN himself for last 3 years

		• No understanding of long-lasting benefits • Refers people with fever to hospital or MMW
7. Krachap Leu village Corn & bean farm 30 hectares 30-50 migrants workers	Morn Poy Male farm owner and acts as MMW	• Acquired land from Khmer Rouge • Before loan scheme, many workers for sick, now improved • Some migrants bring own nets, some don't have • Received 50 loan nets. Need replacing after 2 years • Owner could not afford to buy for workers, but he would buy nets for the migrants from the market with an advance on wage • Dipping of nets done at Village chief house • Migrants do not mind the second hand net • Complained of Olyset being too short • Migrants also earn extra income from catching & selling crickets • Brokers visit farms in locality to negotiate prices of produce • No formal information exchange systems between farms – all informal sharing of knowledge and needs for migrant labour etc • Long-term (2 years) and short-term migrants hired • Owner is an example of a Positive role model
8. O'Ktimg Village Small farm owner Mung beans 10 migrant workers [NOT PART OF LOAN SCHEME]	On Thorn Farm Owner and also a VMW	• VMW program started in 1993 • Provides education on malaria prevention, plus diagnosis and treatment • Visits from house-to-house, especially newcomers • Good knowledge of prevention and treatment of nets • Visits farm owners employing migrants • Passionate about role for good of his community • Believes that very few migrants come with their own nets, but are told not to, because will receive when they arrive • Would buy nets for his own workers, does not believe this is too much to pay and he would dip the nets himself • Believes in self-reliance, not need to receive free nets • Number of migrants decrease as Thai/Cambodia situation eases – potential for more income to be earned in Thailand. • Would advocate to farmers to buy nets for their workers – can show success of prevention measures and benefits to farmers • Takes 2000-3000 Riel as ksappreciation for malaria treatment • On Thorn is an example of a Positive role model
9. Pre Mongkull Village Cassava for bio fuel 120 hectare farm Permanent staff 20 Migrant workers 60 (have had as many as 500 migrants in good harvest years)	Phai Phalla Farm Manager	• Is part of Loan Scheme (60 nets) • 60% of workers come with their own nets • Farm manager educates workers • Health Centre next to farm. Doctor there owns farm. • Believes that it would be a good investment to buy nets for workers, so would do so if no more free LLINs • NGO comes to farm to dip nets for workers – twice a year • Hammocks are used on farm but no free hammock nets
10. Pang Rolim Village 40 hectares rubber	Yim Bony Farm Owner	• Complained about not receiving free LLINs, despite that 'millions of free nets' were advertised on radio'.

80 hectares corn and cassava (will convert to rubber) 10 permanent staff 50 migrant workers [NOT PART OF LOAN SCHEME]	(with son)	• Not keen to monitor nets as required by Loan Scheme (came round to idea by end of interview) • Would not buy nets for workers since free nets are available. Would maybe do so in future, if free nets discontinued
11. Phant Rolim Market Retailer	Retailers	• New market, only one year old, near to migrant farms • Farmers and some migrants shop here • Receives nets from Battambang Wholesaler and from Thai borders • Nets received from Battambang were bundled with SuperMalatab • Smaller stock held, because demand is less with free LLINs available • Variety of nets available including hammocks and hammock nets (10,000 Riel). B52's popular
12. Sam Maki Market, Pailin	Retailers	• Sell a variety of nets. B52's popular • Sell to farm owners and permanent workers mostly
13. Psa Prum Market, Cambodia Border	Retailers	• Sell a variety of nets. B52's popular • Some nets bundled with SuperMalatab, some not. Stock of LLITks available • Sells a lot of nets to both migrants and farm owners • Also sale of hats with covers used by migrants 'muok mean robang'
14. Phakkard Market, Thai Border Market Chantaburi province	Retailers/ Wholesalers	• 16 stalls selling nets here • Sell only to Thais e.g. Thai rice farmers • B52s popular – Flying Lion, Bird, Golden Horse • Sell wholesale quantities from this market to Cambodia • Wholesale to Cambodian market was good, despite free LLINs

Stable Target Groups

The majority (80%) of Cambodia's population lives in urban or rural areas without malaria transmission. The remaining 20% (approximately three million), who either live permanently in the forested endemic areas or are "forest dependant" for additional income besides rice farming, are at risk of malaria and 1.62 million of these live in the high transmission areas within 1 km of the forest. These areas are sparsely populated with an average of just five inhabitants per square kilometre (compared to 132 inhabitants per square kilometre in non-malarious central areas of the country). The populations living close to the forest are also the poorest people and face greater challenges reaching public services, including health care.

Traditional forest dwelling inhabitants (ethnic minorities) live mainly in the north eastern part of the country; most concentrated in Ratanakiri and Mondulkiri (approximately 200,000). All age groups in this category are exposed seasonally to long periods of intense transmission. Adults are usually partially immune but children and pregnant women are still extremely vulnerable. The majority of staff in formal health facilities in the hard to reach areas, such as Ratanakiri, do not speak the local language which, along with cultural differences, is thought to be the primary barriers to providing access to high quality prevention, treatment and/or care and support services. These ethnic minority groups often have their own traditional and cultural beliefs regarding treatment-seeking, and rarely utilize health facilities even if they are available. The successful implementation of the VMWs in the previous GFATM rounds has warranted the scale up VMWs and MMWs in these remote areas to provide outreach activities.

Approximately 1,300,000 people live in rice growing communities close to the forest. Villagers (predominantly young men) make frequent overnight visits to the forest to hunt and to collect construction wood and other products. These visits put the forest-goers at risk for contracting malaria. Cases returning to the village can infect anopheles mosquitoes breeding in and around the rice fields. Although these species are less efficient vectors of malaria than the ones found in the forest, limited local transmission can occur and put all age groups at risk. It is estimated that approximately 400,000 people live within 1-2 km from the forest making this group of forest fringe inhabitants highly vulnerable to contracting malaria. Part of the GFATM Round 9 strategy is to target these forest fringe inhabitants by providing LLINs and innovative long-lasting insecticidal hammock nets (LLIHNs) to those who go into the forest.

Table 19: Stable target groups - Cambodia

STABLE POPULATION TARGET GROUP	GROUP PROFILE		OUTREACH POSSIBILITIES	PUBLIC SECTOR INTERVENTIONS	CIVIL SOCIETY INTERVENTIONS	PRIVATE SECTOR INTERVENTIONS
1.Permanent residents at risk of malaria 	Approximately 3.1 million who live permanently in the forested endemic areas or are "forest dependant"	A1: Live within 1 km of the forest and are the poorest people, therefore face greater challenges reaching public services A2: Largely ethnic minority groups where language and cultural differences are the primary barriers to accessing high quality, affordable and locally available services B1: Villagers from non-endemic areas, predominantly young men, who make frequent overnight visits to the forest	Outreach possible - home address known	EXISTING: Free LLINs Village malaria Workers BCC and dipping POTENTIAL: LLIN distribution via ANC clinics, EPI outreach, & TBAs	EXISTING: BCC CBD POTENTIAL Prevention BCC	EXISTING: Retail sale of nets & hammock nets POTENTIAL: LLIHN Other PP Tools
2. Ethnic minorities 	Visiting forests for hunting, fishing, collecting valuable products Concentrated in the Northeast provinces of Ratanakiri and Mondulkiri Considered part of A2 group for Universal Coverage strategy Adults usually partially immune but children under-five and pregnant women still vulnerable		Outreach possible - home address is known, access may be difficult due to remoteness	EXISTING: Village malaria Workers, BCC and dipping campaigns POTENTIAL LLIN distribution via ANC clinics, EPI outreach, & TBAs	EXISTING: BCC CBD POTENTIAL: Prevention BCC	EXISTING: Retail sale of nets POTENTIAL LLIHN Other PP Tools

Cambodia also has a high incidence of internal migration: rural to rural migration dominates, followed by rural to urban, urban to urban, and urban to rural. Border crossers and temporary migrant workers are estimated to account for approximately 400,000 people. Migration is mainly seasonal in nature with people working in the forest for extended periods such as gem miners, loggers, construction workers, agricultural farm workers and sandal wood collectors. Interestingly, drug efficacy studies in the north east to date show no resistance to artemisinin, despite the high incidence. Similarly, chloroquine resistant *P. vivax* is seen in the northeast but nowhere else in country[23]. This implies no de novo mutation in the region, and limited movement of people from the north eastern area to other parts of Cambodia or across the border to Vietnam.

Soldiers and border police are at high risk of contracting malaria. Most of those who fall under this group are adult males however, a survey by URC in 2008 on migrants along the Thai-Cambodian border suggested that some traveled with their families and some even with their pregnant wives. The migrant workers may come from villages near the forest but many also come from far-flung regions of the country when there is seasonal demand for labour, which may mean that they have little or no immunity to malaria. According to the same report, those who do seek treatment go to the private sector and many will also wait to seek treatment when they return to their homes, which could increase the chances for further spread of artemisinin-resistant parasites.

To target border-crossers and temporary migrant workers, CNM is recruiting and training mobile malaria workers (MMWs) to provide diagnosis, treatment, and to take part in cross-border surveillance activities. Border malaria posts have also been established in some provinces to provide free diagnosis and treatment for border-crossers.

Targeting for malaria prevention activities has been based on a system of stratification, which in turn is based on the proximity of each community to the forest. In the absence of reliable epidemiological data, proximity to forest is likely to be the best available indicator of risk, and for practical purposes there has been no concerted and consistent attempt to verify the system using epidemiological data.

[23] Interview with Dr Steve Bjorge, WHO Cambodia, on 19th March, 2012, in Phnom Penh, Cambodia

Behaviour Change Communication

Current Activities:

- No private sector promotion of nets at consumer level.
- PSI has a multi-media strategy to support Bundling Strategy – stated more needed in their initial year evaluation.
- URC's BCC training of VMW and MMW – need to ensure sufficient attention paid to prevention and net treatment. Also work on Loan Scheme and to sensitize farm owners and taxi campaign to target newly arrived migrants before reaching farms.
- FHI's BCC training of VMW and MMW – need to ensure sufficient attention paid to prevention and net treatment. Also work on Loan Scheme and to sensitize farm owners and taxi campaign to target newly arrived migrants before reaching farms.
- BBC Media Action work in three provinces: Battambang, Pailin, and Preah Vihear. Study to show media consumption and KAP toward malaria in the three provinces. Radio is a popular medium, followed by TV and health staff; 90%+ have access to mobile phones; Self-efficacy: 90%+ confident about diagnosis and treatment and only 60%+ confident about preventing malaria. Misconceptions about water and sanitation as causes of malaria. Net treatment – 79% say it is common for people to treat their nets every six months. Majority (80%) discuss malaria prevention amongst the community.
- WMC has developed TV and Radio spots on malaria prevention and treatment messages. WMC also use local media i.e. mobile video units to share the TV and Radio spot to the communities and mobile populations.
- AMDA has trained 200 village health volunteers and 120 health staff on BCC and monitoring of the BCC activities. They are engaged in the health education at the community level through village health volunteers. They are conducting mobile video shows to reach out to the hard to reach population and have conducted 40 mobile shows in the target communities.
- Buddhists for Development have been active in Pailin and mentioned by a number of respondents during field visits. Would be useful to follow up with this group to understand their activities.

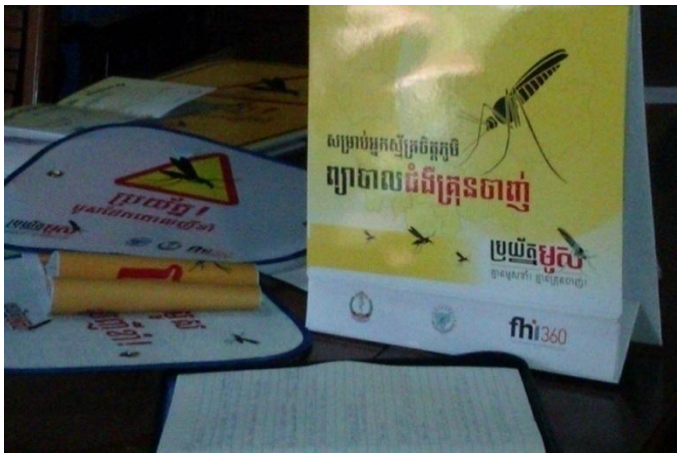


Image 32: BCC flipchart and materials (FHI) Cambodia

Gaps:

- **Behavioural research:**
    - Malaria prevention and health seeking
    - Women known to be the main purchaser of nets – why are they buying, what do they look for etc?
    - Net preferences in terms of design, materials, colours, and sizes of different community groups and different at- risk target population groups.
    - Price elasticity of demand – if want higher priced LLINs on market – people unlikely to want to spend more.
    - Alternative prevention tools – what are people prepared to buy and use?
- Top level advocacy – inter-sectoral government departments – learn lessons from HIV/AIDS advocacy efforts particularly in engaging employers.
- Community engagement needed from key stakeholders e.g. teachers, Village Chiefs, etc. to ensure malaria messages are spread by community leaders.
- Farm owners require increased advocacy and motivation to join loan scheme – need strategy of sensitisation.
- VMWs and MMWs need more training in communication skills, prevention and net treatment.
- There is no harmonised strategy between Bundling (treated net) messages and the use of LLIN (no treatment required)
- There is no real BCC strategy – rather a list of information, education communication (IEC) interventions; although efforts are underway to provide assistance to CNM for development of this strategy.
- Need a greater emphasis placed on monitoring and evaluation of BCC interventions

NB. Malaria Consortium evaluation of BCC interventions by sub-sub-recipient NGO partners will be completed in June 2012.

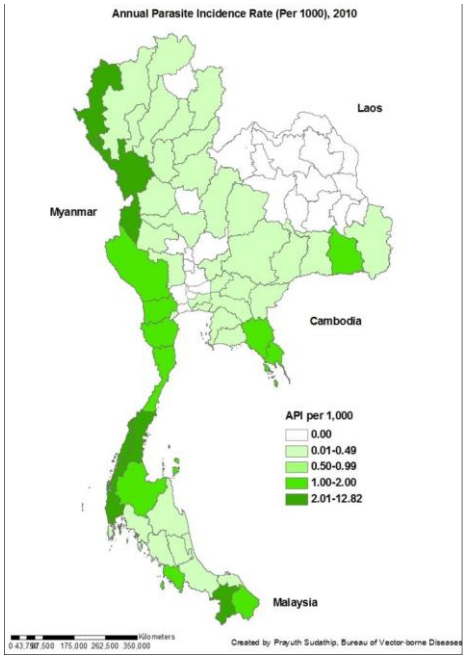
THAILAND

Overview

Thailand's malaria morbidity and mortality rates have been significantly reduced over the past five decades, through intensive malaria control measures and a large network of malaria clinics providing early diagnosis and treatment. Staff in these facilities use either microscopy or rapid diagnostic tests (RDTs) (although stock outs of RDTs occur occasionally) and patients testing positive for falciparum malaria are treated with mefloquine and artesunate per national policy and with atovaquone-proguanil in select zones of the artemisinin resistance containment project. Thanks to these interventions, large sections of the country have become malaria-free. Between 2001 and 2009 the number of malaria cases in Thailand decreased from 63,528 to 23,327 and deaths from 848 to 70. However, surveillance data along the border areas with Myanmar/Burma and Cambodia reveal some provinces continue to have a high incidence of disease. Population movements along the border areas often bring partially immune or non-immune populations into close proximity with high transmission forested areas, placing them at risk of acquiring malaria[24].

Malaria in Thailand is most prevalent along the international borders, especially on the Thai–Myanmar/Burma border. In 2010, 41% cases were *P. falciparum* and 58% *P. vivax*. Most of these cases (89.9%) were in the 30 provinces with international borders. A total of 15,181 cases were in the ten provinces along the Thai-Myanmar/Burma border (68% of the national total) and 2,437 cases were in the six provinces along the Thai-Cambodian border (11%)[25].

Map 4: Malaria incidence across Thailand



[24]Wangroongsarb P et al, Respondent-driven sampling on the Thailand-Cambodia border. Can malaria cases be contained in mobile migrant workers? *Malaria Journal* 2011, 10:120

[25]Thai National Strategic Plan for Malaria Control and Elimination, 2011- 2016

In the central plain areas, transmission has been eliminated for more than two decades but malaria transmission in forested areas remains intense, because of highly efficient vectors, enhanced vector longevity and extensive population movement into and out of these same areas.

Public Sector

The Thai Malaria Control Program was a vertical program from its inception in 1949 until 1996, when it partially merged with other vector-borne disease programs (Dengue fever and Filariasis). It is now called the Bureau of Vector-borne Diseases (BVBD) within the Department of Disease Control in the Ministry of Public Health. BVBD is the program manager of the NMCP. Currently, the malaria control program is undergoing decentralization to the general health service, reducing the number of specialized field malaria officials and funds. The program still operates vertically in areas where malaria transmission still occurs, but provides only technical assistance in areas where indigenous transmission has been eliminated. In these areas programmatic responsibilities have been transferred to Provincial Public Health Offices. The BVBD is responsible for malaria-related research, generating policy for malaria control, and evaluating the program.

In addition to malaria clinics, malaria posts (community-based malaria clinics) were introduced to manage malaria in remote areas. These posts are operated by villagers called Malaria Post Workers (MPWs) using light microscopes or RDTs and were established to serve vulnerable populations and foreign migrants along the borders. Additionally, VMWs are actively involved in prevention and control activities in each community. Under Global Fund Round 7, Migrant Health Volunteers (MHVs) were also introduced to complement the role and function of MPWs operating in endemic A1 villages.

Good estimates of net coverage (both untreated and treated) in Thailand are not available. However, usage is thought to be lower than in neighbouring areas of Myanmar/Burma and Cambodia. According to data presented during the Thailand Malaria Program Review in August 2011, of the 2.1 million persons at risk in Thailand, 1.8 million were protected by ITNs/LLINs in 2010. The 2007 WHO- MMP Profiles report also states that approximately eight million people in Thailand were covered by mosquito nets in 2007 (including both conventional and treated nets). However, according to the National Malaria Strategy, it is estimated that approximately 40% of the population at moderate and high risk of malaria, were covered by mosquito nets. The proportion of these that are treated is not clear. Higher coverage of ITNs is reported from the artemisinin resistance containment project areas along the Thai-Cambodia border, but no specific figures are given.

As in Cambodia, the NMCP is implementing a National Strategic Plan for Malaria Control and Elimination with the goal of 80% of the total country areas being free from malaria transmission by the year 2020. The National Strategy includes the objective to prevent transmission of malaria parasites through effective vector control and personal protection measures among vulnerable populations by encouraging high risk populations to use LLINs, ITNs, and repellents. The NMCP also plans to engage CBOs especially in remote areas to deliver malaria prevention and research innovative approaches to effectively reach identified vulnerable groups.

Table 20: Public Sector Overview - Thailand

THAILAND MALARIA PREVENTION OVERVIEW:	
Malaria Prevention Objective(s)	Prevent transmission of malaria parasites by encouraging high risk populations to use LLINs, ITNs, and repellents
LLIN Distribution	1 LLIN per 1 person for residents, long term economic migrants (M1s) and military based in A1 and A2 villages in the 22 target provinces. LLINs to be replaced every 3 years. LLINs for short-term economic migrants (M2s) provided upon presentation with fever. LLINs and bed mats distributed to all refugee camp residents along the Thai-Burma border. LLIHNs distributed in A1 and A2 areas of target provinces where LLINs not effective Approx 2.1 million thought to be at risk in the A1 and A2 areas 1.9 million LLINs to be distributed in 22 endemic target districts. 83,500 LLIHNs will be provided to local residents, migrants and soldiers spending nights in the forest (estimated to be 1% of the population) particularly on the Thai-Cambodia border. Approx 143,000 refugees in 9 camps along Thai – Burma border 181,579 Cambodian migrants thought to have registered with the Thai authorities - number from Burma unknown. NGOS responsible for distribution of LLINs at refugee camps
Current Net Coverage (all nets)	Approx 40% of the population thought to be covered by any type of net
Current LLIN/ITN Coverage	1.8 million protected by ITNs/LLINs in 2010 (% of population not available)

Targeting of activities is based on a robust stratification of malaria transmission risk which is updated yearly (see Table 21 below). Thailand has made impressive advances, reducing the number of villages classified as A1 from 781 in 2004 to 426 in 2009.

Table 21: Stratification of malaria transmission risk in Thailand

Areas	Stratification levels
A - Control area with transmission	A1 - perennial transmission area (transmission reported for at least 6 months per year).
	A2 - periodic transmission area (transmission reported but for less than 6 months per year
B - Elimination area without transmission:	B1 - high and moderate receptivity (transmission not reported within the last 3 years but primary and secondary vectors present).
	B2 - low and no receptivity (transmission not reported within the last 3 years and primary and secondary vectors absent, suspected vector may be present).

BVBD is continuing with containment activities (initially implemented along the Thai-Cambodia border with funds from the Bill and Melinda Gates Foundation [BMGF]) and expanding to include the Thai-Myanmar/Burma border. In 22 target provinces, LLIN

coverage is set to increase to 100% among Thai citizens and long-term economic migrants (M1s), with one net per person. Under the GFATM Round 10, 1.9 million LLINs are expected to arrive in June 2012, and will be distributed to residents, M1s and military personnel based in A1 and A2 villages. LLINs will also be provided for short-term economic migrants (M2s) who present at a clinic or malaria post with a fever (M2s are estimated at 120,000 per year). In addition, LLINs and bed mats will be distributed by NGOs to all residents in camps along the Thai-Myanmar/Burma border, upon their arrival. According to Shoklo Malaria Research Unit (SMRU), a local research organisation affiliated with Mahidol University, less than 10% of malaria cases in the camps are actually caught in the camp e.g. 90% of malaria cases are among people who leave the camp for work (although this is technically illegal)[26].

LLIHNs will also be distributed in target A1 and A2 areas in order to provide protection from malaria where LLINs cannot. In total, 83,500 hammock nets will be provided to local residents, migrants and soldiers spending nights in the forest particularly on the Thai-Cambodia border. Quantification of requirements has been based on rough estimates of need (1% of the total population is estimated to spend nights in A1 and A2 areas). Distribution and quality assurance activities will be fully integrated with those for LLINs. Topical repellents will also be distributed to migrants and military spending time in the forests of A1 and A2 areas. Under the current GFATM grant, LLINs will be provided to all migrants presenting with fevers at malaria clinics.

The BVBD will provide overall management for the procurement and distribution of LLINs, which are scheduled to be replaced every three years. Macro-distribution to Vector Borne Disease Centres (VBDCs) at provincial level will be through the supplier (LLINs will be delivered in their containers which will serve as storage prior to micro-distribution). Micro-distribution to Thai residents and M1 migrants will be managed by the BVBD through VBDCs, Vector Borne Disease Units (VBDUs) and sub-recipient (SR) NGOs. Surveys will be conducted prior to distribution in order to accurately quantify the number of LLINs and LLIHNs needed per household. Post distribution surveys will be conducted in a representative random sample of target villages. Utilization surveys are also planned, but no schedule was available to review. In addition, the BVBD hopes to conduct periodic testing of LLIN/LLIHN samples from the field to assess their efficacy under local conditions.

The net distribution system appears well designed, based on village stratification, pre-distribution census and some post distribution assessments. However, further efforts are needed to increase access to LLINs by hard to reach populations, especially mobile and migrant populations who may be in the country illegally, and are therefore easily exploited by their employers, and or overlooked by the public sector. Currently, undocumented migrants (estimated to be approximately 4.6 million) have very limited access to health services in Thailand, except under special projects. A health insurance scheme does exist for M1s, who have the option of paying a health insurance fee of approximately US$40 per year to receive health services. However, policies regarding undocumented M2s are not very clearly defined and there is no health insurance for this group.

[26] Interview with Dr Verena from SMRU, on 22nd March 2012 in Mae Sot, Thailand

Civil Society

With the end of the BMGF supported containment project, the GFATM Round 10 activities are currently the main malaria prevention interventions being implemented in Thailand. PMI is also supporting some cross-border activities under the CAP Malaria project.

The MoH's Department for Disease Control is the principal recipient under the GFATM Round 10. BVBD, MC, SMRU and IOM are sub-recipients of the grant.

Table 22: Civil Society Overview – Thailand

NGO:	MALARIA PREVENTION ACTIVITIES:
IRC	IEC/BCC for 9 refugee camps along Thai/Myanmar/Burma border
ARC	Migrant health worker (MHW) and migrant health volunteer (MHV) network along Thai/Myanmar/Burma border (4 provinces: Kanchanaburi, Petchaburi, Chumporn and Ranong)
Raks Thai Foundation (RTF)	Community mapping focused on migrant and mobile populations (9 provinces: Ratchaburi, Prachaubkirikhan, Si Saket, Ubon Ratchatani, Trat, Chonburi, Songkla, Surathani, and Rayong)
IOM	BCC/IEC package, LLIN/LLIHN distribution targeting migrants and mobile populations (7 provinces: Chiang Rai, Chiang Mai, Mae Hong Son, Tak, Sa Kaew, Chantaburi, and Phang Nga)
URC	IEC/BCC under USAID CAP Malaria project, working along Thai/Myanmar/Burma and Thai/Cambodia borders
KIA	Quality assurance of LLIN and school-based BCC/IEC.
SMRU	Research; distribution of nets to patients that present at clinics with fever (M2s). Primary focus on EDAT.
MC	Focus on M&E, surveillance, and operational research with a focus on malaria prevention in high risk populations such as migrants. Provides BCC technical assistance.
BIOPHICS	Development of web-based surveillance system for all provinces under R7/R10.

Most malaria prevention activities in Thailand are currently funded by the GFATM Round 10. The GFATM proposal includes BCC and prevention activities, but other than those involved in distributing LLINs in camps along the Thai-Myanmar/Burma border, it is unclear what specific activities are being implementing. It is also unclear what level of coordination exists between partners and the between the NGOs and BVBD.

Private Sector

The following PEST analysis gives an overview and summary of the private sector environment within Thailand.

Table 23: Thailand 'PEST' Market Analysis:

+ve/-ve:	Political	Economical	+ve/-ve:
Although this is a middle-income country, it still struggles to deal with malaria, particularly among migrants and mobile populations.	• Violence after anti-government protests and military clamp-downs in 2010, and the severe flooding have upset confidence in the country. • Thailand has made tremendous progress towards reduction of malaria morbidity and mortality over the past decade. Now there is the threat of artemisinin resistance at borders and spread of malaria from migrants. Support from BVBD for both ITNs and LLINs to fight malaria on the borders with Cambodia and Myanmar/Burma. • Free LLINs are being targeted to those most at risk (2.1m) • Funds available to Thailand for free LLINs supply from donors (e.g. GFATM) • Procurement of WHOPES-approved LLINs from outside the country • Food and Drug Administration (FDA) restrictions in Thailand make it difficult for local LLIN manufacturers to sell within Thailand. No harmonised policies. • Malaria is no longer a priority health intervention, so very little top-level government advocacy or inter-sectoral support for malaria, especially as those most at risk are not Thai citizens, i.e. Burmese refugees and illegal migrants workers • Strong international influence on local policies • Conflicts on borders with	• Baht has been unsteady following political unrest, but is reported as stable against the US$ now. Still there is a backlash from SME's at unpopular wage increases set by government recently. Also petrol and gas price increases in April 2012. • Current duties for commercial purchase (0% if by Government). • Major urban markets and distribution systems are well developed • There are a number of local companies manufacturing untreated nets in Thailand. Further investigation is needed on their operations and capacity. E.g. Netto supplies untreated products but their website suggests they have LLIN capabilities on site (WHOPES approvals stated, although this is not the case).	Thai FDA restrictions make this a difficult operating environment for LLIN manufacturers. Ordinary net manufacture is vibrant both within and for export market.

	Myanmar/Burma and Cambodia • Garment factories, farming, agriculture, mining, logging, construction, etc. Possible to identify stakeholders to work with for malaria prevention although reticence of Thai employers to provide good working conditions for illegal workers.		
+ve/-ve: The minority /illegal / refugee status of the most at-risk population makes this a difficult target group to work with.	**Social** • There is a good net use culture in Thailand. • Single size and shape of LLINs distributed for free has not considered user preferences for longer, softer opaque fabric, for privacy. CYC cotton popular along Myanmar/Burma borders. Further differences along Cambodia borders. • Mainly illegal migrant workers and refugees will have very little disposable income for net purchases • Number of people sleeping under ITNs is still low • Opportunity for large-scale BCC campaigns to reinforce treatment of existing untreated nets • Need to ascertain if there are any misconceptions about dirty water and hygiene causing malaria and the safety of insecticide • Women are more disposed to purchase and use nets • Outdoor transmission focus required on migrant and mobile labourers, adult males	**Technological** • Important to monitor consumer preferences for nets and other prevention tools e.g. clothing, repellents in border and forest areas • Research into other interventions needed to prevent outdoor transmission at forest fringes • Need to identify if a greater range of media can be employed to promote the prevention message • There is capacity for LLIN production in-country –Tana Netting, but no internal supply only export. • Change to LLIN technology would cause most local net players to exit the market – with a resulting loss of consumer choice	**+ve/-ve:** Manufacturing capacity is present in Thailand. More research is needed as to the extent of their capacity

Private Sector Activity in Thailand

There was not the time on this trip to carry out a full investigation into the net manufacturers in Thailand.

A visit was made to Tana Netting's manufacturing plant to witness the end-of-line treatment process and their factory set-up. Tana are unable to sell their LLINs in Thailand due to FDA restrictions and so only produce their brand DawaPlus (LLIN) for export.

Image 33: The end-of-line process 'giant washing machine' - Tana Netting, Bangkok

Image 34 DawaPlus LLIN produced by Tana Netting, Bangkok

There is a vibrant export market of untreated nets to both Cambodia and Myanmar/Burma from Thailand and this requires further exploration. It is possible that the very popular B-52's brand has been franchised to Thai producers, such as Netto, from China. Investigations are underway to find out if this is the case, but it is difficult to make contact with Thai manufacturers, despite email addresses being supplied on packaging. Attempts to contact manufacturers were unsuccessful. The Netto manufacturer also claims to have a WHOPES-approved LLIN, according to its website and pictured below. No verification of this was possible on this assessment.

It is recommended to ascertain if there is some way of engaging with these Thai manufacturers to see if treatment can be added to their popular products.

Image 35: Netto - a prominent Thai manufacturer

Image 36: B-52's produced by Netto

Stable Target Groups

Thailand has a large migrant population, mainly made up of external migrants from Myanmar/Burma and Cambodia. Transit between different areas increases the risk of exposing people to malaria infection, meaning the burden of infection often falls disproportionately on mobile and migrant sectors of the community[27].Based on this, the focus of the NMCPs prevention activities is migrant populations and local Thai residents in A1 and A2 areas across 22 target provinces, as well as communities living in conflict zones (Yala, Narathiwat and Songkhla provinces).

Migrants are classified into two groups: 'M1s' are those who have been residing in Thailand for more than six months, the majority of whom are presumed to have registered with the Ministry of Labour (MoL); 'M2s' is are migrants who have been residing in Thailand for less than six months. These "mobile migrants" are usually not registered with the MoL and are therefore much harder to reach. Under previous interventions, malaria posts were provided with nets for distribution to migrants but the migrants attended clinics over posts as thought to have more professional staff. As a result, M1s are counted among Thai nationals, as far as distribution is concerned. M2s however, are still catered for via public health facilities. Since M2s along the Thai-Myanmar/Burma border are in the country illegally, and are not registered with the MoL, this strategy is likely to ensure a large portion of the migrant population remains unprotected.

Migrants from both Cambodia and Myanmar/Burma settle for varying periods of time in Thailand, often in search of work. IOM reported that Thailand has attracted increasing numbers of migrant workers, mostly from neighbouring countries with over one million registered migrant workers entering the country since 2004. Many patients from Myanmar/Burma are also thought to cross the border to seek health care in Thailand; more than 240,000 migrants were screened for malaria in 2010 at Thai health facilities[28] but it is unclear if this means M1s, M2s or the two combined. The real number of M2s is unknown but figures currently quoted are thought to be grossly underestimated. For example the District Health Officer in Prob Prah district (Tak Province) commented that although 10,000 were registered in the district, the real figure was probably closer to 100,000[29].

[27]Caroline Lynch, Cally Roper, The Transit Phase of Migration: Circulation of Malaria and Its Multidrug-Resistant Forms in Africa, PLoS Medicine, www.plosmedicine.org, May 2011 | Volume 8 | Issue 5 | e1001040
[28]Thai National Strategic Plan for Malaria Control and Elimination 2011 -2016
[29] Interview with P'Jan Jiraporn, District Health Officer for Prob Prah, on 23rd March, 2012 in Prob Prah, Thailand

Table 24: Stable Target Groups - Thailand

STABLE POPULATION TARGET GROUP	GROUP PROFILE		OUTREACH POSSIBILITIES	PUBLIC SECTOR INTERVENTIONS	CIVIL SOCIETY INTERVENTIONS	PRIVATE SECTOR INTERVENTIONS
1.Migrants (M1) 	Economic migrants residing in Thailand more than six months Majority registered with the Ministry of Labour. Usually working in endemic areas for an employer e.g. - hydroelectric dams - farm/plantation - fisheries - food processing (cassava) - rubber/palm oil plantation (mature harvesting) Often from Myanmar/Burma or Cambodia		Outreach possible - employer location is known	EXISTING: Mobile Malaria Workers, (Border) Malaria Post Workers - BCC and dipping campaigns POTENTIAL: Border malaria posts for screening and distribution of pre-departure packs with LLIN / LLIHN	EXISTING: Some BCC POTENTIAL Prevention BCC	EXISTING: Retail sale of nets POTENTIAL: LLIN/LLIHN distributed by companies Other personal protection tools; Malaria Campaigns at Workplace
2. Refugees 	Living in long term settlements along Myanmar/Burma border Low levels of malaria - apart from those who leave camps for employment		Outreach possible - home address is known in camps	EXISTING: Camp equivalent of Village Malaria Workers, BCC & dipping campaigns POTENTIAL Train staff at migrant learning centres	EXISTING: BCC LLINS for new camp registrations POTENTIAL IGAs in camps - sewing and dipping of nets for local community	EXISTING: Retail sale of nets POTENTIAL Limited (Ability to pay)
3. Thai residents 	Residents in A1 and A2 areas, and conflict zone communities (in Yala, Narathiwat and Songkhla provinces) Often underserved Visiting forests for hunting, fishing, collecting valuable products, etc.	A1 - transmission reported for at least 6 months per year A2 - transmission reported but for less than 6 months per year	Outreach possible - home address is known, but are hard to access	EXISTING: Clinics, malaria posts, Village Malaria Workers, Malaria Post Workers – BCC and Dipping campaigns POTENTIAL Distribution via ANC & EPI outreach	EXISTING: BCC POTENTIAL: Prevention BCC	EXISTING: Retail sale of nets POTENTIAL: Other PP tools

As noted in the Thailand Public Sector section of this report, targeting interventions to meet the needs of migrants is incredibly challenging, for a number of reasons. The situation is not helped by the fact that malaria prevalence differs widely among the different migrant groups, depending on where they are working, and can vary from 0% to 30% within a 10km radius. This means very specific and targeted interventions are essential.

Fighting in the three southern provinces along the Malaysian border makes them virtually inaccessible and makes it extremely difficult to monitor activities sufficiently for GFATM. Since GFATM funds are the only resources available for prevention activities in the public sector, the population in these areas have limited access to any prevention tools, despite 19% of cases in Thailand. There was conflicting information given on whether or not this population is included under GF10 activities.

It is important to note the presence of an additional group along Thai-Myanmar/Burma border of Rohingya (referred to locally as Burmese Muslims). This group, of whom the majority in Thailand are based in the Ranong area (southwestern Thailand), belong to an ethnic minority from Western Myanmar/Burma, along the Bangladesh border. They have been involved in fighting for an independent homeland, and as a result have no proof of citizenship from Myanmar/Burma, essentially making them stateless. Their presence in Thailand is controversial and their needs have been largely neglected. IOM has several projects engaging this group, including providing health services. IOM is also working to sensitise the Thai government and local leaders on the needs of this community.

Behaviour Change Communication

Current Activities:

- No private sector promotion of nets at consumer level
- IOM and its Sub Sub-Recipients (SSRs) will play leading roles in the development of materials for migrants and mobile populations.
- SMRU‘s emphasis on early diagnosis and treatment messages among more stable refugee populations. Based on SMRU’s experience in the camps and with migrant populations, they recommended that the malaria SSF grant focus mostly on working aged men and women, ensuring that three key messages are given: working in forests is a risk to get malaria and therefore forest workers need to use preventive methods; if you get a fever, get tested; and to not self-medicate. These messages would be most helpful in the run up to the wet season, which is in June for this area.
- KIA conducts workshops to develop curriculum for teachers to educate children on malaria prevention. KI also produce leaflets and other IEC materials for schools.
- IRC: International Red Cross will develop materials for refugee camps along the Thai-Myanmar/Burma border
- BVBD develops BCC materials for the Thai resident population

Materials for migrants will be developed with language specific materials for migrant populations on both borders in consultation with related NGOs. Thai and Khmer language materials will be refined based on those already developed by the Thai and Cambodian national programmes with technical support from Malaria Consortium in the BMGF Containment Project.

MC has undertaken a qualitative assessment on health seeking behaviour amongst migrants and there is a section here on nets and net use. It would be useful to collate the learning from this study.

Based on the preliminary findings of the qualitative study, migrants do not receive mosquito nets during distribution. They only received mosquito nets if they get sick and are malaria positive at the clinic. The migrants requested that they should be provided with hammock nets as hammock nets are easy to use in the farm or forest.

Gaps:

- **Behavioural research:**
    - Are women the main purchasers of nets – why are they buying, what do they look for?
    - Net preferences in terms of design, materials, colours, sizes, and length.
    - Price elasticity of demand – if want higher priced LLINs on market – people unlikely to want to spend more
    - Alternative prevention tools – what are people prepared to buy and use?
- Top level advocacy – inter-sectoral government departments – learn lessons from HIV/AIDS advocacy efforts particularly in engaging employers
- Mapping of Special Economic Zones – factories and their migrant labour force (IOM interested in developing this)
- Needs more BCC efforts to prevent outdoor transmission, currently the focus is on sleeping patterns only. Recent move to recognise migrants labourers were a priority.

Outdoor Transmission

Biting habits of *Anopheles dirus* and *An. minimus*

A very high proportion of malaria transmission in the region is not at home but outdoors among populations sleeping or working outside at night time. There are limited means of protection for these people, and the focus of efforts to date on the more stable populations, even in refugee camps, has been missing the main need.

The primary vectors in all three countries are *An. dirus* complex (forest and well breeding) and *An. minimus* complex, both of which are generally anthropophilic. Table 25 shows Anopheles density inside and outside in several sentinel surveillance sites in Myanmar/Burma.

Table 25: Indoor vs. outdoor anopheles density[30]

Location	Anopheles Density	
	Outdoor	**Indoor**
Thaechaung	1.21	0
Basara ward	0.9	0
West Sanpya	0.73	0.25
Ywakone V	0.15	0.025
Kwantaung	1.4	0.3
Chaungphya	101 (no)	0
Upper Maezaung	0.33	0
Bawkahtar	0.125	0
Lower Maezaung	0	0.15
Yone Taing	1	0

The scaling up ITNs and indoor residual spraying (IRS) have contributed significantly to a worldwide decrease of malaria, but the relative proportion of outdoor transmission has increased almost everywhere with scaling up of vector control[31]: IRS has little impact on outdoor resting vectors and ITNs do not affect outdoor and/or early biting vectors.

An. minimus bites equally in the first and second quarter of the night and evidence suggests that *An. dirus* also bites during hours when forestry workers and rubber tappers are most active. The early evening and early morning biting habits of the main vectors, as well as night time work habits of much of the working-age population (e.g. for rubber tapping, illegal mining and timber extraction) means that the efficacy of nets as a preventive measure is limited. Even among those who work at normal day time hours, generally, existing mosquito nets are not carried by migrants when they travel go for work. Table 26 shows the biting times for *An. dirus* from entomological surveillance carried out in Myanmar/Burma, however similar data from other GMS countries suggests approximately 60% of biting occurs before 10 pm. This means that generally only the very old and young are protected by LLINs at the

[30]Presentation by Dr Saw Lwin, RBM VCWG meeting on Outdoor Transmission, Bangkok, 12th March 2012
[31]Presentation by Dr Marc Coosemans, RBM VCWG meeting on Outdoor Transmission, Bangkok, 12th March, 2012

height of the biting time. This is supported by data from SMRU supported clinics in Mae Sot, which shows no difference in malaria prevalence among pregnant women who do and do not sleep under a net[32].

Table 26: Biting times for *An. dirus*[33]

Time	Total	%
18:00- 19:00	39	21%
19:00 -20:00	10	5%
20:00 – 21:00	21	11%
21:00-22:00	20	11%
22:00-23:00	27	14%
23:00-24:00	22	12%
24:00-01:00	13	7%
01:00 -02:00	13	7%
02:00 -03:00	5	3%
03:00 -04:00	10	5%
04:00 -05:00	8	4%
06:00 -07:00	1	1%
Total	189	100%

[32]Interview with Dr Verena of SMRU on 22nd March 2012, in Mae Sot, Thailand
[33]Presentation by Dr Saw Lwin, RBM VCWG meeting on Outdoor Transmission, Bangkok, 12th March 2012

Alternative Protection Tools

As discussed at the Roll Back Malaria (RBM) Outdoor Transmission Workshop (Bangkok, March 2012), there is growing consensus that LLINs alone may not be enough to interrupt malaria transmission in the region. There is a need to develop alternative methods of malaria prevention, to complement LLINs, and specifically to prevent malaria amongst forest dwellers and workers. More is known about the mosquito than is known about the human beings at risk of malaria in this region. There is a call for more behavioural research to understand various mobile target segments' knowledge, attitudes, behaviours and preferences for malaria prevention.

As requested by Wayne Stinson, a review of the potential for outdoor transmission personal protection tools has been included in this assessment. It is recommended that this is further developed, since its inclusion is aimed to stimulate further discussion.

There is limited research for alternative products in the region, but some lessons can be drawn from studies conducted elsewhere e.g. Afghanistan and Latin America.

There follows tables to show potential alternative protection tools:

- Topical Repellents
- Spatial Repellents
- Insecticide treated materials

These lists are not exhaustive, as shown below, there are other *ingenious* tools developed for malaria prevention:

Image 37: 'Electric Bug Zapper' found at Thai border attached to Burmese market

Image 38: Mosquito coils

Worker cap. *Courtesy: Dr Saw Lwin, RBM presentation (Mar 2012)*

Alternative Protection Tools: Topical Repellents

Table 27: Review of Topical Repellents

Product:	Manufacturer:	Details:	Research/efficacy/use:
Topical Repellents:			
AUTAN PLUS	SC Johnson, US	Autan - Repellent Liquid. Active ingredient Icaridin (20%), WHO approved. Offers 8 hour protection	Donated product to be tested in Coosemans $3m Gates funded study in Cambodia. Results due in 2013
	Dabur, India	Odomos - Repellent Cream. Active ingredient n, n-diethyl benzamide (12%). Offers 11 hours protection	Procured through IoM for Burmese refugee camps IJMR, 133 April 2011, p426-430 , Mittal et al. Compared well with DEET cream (only 6 hours protection)
	Made in Australia and Philippines for studies, no brand owner	Mosbar - Repellent Soap. Active ingredients DEET (20%) & permethrin (0.5%)	Wash with water but don't rinse off. First used un 1984. V cheap to produce Tropical Medicine & International Health 9(3): 343-350, Rowland et al, 2004 'DEET mosquito repellent sold through social marketing provides personal protection against malaria in an area of all-night mosquito biting and partial coverage of insecticide-treated nets' Also, 1991 study by Mani et al in India.

Note: The mention of product manufacturers is not meant as a recommendation, since further exploration would need to be made into applications for product development in this area.

Dr Kyaw from VBDC Myanmar/Burma also spoke of an indigenous herbal repellent that is used in Myanmar/Burma. It would be useful to research into the acceptability of repellent use among at risk populations, based in this insight. Further, he spoke of people using a pain relief ointment (analgesic), as a repellent, particularly for migrant workers use at night.

Dr Kyaw further mentioned that there are plans in Myanmar/Burma for operational research into personal protection measures such as clothing and scarves.

Further studies mentioned by Dr Coosemans in his RBM Outdoor Transmission presentation:

- Study in Bolivia – combined use of repellent +ITN – 80% additional reduction in Malaria
- Study in Pakistan – DEET in soap – 56% reduction
- Study in Laos – 50% DEET –spill-over effect and low adherence
- Study in Tanzania – spill over and low adherence

Alternative Protection Tools: Spatial Repellents

Table 28: Overview of available spatial repellents

Product:	Manufacturer:	Details:	Research/efficacy/use:
Metofluthrin Dispensers 	Sumitomo, Japan	Product in Development. Metofluthrin Dispenser (a pyrethroid spatial repellent). Product is supposed to last 60 days.	D Chalwood from Liverpool School of Tropical Medicine undertaking an Efficacy Study (Pailin, Cambodia). DFID funding. Results in 2013 Also a Gates funded pilot in Indonesia - showing 4-fold decrease in outdoor transmission
Metofluthrin Ceiling Strips	Sumitomo, Japan	Product tested	Efficacy studies available
Repellent Stakes 	Repel, US	Outdoor use stakes to insert in ground Active ingredient, d-cis/trans allethrin (0.25%)	No efficacy studies
Citrone 	BusinessKind, Myanmar	Indoor use – candles with citronella	Natural product

Note: The mention of product manufacturers is not meant as a recommendation, since further exploration would need to be made into applications for product development in this area.

Alternative Protection Tools: Insecticide Treated Materials

Table 29: Overview of available ITMs

Product:	Manufacturer:	Details:	Research/efficacy/use:
1. Clothes repellent spray 	Repel, US	Permethrin spray for clothing and gear. (2 strengths: Permanone 0.5%, & Max 40% active ingredient)	Malaria Journal 2006, 5:63 Use of insecticide-treated clothes for personal protection against malaria: a community trial. Kimani et al
2. Pre-fabricated Clothing:			
NOSILIFE	Craghoppers, UK	Outdoor leisure-wear made with permethrin yarn	May not be suitable – leisure markets only
VECTOR SHIELD	Elliots Quality Safety Gear, Australia	Outdoor work-wear made with permethrin yarn.	Passed by Oeko-Tex® Standard 100 – safety standard introduced at the beginning of the 1990s for chemicals in clothing.
insect shield repellent technology	Insect Shield, US	Outdoor work-wear made with permethrin yarn. Lasts 70 washes	Work with World Vision and other development projects. Interested in undertaking product trials
Netting Over-Jackets	Unknown	Pre-treated netting over-jackets for rubber tappers, proposed as new product trial in Thailand	Sample shown at RBM Outdoor Transmission Workshop (Mar2012)
Scarves (Kramas)	n/a	Treatment of kramas for farm and outdoor workers, proposed as new product trial in Cambodia	Malaria Consortium study in Cambodia
Blankets	n/a	Treatment of blankets (sprayed) undertaken as new product trial in Burma	JICA study in Burma
3. Pre-trea ZeroFly s	Vestergaard Frandsen	Use in refugee camps	Studies available

Note 1: The mention of product manufacturers is not meant as a recommendation, since further exploration would need to be made into applications for product development in this area.

Note 2: The impregnated scarves study in Cambodia was not implemented; discussions are underway to conduct a feasibility trial on an impregnated material in another GMS country.

Regional Considerations for Insecticide Treated Clothing:

Thailand: Army uniform: Border Police uniform:


Cambodia: Krama: Headwear:




Sampot/Sarong: Rubber Plantation Youth:


Myanmar/Burma: Longyi/ Lungyi **(**Also called ‘Paso’ for men) - can be hitched up when playing sport:



Known as ‘Hutamein’ for women:

Mobile Target Groups

In accessing short term migrants, the main challenge is in Thailand and mostly along the Myanmar/Burma border area, due to the illegal nature of work in Thailand. The District Health Officer from Prob Prah noted that some employers are reluctant to register their workers. Although they are legally required to register all workers, they must pay a registration fee for each migrant, so many intentionally do not register all their staff. This makes it very difficult to get an accurate picture of the real number of employees a company has, and ultimately the real number of migrants in a given area.[34] The language barrier between Thais and migrants makes it hard to form trusting relationships and leads to a lot of misunderstandings between the different groups.

Village leaders in Thailand are also meant to report the number of migrants living/working in their village, including those working on nearby farms, but this is only done once a year and there is no penalty for not reporting or misreporting.[35] IOM is supporting community dispute mediation teams in various districts, which are working to increase understanding and collaboration between the communities and migrants. There are also a few local migrant rights based groups in Thailand, such as the Migrant Assistance Program (MAP) and the Labour Law Clinic (LLC) a migrant rights group that also have some access to factories/employers. MAP trains factory workers on migrant rights issues. These trained workers then report any violations to MAP and MAP in turn reports them to the LLC. The LLC, in turn, accesses Thai legal system on behalf of migrants. LLC also had an activity that reached out to farm workers and communities outside of factory areas. In Tak Province, along the Thai-Myanmar/Burma border, Mae Tao Mai, a local CBO with a library and resource centre, is implementing a language training program for migrants, and also provides them with reproductive health commodities and IEC materials[36].

In Myanmar/Burma and Cambodia, illegal activities, such as some mining and logging, makes it difficult to track migrants even within their own country.

In Myanmar/Burma, IOM has developed the concept of 'clusters' e.g. groups of migrants living on the edge of villages and highly susceptible to malaria. IOM and MMA are supporting village mobility working groups with employers, comprised of community leaders, employers and migrant workers and are working through these groups to deliver services to previously unregistered migrants: micro planning, logs, transport etc. IOM provides small scale grants to working groups and then groups implement.[37]

The following tables show the profile of key population segments, within the three different mobile target groups:

- Affiliated to an employer (Fig. 12)
- Affiliated with Government (Fig. 13)
- Non-affiliated (Fig. 14)

[34] Interview with P'Jan Jiraporn, District Health Officer for Prob Prah, on 23rd March, 2012 in Prob Prah
[35] Interview with Sudarat Tunyee, Malaria Post Worker for Prob Prah District, on 23rd March, 2012 in Prob Prah.
[36] Interview with Lanna Walsh, IOM Thailand, on 23rd March, 2012, in Mae Sot Thailand
[37] Interviews with Dr Myo Min, Myanmar Medical Association (MMA) and Greg Irving, IOM Myanmar/Burma, on 28th March, 2012 in Yangon, Myanmar/Burma.

As noted under the individual country sections, the mobile or migrant groups are the most difficult to reach in all three countries.

Table 29: Employer Affiliated Mobile Target Groups

MOBILE TARGET GROUP	GROUP PROFILE
1. AFFILIATED TO EMPLOYER	
i. "Semi-mobile Employee" **Affiliated with company employer** 	Working in endemic areas for an employer e.g. - hydroelectric dams - food processing (cassava) - rubber/palm oil plantation (mature harvesting) Often from neighbouring province; Less immune to malaria; No close relationship with employer
ii. "Seasonal Farm Worker" **Affiliated with landowner** 	Planting or harvesting agricultural products (2-4 months); Often from other provinces; Often non-immune; Mutually beneficial relationships formed with farm owners, maintain contact and repeat service each season

OUTREACH POSSIBILITIES	PUBLIC SECTOR INTERVENTIONS	CIVIL SOCIETY INTERVENTIONS	PRIVATE SECTOR INTERVENTIONS
Outreach possible - address at employer/farm location is known	EXISTING: Mobile Malaria Workers BCC & Dipping campaigns POTENTIAL: Training for MMWs BCC focus on nets & treatment	EXISTING: Some mapping of farms in Cambodia Lending Scheme & Taxi Scheme in Cambodia POTENTIAL: KAP studies of target groups. Mapping of employers/ farms/plantations Increase BCC Scale-up LLIN lending schemes Trials of new products e.g. repellents, treated clothing	EXISTING: Retail sale of nets and hammock nets Farm Owners participation in Lending Scheme POTENTIAL: Advocacy to enlist employers to purchase LLIN, LLIHN at bulk rates and distribute at company/farm LLITKs in retail market

Although the location of military and other security personnel is known, their often remote locations makes them a difficult group for the public sector to reach. They are also largely inaccessible by most civil society groups due to the sometimes sensitive nature of their work and government restrictions.

Table 30: Govt. Affiliated Mobile Target Groups

MOBILE TARGET GROUP	GROUP PROFILE	OUTREACH POSSIBILITIES	PUBLIC SECTOR INTERVENTIONS	CIVIL SOCIETY INTERVENTIONS	PRIVATE SECTOR INTERVENTIONS
2. AFFILIATED WITH GOVT.					
iii. "Security Personnel" **Affiliated with government** 	Military, police, border guards who patrol in forest or other risk areas. & Families who follow partners into forest-risk areas ('Camp-followers')	**Outreach possible through government structures. Difficult to monitor due to lack of open access**	EXISTING: Some activities (unknown) – distribution of LLINs/LLIHNs planned in Cambodia POTENTIAL: High level inter-sectoral advocacy LLIN/LLIHN distribution ITM – Uniforms Topical repellents Border post LLIN distribution Military clinic staff Quantification BCC with families – especially wives of security personnel KAP studies	EXISTING: (unknown) POTENTIAL: BCC with families (although access for NGOs may be limited due to sensitive nature of security work)	EXISTING: Retail sale of nets & hammock nets POTENTIAL: Institutional sale of uniforms etc to MoD. Retail sale of: Other PP Tools

ect

The non-affiliated groups are by far the most difficult segment to reach and represent the biggest challenge in utilising sectors to address their needs.

Table 31: Non-Affiliated Mobile Target Groups

MOBILE TARGET GROUP	GROUP PROFILE	OUTREACH POSSIBILITIES	PUBLIC SECTOR INTERVENTIONS	CIVIL SOCIETY INTERVENTIONS	PRIVATE SECTOR INTERVENTIONS
3. NON-AFFILIATED					
iv. "Ad-hoc Labourers" 	Local residents work on temporary / ad hoc basis e.g. Road building – crews live at site. New land development for rubber/palm oil plantations 1st clear land/2nd plant trees.	**Outreach difficult because no employer takes responsibility.** **Can be of illegal status. NGOs, CBOs, local rights based groups, community dispute mediation groups, migrant learning centres**	EXISTING: Village Malaria Workers BCC & Dipping campaigns M2s receiving LLINs from clinic POTENTIAL: Support to Cluster Mobile Malaria Workers Issue pre-departure packs (distribution and dipping), malaria post workers, BCC & Dipping campaigns	EXISTING: M2s receiving LLINs from clinics Mapping of labourers (IOM and MMA led in Burma[cluster approach]) Cluster village mobility working groups (IOM supported in Burma and along Thai/Burmese border) POTENTIAL: Scale up of– BCC, dipping and distribution Scale up of cluster village mobility working groups Distribution via community dispute mediation groups Distribution via migrant learning centres	EXISTING: Retail sale of: nets & hammock nets POTENTIAL: Retail sale of other PP tools & LLITKs
v. "New Settlers" 	Landless people from other provinces seeking uninhabited land, therefore remote, often remain hidden, often non-immune				
vi. "Highly Mobile Labour" 	Opportunistic remote work. Often from other provinces. Loose groups, living in camps. Formerly gem miners, now gold miners, wood cutters, stump miners				
vii. "Short-term Migrants" 	(Termed M2 in Thailand) Economic migrants, crossing borders for work. Often planting or harvesting agricultural products (2-4 months) or in other short term situations - often exploitative.				

Private Sector Engagement

Private Sector Engagement Options

Unlike Africa, the problem in the GMS is not one of inadequate demand for nets. Net ownership is high in most target groups (although Myanmar/Burma has data showing that net ownership is not uniformly high in all communities). Neither is there a problem of supply. There is a functioning private sector market system which appears to be working to get nets to people who are prepared to purchase them.

The problem is one of *insecticide treated* net availability. Currently there are only institutional sales of LLINs to government (PermaNet was found on sale in Yangon, but there are no plans for widespread distribution). The problem with current LLIN technology is that it is not consumer oriented – LLINs were produced for a specific consumer, the global fund procurement officers, for mass campaign distribution in Africa.

People do not value insecticide treatment for their nets highly enough to switch to a higher cost, lower specification LLIN, limited in colour, size and material. The net culture is present in urban as well as rural areas. Nets are used for nuisance biting and privacy, as well as for malaria prevention, this keeps the net market buoyant, even in regions where there is no malaria present. This demand is met by small scale local manufacture and also a ready supply of imported nets from Thailand and Vietnam.

The assessment brief asks how one can transition the current conventional net market to one of LLINs. Figure 3 looks at the issues for both LLINs and conventional nets treated with long-lasting insecticide (ITNs). There are complex issues with deciding on one source of supply, hence a Value Chain Analysis is recommended to ascertain the most cost effective intervention.

For this assessment, discussions were held with 9 of the current WHOPES approved LLIN manufacturers. Details of these discussions are summarised in Figs 16 and 17. Most surprising is that Vestergaard Frandsen (VF), the one manufacturer who had until a year ago the largest retail market activity, has now withdrawn, having found that the consumer retail market is just not a viable business proposition. Some other manufacturers are tentatively moving to retail, but in a very limited way.

The question for private sector intervention remains, should current high volume, low cost, low tech suppliers be put out of business, in favour of supporting manufacturers of the high tech LLIN product?

Alternatively, a further analysis is required to consider other interim measures, such as the bundling strategy trialled in Cambodia and to see how such interim measures can be developed further to offer the most cost-effective prevention intervention for this region. See table y.

Considerations in Transitioning from ITNs to LLINs:

Figure 3: ITNs & LLINs

Conventional Nets:

- High net use culture, acceptability and coverage of conventional nets
- Buoyant and diverse market for nets
- Challenge – nets are untreated
- Can net treatment become a norm?
- Existing re-treatment / dipping campaigns
- Options for bundling or treating at source
- Potential for sales of LLITks
- LLINs not tailored for consumer preferences (colour, shape, size, material opaqueness, smell)
- Difficulty accessing certain communities with LLIN free distribution, replacement
- Efficacy questions - LLINs in Burmese household setting (JICA LLIN efficacy tests, in Myanmar/Burma)
- Evidence of 'crowding-out' retail nets when

LLINs:

- LLINs are the superior technology
- Free LLINs necessary for those that cannot afford to pay
- Priority for populations where resistance has developed
- Can net use culture be transferred to LLINs?
- Significant economies of scale generated through institutional sales, so price has reduced
- Can retail supply generate critical sales volumes for a viable LLIN retail market?
- Reductions in institutional procurement is forcing the manufacturers to consider development of retail channels
- Examples of some LLIN manufacturers trialling retail channels (BestNet, Yorkool), others withdrawing (VF)
- Social Marketing of LLINs in Myanmar/Burma

Value Chain Analysis

A value-chain analysis looks at every step of a business process, from raw materials, adding value, to finished product and final sale to the end-user. The goal is to deliver maximum value for the least possible total cost. If this is overlaid with an M4P approach, this maximum value can be of maximum value to the poor.

Assessment of Private Sector LLIN & LLITK Manufacturers

In the RBM workshops – there were calls from a number of participants, including Dr Coosemans and Mike McDonald, involve the private sector in the planning and engage them in new product research and development.

Table 33: the LLIN Manufacturers

BRAND:	Type:	Sustainability Plans:	Potential innovations:
PermaNet Vestergaard Frandsen	2.0 Deltamethrin coated on polyester 3.0 Combination of deltamethrin coated on polyester with strengthened border and deltamethrin and PBO incorporated into polyethylene roof.	Public Health focussed company: Has always had small retail arm, but relied on institutional sales. In strongest position to develop retail market but withdrew from retail markets in 2011, because not seen as viable. Inst. supply to Cambodia & Burma	Potential sale of pre-treated yarn on spindles PermaNet4 - "Resistance Breaking" LLIN (for pyrethroid resistance). In trial, awaiting WHOPES final approval. ZeroFly Tarpaulins ZeroVector Wall lining to replace IRS
SUMITOMO CHEMICAL Olyset Net Sumitomo	Permethrin incorporated into polyethylene	Large Chemical Company: LLIN is v small component of company in Vector Control division (1 person) Developed Olyset as CSR project. Set up A to Z in Tanzania as a social enterprise. Just starting a retail arm in Kenya to trial. Inst. supply to Cambodia & Burma	New Olyset net in June/July 2012, enhanced efficacy and softer feel. By 2014 new LLIN with different class of insecticide Consumer products developed with 3rd parties i.e. SC Johnson, Reckit, Scotts, Unilever, P&G etc
LifeNet Bayer	Deltamethrin incorporated polypropylene	Large Chemical Company: Full portfolio of vector control products, incl IRS, Developed consumer retail arm for other pest control products	New polypropylene LLIN in April 2012 Sale of pre-treated netting in bulk – now in consideration - for local tailored stitching and production
DAWA PLUS Tana Netting	Deltamethrin coated on polyester	Small LLIN company: Flexibility in producing any netting product. Diversifying into leisure-wear clothing for travel	Technology transfer of end-of-line process. Trials of pre-treated clothing
NETPROTECT Bestnet	Deltamethrin incorporated into polyethylene	Small LLIN company: Former employees of VF Diversifying into relief work products. Also developing retail arm in 2012 and new colour/stripes product differentiation.	Launched treated hammock with net in April 2012 'Jungle Hammock Net' Striped and coloured products launched in 2012
INTERCEPTOR BASF	Alpha-cypermethrin coated on polyester	Large Chemical Company: Believes reduction in institutional sales will decrease market. Some are divesting from market and will leave	Development of new LLIN – using chlorfenapyr fore resistance mgmt. For WHOPES evaluation in 2013 Recommends Micro-Credit Small Business enterprises or Social Franchising for health products
DuraNet Clarke	Alpha-cypermethrin incorporated into polyethylene	Environmental Products Company:	
MAGNet VKA Polymers	Alpha-cypermethrin incorporated into polyethylene	LLIN company (copy of Clarke)	Offer full technology transfer and partial transfer (netting for stitching)
YORKOOL LN™ Yorkool	Deltamethrin coated on polyester	LLIN company (copy of VF) Inst. Supply to Burma (thro PSI). Have a distributor in Pakistan. Also selling privately to Kenya & Uganda	Interested in other prevention products but no plans as yet.

Table 34: The LLITK Manufacturers

BRAND	Manf.:	Type:	Sustainability Plans:	Potential innovations:
K-O TAB 1-2-3 iconMaxx	Bayer	Deltamethrin with binding agent *Presents as:* 2 tablets	Interested in developing retail arm. Just started retail development in Bangladesh.	Development of resistance insecticide with IVCC Burma seen as a big market for development Is used in region
	Syngenta	Lambda-cylhalothrin with binding agent *Presents as:* 2 liquid sachets	Interested in developing retail arm, not active yet.	Development of resistance insecticide with IVCC Programs for CBD by women's groups in Africa Is used in region Currently bundled with conventional nets as 'SuperMalatab' in Cambodia (PSI brand)

Consideration of options for interim measures in transitioning to LLINs:

The transition from conventional untreated nets to LLINs is a complex challenge and there is no one obvious solution to this problem. The following tables are an attempt to put some structure to the argument for possible transition options. This is not an exhaustive list. It is merely meant to stimulate thought and possible further analysis to ascertain the best course of action to take.

From discussions with Jo Lines of the London School of Hygiene and Tropical Medicine (LSHTM), as well as staff at PSI and CNM, whilst in Phnom Penh; it is evident that the original purpose of the bundling strategy may have been overlooked or misunderstood.

Originally, the bundling strategy was an interim exercise which aimed to ascertain the reach and penetration of the supply chains operating out from the central wholesale market – Olympic Market, in Phnom Penh. The bundling of LLITKs with conventional nets was always considered a retrograde interim technology. However, it was assumed that the bundling of LLITKs with all nets at Olympic market would be more cost effective than trying to bundle a limited number of nets to be targeted at risk groups. There was no way to determine which private sector suppliers were getting nets to the forest workers areas. This exercise intended to demonstrate the ability of the market structure to achieve sufficient penetration of supply and access to LLINs. It aimed to show that an intervention made at this central location could capture 90% of the nets people purchase. This could then be shown to have solved the problem of distribution, as long as there was no interference in the existing private sector supply chain. It allowed the existing market structures and consumer preferences to continue without disruption.

From early data from PSI's monitoring of the bundling program, it appears that the supply chain does achieve the reach and access assumed. Therefore, it is necessary to reconsider the most appropriate 'technology' or approach to move to the next stage, drawing valuable lessons from the PSI bundling experience.

These are important lessons to draw on, as they may have considerable applicability to Myanmar/Burma.

OPTIONS:

The supply of free LLINs to those most at risk is considered as necessary, but not sufficient:

Table 35: considerations for free LLIN distribution

Option 1	Funding Inputs	+ve's	-ve's
FREE LLIN 	Sources of public funding for procurement	Supply the best technological product to people to prevent malaria	Not sufficient public funds to cover all
LLINs supplied free to all at risk	Public distribution mechanisms	No retreatment necessary	Crowding-out of existing private sector supply of nets.

Therefore, ideally LLINs would be made available for sale in retail channels

Table 36: Considerations for LLIN retail

Option 2	Funding Inputs	+ve's	-ve's
LLIN RETAIL  *LLINs on sale in the retail market e.g. PermaNet, Myanmar/Burma*	Value Chain analysis	Supply the best technological product to people to prevent malaria	Not economically viable for current manufacturers
		No retreatment necessary	LLIN limited product range not consumer oriented. Use net for more than malaria prevention
		Utilise the private sector supply chains	High supply chain margins make price high to consumers
			May not be able to compete with low cost conventional nets
			May not reach all at risk groups and all socio-economic strata

However, this is not viable and therefore the trial of new approaches to converting existing conventional untreated nets to LLINs may be a necessary option.

Table 37: Considerations for net and LLITK bundling

Option 3	Funding Inputs	+ve's	-ve's
BUNDLE  *Bundle existing conventional nets with long-lasting insecticide at distribution hub i.e. Cambodia / PSI*	Public funded intermediary 'bundling agency'	Potential to have all nets transferred to LLINs cost-effectively	Requires public funded intermediary
	Public funded procurement of LLITks	Allows consumer preference and choice to be maintained	Requires all suppliers to sign up to bundling
	Public funded trade promotion and consumer BCC for net treatment	Distribution costs borne by private sector	Requires a central hub of distribution where bundling can be done (i.e. Olympic market, Phnom Penh)
	Value Chain analysis to determine cost-benefits	Economies of scale achieved by operating	Requires consumers to use the LLITK to treat

		national program, rather than targeted intervention	their net
			High costs of BCC necessary – although limit to high risk groups only - national coverage not necessary
			Blitz teams – costly / necessary? Better to target consumers to treat, rather than retailers to bundle?
			Different weights of netting/fabric may require different concentrations of insecticide

Consideration of alternative options:

Table 38: Considerations for treating nets at manufacturers

Option 4	Funding Inputs	+ve's	-ve's
MANUF. TREAT  *Treat conventional nets with long lasting insecticide, at source*	Public funded intermediary to negotiate with all manufacturers/producers	Potential to have all nets transferred to LLINs	Requires public funded intermediary
	Public funded procurement of insecticide and binding agent	No net treatment necessary for consumers to undertake	Requires all suppliers to agree to treating of their nets
	Treatment methodology to suit many different suppliers	Allows consumer preference and choice to be maintained	Requires a methodology to enable all producers to treat nets at production site appropriately
	Negotiations with all net producers	No need for costly BCC for net treatment	Requires monitoring to ensure compliance
	Value Chain analysis to determine cost-benefits		Additional production process may put up unit cost of nets

Table 39: Considerations for end of line treatment of nets

Option 5	Funding Inputs	+ve's	-ve's
'WASHING MACHINE'  *Treat conventional nets with long lasting insecticide technology, at central hub e.g. Olympic Market, Phnom Penh*	Public funded intermediary	Potential to have all nets transferred to LLINs	Requires public funded intermediary
	Public funded procurement of insecticide and binding agent and technological process e.g. end-of-line process	No treatment necessary for consumers to undertake	Requires all suppliers to sign up to treatment
	Management organisation to run technological treatment plant	Allows consumer preference and choice to be maintained	Cost of technological transfer
	Value Chain analysis to determine cost-benefits	No need for net treatment BCC costs	Cost of technology/management
		Monitoring costs minimised	Different weights of netting/fabric may require different concentrations of insecticide

Table 40: Considerations for insecticide treated yarn

Option 6	Funding Inputs	+ve's	-ve's
LLIT YARN  *Supply long-lasting insecticide treated yarn to all net producers*	LLIT Yarn producer	Potential to have all nets transferred to LLINs	Requires public funded intermediary
	Health & safety assurances for net stitchers	No treatment necessary for consumers to undertake	Requires all suppliers to sign up to purchase LLIT Yarn
	Intermediary agency	Allows consumer preference and choice to be maintained	Cost of LLI T Yarn, and monopolistic supply of yarn (?)
	Value Chain analysis to determine cost-benefits	No need for net treatment BCC costs	Cost of health and safety measures for producers and compliance
			Monitoring costs

Further analysis of existing strategies:

Table 41: Considerations for LLITK retail

Option 7	Funding Inputs	+ve's	-ve's
LLITK RETAIL  *LLITks on sale in the retail market e.g.* SuperMalatab (Cambodia)	Value Chain analysis	Utilise the private sector supply chains	Not economically viable for current manufacturers of LLITks
	Social Marketing (?)	People prepared to buy	Rely on consumer compliance to treat their nets
	BCC net treatment		Costs of BCC
	Consumer acceptability and willingness to pay study		
	Procurement of LLITks		

Table 42: Considerations for social marketing of nets

Option 8	Funding Inputs	+ve's	-ve's
LLIN SOCIAL MARKETING  *Social marketing of LLINs e.g. SupaNet (Myanmar/Burma)*	Value Chain analysis	Supply the best technological product to people to prevent malaria	Limited product range not consumer oriented. Use net for more than malaria prevention
	Public funded social marketing subsidy	No retreatment necessary	May not be able to compete with low cost conventional nets unless price is kept v low. See Cambodia experience of social marketing
	Public funded distribution in retail chain	Utilise the private sector supply chains	Potential to 'crowd-out' must be weighed with market priming
	BCC for LLINs	Keep costs affordable	May crowd-out low cost conventional nets –

			distort the existing market
		Ensure access through targeted distribution	May not reach all at risk groups and all socio-economic strat

Monitoring and Evaluation

All three countries (Myanmar/Burma, Cambodia, and Thailand) have updated or in the process of updating their National Malaria Strategic Plans (NMSP) and National M&E Plans which is aimed to align as much as possible the indicators with the Regional Malaria Indicator Framework (RMIF) and Global Malaria Indicators (GMI). This process is supported through technical assistance from WHO, Malaria Consortium, and other partners.

Myanmar/Burma	Cambodia	Thailand
National Strategic Plan for Malaria Prevention and Control (2010-2015)	National Strategic Plan For Elimination of Malaria in Cambodia (2011-2025)	National Strategic Plan for Malaria Control and Elimination in Thailand (2011-2016)
National Monitoring and Evaluation Plan for Malaria Prevention and Control (2010-2015)	National Malaria Control Program Monitoring and Evaluation Plan (2009-2014)	National Monitoring and Evaluation Plan for Malaria Control and Elimination in Thailand (2011-2016)

Malaria prevention is an integral component of national malaria strategies and subsequently is monitored in their National M&E Plans. The table below summarizes the key indicators proposed in the respective National M&E Plans (including Global Fund) and other relevant indicator frameworks for monitoring of prevention measures.

	Myanmar/Burma	Cambodia	Thailand
Prevention	***National Malaria Strategy and Global Fund R9:*** • % of households with at least one LLIN • % of people who slept inside LLIN/ITN the night before • # of LLINs distributed • # of mosquito nets treated with insecticide ***Myanmar Artemisinin Resistance Containment (MARC) M&E Framework:*** • % of people sleeping under an ITN/LLIN the previous night (in Tier 1 and Tier 2) • % of migrants/mobile populations sleeping under an LLIN/ITN the previous night (in Tier 1 and Tier 2) • % of households in target areas with at least 1 LLIN/ITN per 2 persons (in Tier 1 and Tier 2) • # of people given protection through (i) other personal protection (not LLIN/ITN) and (ii) IRS	***National Malaria Strategy:*** • % of households at risk of malaria living in the targeted villages with at least one insecticide- treated net (LLIN/ conventional treated net) and/or sprayed by IRS in the last 12 months • % of population at risk of malaria living in the targeted villages who slept under an insecticide- treated net (LLIHN/ LLIN/ conventional treated net) during the previous night ***Global Fund R9:*** • % of families living in high malaria endemic areas that have sufficient LLINs/ITNs (2 persons per net) • # of LLIHNs procured and distributed in malaria risk zone (<2km from the forest) • # of existing nets at community level re-treated in malaria endemic areas	***National Malaria Strategy and Global Fund R10:*** • % of population at risk (A1 + A2) covered by LLIN/ITN distribution • % of targeted population (A1 + A2) covered by indoor residual spraying (IRS) • % of households at risk of malaria (A1 + A2) with at least one LLIN/ITN and/or sprayed by IRS in the last 12 months • # of LLINs distributed to Thai, M1, and M2 migrants • # of existing ITNs reimpregnated

	• # of LLINs distributed (i) in total and (ii) to migrant and mobile populations • # of nets treated/retreated (i) with regular insecticide treatment and (ii) with long-lasting insecticide treatment		
BCC	• % of people who slept inside LLIN/ITN the night before	• % of population / children <5 years / pregnant women living in malaria endemic areas (< 2 km from forest) of 20 provinces sleeping under a treated mosquito net the previous night	• % of individuals in areas at risk of malaria (A1 + A2) who slept under an ITN/LLIN the previous night • % of respondents in malaria risk areas (A1 + A2) who can recall at least 1 key messages on malaria control and containment/ elimination

The indicators used to monitor prevention measures in all three national malaria programs mainly focus on the coverage of LLINs and ITNs among target populations. Cambodia is one of the few national programs, in addition to Viet Nam, which has limited documentation (and anecdotal evidence) on the use and acceptability of LLIHNs. Consequently, this prevention measure is included in their national M&E plan indicators in Cambodia. Myanmar/Burma, through monitoring for the Myanmar Artemisinin Resistance Containment (MARC) strategy, has included an indicator on the use of personal protection that is not LLIN/ITN. However, most national malaria programs are not routinely monitoring the use of other personal protection methods such as repellents and insecticide treated materials.

BCC messages are often focused on the use of LLINs, LLIHNs, and ITNs – and subsequently are primarily measured through the behavior of sleeping under these personal protection tools the previous night. Thailand includes in their NMSP an indicator on knowledge of key messages that attempts to measure behavior change; although it is acknowledged that such indicators are limited to recall and may not to have a direct relationship with actual change of behavior. As seen in the choice of indicators in the three countries, BCC indicators are traditionally focused on the use of LLINs/ITNs as a measurement of behavior change. ***However, there is a need, particularly in this region, to expand monitoring of personal protection tools beyond LLINs and ITNs.***

Myanmar/Burma

National Strategic and M&E Plan. According to the National Malaria Strategic Plan, by 2015, at least 80% of people in high and moderate risk villages in 180 priority townships will be protected from malaria by using insecticide-treated nets/long-lasting insecticidal nets, complemented with other appropriate vector control methods, where applicable.

Out of the 284 malaria endemic townships, a total of 180 are targeted form LLIN/ITN scale up. These 180 townships represent up to 88% of reported malaria cases and 86% of

malaria deaths between 2003 and 2007[38]. The LLIN strategy in Myanmar/Burma is applied according to risk stratification – with priority given to high and moderate risk villages for full coverage of LLINs and retreatment of ITNs through mass campaigns. It is estimated that the total population in the 180 townships (2010 estimates) was approximately 29.8 million, of which 75% (22.4 million) live in malaria risk areas and 15.5 million live in high and moderate risk villages. The target coverage rate for LLINs is based on 2 LLINs per household.

The National Malaria Strategic Plan also outlines activities for LLIN to include:

- Micro-stratification
- Household survey in high-risk villages
- Micro-planning for mass LLIN delivery and/or treatment of mosquito nets
- Community mobilization for mass retreatment of mosquito nets or LLIN delivery
- BCC targeting use of ITNs/LLINs
- Mass retreatment of mosquito nets (once per year before malaria transmission season or delivery of LLINs)
- Follow-up monitoring and BCC
- Planning **replacement strategy for LLINs** after 3-5 years depending on the type of LLIN procured.

Global Fund R9. The Global Fund R9 is one of the primary providers of LLINs in 170 targeted high risk townships in Myanmar/Burma. The GFATM R9 proposal identifies prevention using LLINs/ITNs for target residents in high and moderate risk villages as well as internal migrant workers and pregnant women as a priority. In 55 priority townships, 1.8 million LLINs are to be distributed free of charge and the existing ordinary mosquito nets will be treated with long lasting insecticide to ensure coverage of 94% and above from year 2 onwards. Moreover, mass treatment of existing ordinary mosquito nets with long lasting insecticides will be done in 115 other priority townships. The table below shows the GFATM Round 9 indicators and targets related to LLINs and personal protection.

Table 43: GFATM Round 9 Indicators and Targets

Indicator	Baseline (2008)	2011	2012	2013	2014	2015
Number of LLINs distributed	282,846	800,000	800,000	100,000	90,000	90,000
No. of mosquito nets treated	852,762	1,000,000	1,272,727	1,272,727	1,272,727	1,272,727
No. households with at least 1 ITN/LLIN	465,453	850,000	1,536,364	1,722,727	1,767,727	1,767,727
Proportion of population at risk surveyed who sleep under LLINs/ITNs the night before the survey	No baseline	68%[39]	75%	80%	80%	80%

[38] Ministry of Health, National Strategic Plan for Malaria Prevention and Control (2010-2015)

[39] Survey indicated that 68% - 85% slept under a net the night before the survey. It is assumed that at least 68% will also sleep under ITNs/LLINs in Year 1 of this proposal.

No. of households reached with BCC - community outreach	To be established	850,000	1,536,364	1,722,727	1,767,727	1,767,727

Source: Myanmar/Burma Global Fund Round 9 proposal

Despite resources from the Global Fund, the gap for LLIN/ITN in the country is estimated to be much greater, as indicated in the priority areas gap analysis in the GFATM R9 proposal.

Priority No: 1	Prevention using LLINS / ITNs	Historical		Current		Country targets				
Indicator name	Number of LLINs provided and bednets treated	2007	2008	2009	2010	2011	2012	2013	2014	2015
A: Country target *(from annual plans where these exist)*		1,000,000	4,400,000	5,600,000	600,000	3,500,000	6,500,000	6,500,000	4,500,000	4,500,000
B: Extent of need already planned to be met under other programs		948,461	1,135,608	596,444	595,699	450,000	50,000	50,000	50,000	**50,000**
C: Expected annual gap in achieving plans		51,539	3,264,392	5,003,556	4,301	3,050,000	6,450,000	6,450,000	4,450,000	4,450,000
D: Round 9 proposal contribution to total need		*(e.g., can be equal to or less than full gap)*			N/A	1,800,000	2,072,727	1,372,727	1,362,727	1,362,727

Source: Myanmar/Burma Global Fund Round 9 proposal

Myanmar Artemisinin Resistance Containment. Evidence through routine antimalarial drug efficacy monitoring suggests that artemisinin resistance may be present in Myanmar and therefore an urgent response was needed to determine the extent of resistance, contain it, and prevent its spread across Myanmar and beyond. The Myanmar Artemisinin Resistance Containment (MARC) strategy and framework was released in April 2011. A key component of its monitoring and evaluation plan is to conduct surveys (malariometric, coverage and behavior) at household, health facility, and drug outlet levels undertaken in year 1 and follow-up in year 2. The objectives of the MARC Surveys are to determine the baseline malaria prevalence in the Containment areas (Tier 1 and Tier 2), to assess and monitor the availability of oral artemisinin monotherapies in the Containment areas and to serve as baseline for the MARC Strategic and M&E Framework in 2011, as well as contribute to baselines for other projects including Global Fund. The baseline survey was carried out in December 2011 with implementation support provided by the Department of Medical Research; survey design, tools, and analysis by Malaria Consortium; and funding support through WHO and 3DF.

The aim of the MARC strategy is to build on and strengthen existing control efforts to prevent, or at minimum, significantly delay the spread of artemisinin resistant parasites within the country and beyond its borders. This implies intensification of present activities and an expansion of specific interventions also to pay more attention to migrants and mobile populations, set up extra sentinel sites to monitor efficacy of antimalarial medicines, increasing advocacy to engage local authorities and relevant stakeholders, engaging the private sector and bridging interventions with neighbouring countries.

In an effort to harmonize and to reduce burden, the MARC M&E Framework was aligned to the National Malaria M&E Plan and Global Fund indicators.

Cambodia

National Strategic and M&E Plan. Since the implementation of activities from the GFATM Rounds 2, 4 and 6, considerable attention and support has been placed on monitoring and evaluation activities. Cambodia is committed to the principle of "Three Ones "as the overarching framework to better coordinate the scale-up of National Malaria Programs and related responses to the Malaria burden in the country. The National Monitoring and Evaluation Plan (2009 – 2014) aims to standardize and harmonize key indicators across different projects, development partners and other stakeholders. The "Three Ones" are:

- One agreed Malaria action framework (the National Malaria Strategic Plan for 2011-15) that provides the basis for coordinating the work of all partners;
- One national Malaria coordinating authority (CNM), with a broad-based multi-sector mandate; and
- One agreed-upon country-level monitoring and evaluation system.

CNM relies on the current reporting system of the HIS for routine reporting of malaria morbidity and mortality, but also has established a network of VMWs who provide a system of reporting treated malaria cases (disaggregated by age and sex) at the community level These figures are combined to give an estimate of the malaria burden in the country. This malaria database, developed in response to the need for case-based and village-level information on artemisinin resistant cases, has now been expanded to include all villages in Cambodia – and will contribute to enabling tracking of malaria cases as the country moves towards malaria elimination.

Cambodia Malaria Surveys. CNM has routinely conducted national malaria surveys (2004, 2007, 2010, and plans are underway for 2012) as part of their monitoring and evaluation of the national program with technical support from Malaria Consortium. These malaria surveys, supported by the Global Fund, WHO, and other partners (which include malariometric estimates as part of a household survey, drug and net outlets, and health facility survey) have been useful in tracking the trends of malaria over time in the country. These data have also contributed to better inform the national program of where to target limited resources, and as a result, have led to an effort to revise malaria risk stratification in the country. Table 44 shows the key malaria indicators that the national program monitors as part of the National M&E Plan (and for Global Fund). Several of the outcome indicators are measured from the malaria surveys.

Table 44: Key Malaria Prevention Indicators

Indicator	2009		2010		TARGETS				
	Target	Result	Target	Result	2011	2012	2013	2014	2015
% of population at risk covered by ITN (LLIN/LLIHN/ conventional treated nets) distribution	75%	96%	90%	82%	95%	>95%	>95%	>95%	>95%

% of households at risk of malaria living in the targeted villages with at least one insecticide-treated net (LLIN/conventional treated net)	-	-	60%	75% (ITN) 52% (LLIN)[40]	-	85%	-	95%	-
% of households at risk of malaria living in the targeted villages with at least one insecticide- treated net (LLIN/conventional treated net) and/or sprayed by IRS in the last 12 months			60%			85%		95%	
% of population at risk of malaria living in the targeted villages who slept under an insecticide- treated net (LLIHN/LLIN/conventional treated net) during the previous night			45%	53% (ITN) 32% (LLIN)[40]		70%		85%	
% of population living in villages located between 2-5km from the forest who slept under an insecticide- treated net (LLIHN/LLIN/conventional treated net) during the previous night			25%	11%[40]		50%		>50%	
% of forest visitors in the targeted villages who reported sleeping under an ITN (LLIHN/ LLIN/ conventional treated net) the last time they slept in the forest			40%	37%[40]		60%		80%	
% of households who treated their net with Super Malatab kit among those who purchased a bundled net within past 6 months, in villages located within 5km from the forest			TBD			60%		N/A	

Rapid Coverage Monitoring in Cambodia

Through support from various donors (including Global Fund, Bill & Melinda Gates Foundation, USAID, and others) to intensify malaria control in order to eliminate artemisinin

[40] Results from Cambodia Malaria Survey 2010

resistance, one of the key interventions continues to be the distribution of long-lasting insecticidal nets to target populations as a means of reducing malaria transmission. In the Containment Project alone, more than 500,000 LLINs and hammock nets were distributed to target populations in areas of known artemisinin resistance. However, particularly in areas along the Thai-Cambodia borders with high proportions of migrants and mobile populations, household estimates for LLIN distribution may fluctuate considerably. Therefore, there was a need to conduct a rapid coverage assessment to monitor and to identify constraints in achieving the intended coverage and to use this information for improvement of strategies. Using adapted tools from the Extended Program for Immunization (EPI), Cambodia conducted micro-planning followed with a rapid coverage monitoring (RCM) in four provinces of the Containment Zone 1. The results indicated although the mass campaigns of LLIN distributions in the target areas achieved the intended coverage, a significant proportion (27%) of the LLINs distributed were not used (and still in their original packaging)[41]. The main objective of the RCM was to make immediate observations following LLIN distributions, to determine gaps in coverage, and to allow the program to adjust its strategies to fill these gaps. Experience from this exercise in Cambodia demonstrated the utility of conducting micro-planning and RCM, particularly in areas with high mobile populations.

[41] Sovannaroth S., Report on Rapid Coverage Monitoring on LLIN Distribution in Containment Zone 1

Thailand

National Strategic and M&E Plans. Thailand has an updated National Strategy for Malaria Control and Elimination (2011-2016) which is supported with a National M&E Plan for the same period. The framework and indicators in the National M&E Plan are aligned with the Global Malaria Indicators, Regional Malaria Indicator Framework, and Global Fund Performance Indicator Framework.

Table 45: Thai National Strategy Prevention Indicators

Indicator	Baseline	Target
% of population at risk (A1 + A2) covered by LLIN/ITN distribution	TBD	100%
% of targeted population (A1+A2) covered by IRS	TBD	95%
% of households at risk of malaria (A1 + A2) with at least one LLIN/ITN and/or sprayed by IRS in the last 12 months	TBD	95%
% of individuals in areas at risk of malaria (A1 + A2) who slept under an ITN/LLIN the previous night	47% (2011)	90% (2016)
% of respondents in malaria risk areas (A1 + A2) who can recall at least 1 key messages on malaria control and containment/elimination	66% (2010)	TBD

Thailand has a well-structured reporting system, but the system is mostly paper-based which make it inefficient to extract data for monitoring and evaluation, planning, and allocating appropriate resources. Only aggregated data are readily available in electronic format. Detailed data such as individual malaria cases by sex and age are only kept on paper at the peripheral levels.

Malaria surveillance in undocumented migrants is challenging, and ensuring treatment compliance and parasite clearance in an environment in which it needs to be closely monitored is quite difficult in this population. While undocumented and highly mobile workers may receive diagnosis and treatment at malaria clinics along the border areas free of charge, they are often not followed up for compliance and parasite clearance, as is the norm in the provinces targeted by the containment project.

Thailand Malaria Survey. Thailand relies on malaria data reported through its long-standing malaria surveillance system and has not needed to conduct malaria surveys in recent decades. However, as Thailand embarks on national malaria elimination, it will be important to ensure that it's malaria risk stratification are updated to reflect the current epidemiology and tools (e.g., PCR and serological parameters). In late 2012, with Global

Fund R10 support, Thailand is scheduled to undertake a household survey assessing ownership and use of LLINs, ITNs, LLIHNs and other personal protection measures. The household survey links a malariometric component (similar to those conducted in Cambodia and Myanmar). Previously, Knowledge, Attitude, and Practice (KAP) surveys were conducted by BVBD annually in target villages to address the indicators on knowledge and treatment of malaria, as well as the use of LLINs. These KAP surveys were managed and implemented by district and provincial staff who were instructed to use standardized sampling design and methodologies. KAP surveys will be conducted every other year and linked with the larger population-based malariometric (household) surveys to be conducted in Y1 and Y5 of the grant.

Considerations for Monitoring and Evaluation of LLINs

Rapid Coverage Assessments following campaign

Rapid Coverage Monitoring (RCM) or Assessments are not routinely conducted by national malaria programs in the region. In Cambodia, this was piloted to assess the coverage of LLINs following a large-scale distribution in an artemisinin resistance target area. The results of this RCM were used by the program to ensure that micro-planning is done prior to distribution, and gaps in coverage are addressed shortly after the distribution. The RCM conducted in Cambodia also highlighted the issue of highly mobile populations which may require a more specialized, targeted approach to increase access of malaria prevention measures for these risk groups. RCM should be conducted in target areas following every large scale campaign to ensure adequate coverage of LLINs has been reached. The results of RCM should also inform ways of improving BCC strategies and communications channels.

Outcome (and Impact Assessments)

Traditionally outcome and impact measurements have relied on the use of large scale surveys, including but not limited to the Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), Malaria Indicator Surveys (MIS), and others. DHS are nationally representative household surveys addressing either general health aspects or health issues concerning children and women of reproductive age. For some DHS, there includes a malaria module but often these do not have a malariometric component and are often conducted during the dry season in the country. MICS do not include always have malaria-specific modules, do not address coverage and use of LLINs, and do not have a malariometric component. MIS are adapted DHS that uses similar nationally representative sampling procedures, collects information on individual net use, and usually collect blood samples for malaria testing.

These large scale surveys take significant resources of time, budget, and personnel to conduct, and as much as possible should be coordinated to obtain the most relevant and useful information for programmatic decision-making.

Qualitative methods

In addition to statistically representative methodologies and surveys, it is also important to consider the use of qualitative data and information for triangulation. Qualitative tools such as in-depth interviews, focus group discussions, and key informant interviews are important to complement quantitative results. Particularly related to the coverage and use of LLINs, qualitative methods can provide deeper understanding into the reasons why households do not have or are not using their LLINs each night. One of the drawbacks of qualitative methods is that it is often difficult to obtain nationally representative results; however, if well designed and conducted, qualitative methods are an invaluable source of information that should not be undermined.

Universal Coverage

According to Roll Back Malaria, the definition of universal coverage is 100% of the population at risk is provided with locally appropriate preventive interventions. For LLINs, universal coverage is defined as ensuring that all target households own one LLIN for every two people living there. Currently there are only two ITN related indicators in the RBM guidelines on Core Population Coverage Indicators: 1) % of households owning at least one ITN/LLIN and 2) % of persons sleeping under an ITN/LLIN the previous night. These two indicators do not adequate capture the *intra-household net coverage* (that is, are there enough nets in the household?). For programmatic purposes, it may be more important to know whether we gave enough nets to those households that received nets.

$$\text{Intra-household net coverage} = \frac{\#\text{ households with ITN/LLIN (ratio < or = 2.0)}}{\#\text{ households with any ITN}}$$

Similarly, in the Cambodia Malaria Surveys, universal coverage was defined as % of households living in targeted, at risk-villages that have sufficient ITNs/LLINs (i.e., at least one ITN/LLIN per 2 persons). By knowing the proportion of households with at least 1 ITN/LLIN per 2 persons among those households with any type of net, this should be able to help inform about the gaps in net coverage at household level.

Moreover, to more adequately measure ‘universal coverage’, it is proposed that four indicators are used together:

1. % of households with **any ITN/LLIN** (core)
2. % of households with **at least one ITN for every two people** among households with any ITN/LLIN (core)
3. % of **existing ITN/LLIN** used last night (supplemental)
4. % of **people using ITN/LLIN** last night (core)

This set of indicators were proposed by Albert Kilian (Malaria Consortium) and endorsed by the RBM Partnership Monitoring and Evaluation Reference Group (MERG) Survey and Indicator Guidance Task Force in April 2011.

It is recommended that the GMS countries try to standardize these indicators and definitions for universal coverage.

Net tracking

Based on the research from various surveys on LLINs, Albert Kilian (Malaria Consortium) has developed the concept note[42] on net tracking, including some proposed indicators to monitor the coverage and use of LLINs.

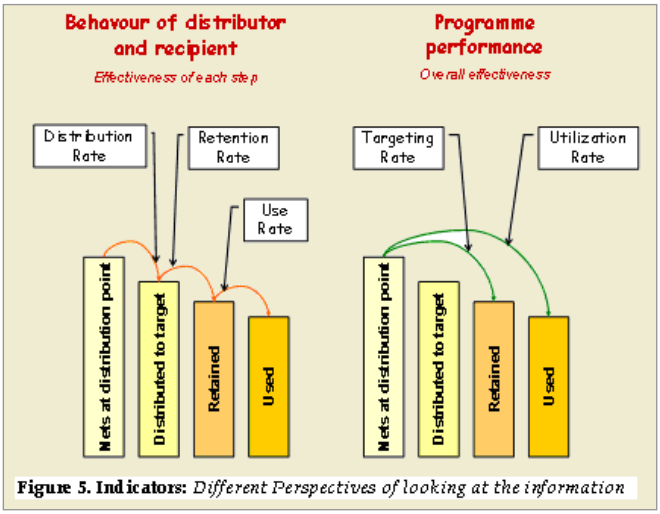


Figure 5. Indicators: *Different Perspectives of looking at the information*

The main objective of net tracking is to determine where LLINs end up once they are given to either a distribution point or household. A net tracking M&E system that covers the entire spectrum from procurement to distribution to use would be particularly informative for monitoring of national program distribution strategies and implementation.

Suggested indicators for net tracking include:

Indicator	Definition	Numerator/Denominator	Rationale
Distribution rate	Proportion of nets that have been distributed correctly to target groups	# nets received by recipient / # nets distributed	Quality of service delivery at distribution point; net leakage
Retention rate	Proportion of nets received by the household that were retained (visually verified) by the recipients after x months	# nets retained (seen) / # nets received by recipients	Indicates proportion of nets that have been stolen, given away, etc

[42] Malaria Consortium, Monitoring the Outcome of ITN Distributions: the Concept of Net Tracking and Its Applications (Jan 2009)

Use rate	Proportion of the nets retained in the HH that were used the previous night	# nets used the previous night / # nets retained	Use of net by each member in the HH
Targeting rate	Proportion of distributed nets that are still found in the possession of the HH after x months	# nets retained (seen) / # nets distributed	Estimate nets still retained by HH; inform program performance
Utilization rate	Proportion of nets given out for distribution that were used by the target group the previous night	# nets used the previous night / # nets distributed	Overall program outcome

Consumer preference, net durability, and use

In Myanmar/Burma's National Malaria Strategy, surveys of mosquito net ownership, usage, washing practices and insecticide treatment coverage are planned to be carried out by midwives in 400 villages annually starting in 2011. The purpose is not only to gain knowledge of the net ownership and usage but also to get information on the local net washing practices and insecticide treatment coverage. Stratification surveys will continue to be carried out in order to maintain updated knowledge of the malaria risk in the targeted townships, to assist in program planning. Annual community-based surveys are also planned, in order to get the following information:

- Malariometric data combined with recording of recalled fever and treatment-seeking behaviour during latest 14 days to assess malaria burden and completeness of surveillance.
- Mapping of risk behaviour
- Assessment of access to diagnosis and treatment
- Coverage with ITNs or other vector control methods

Cambodia also had plans to conduct preference studies for LLINs and other insecticide-treated materials but these activities were curtailed due to reprogramming of Global Funds.

There is a pressing need for more information on user preferences of LLINs and other personal protection materials (including insecticide-treated materials, repellents, etc) in the GMS. Undoubtedly, the assessment team has encountered various anecdotes about the issues and preferences of some mosquito nets over others, but there does not seem to be adequate documentation in this regard. Some of these preference questions have been piloted in planned malaria surveys but there is a need for more rigorous assessments (including qualitative methods) of the particular types (color, texture, size, etc) of mosquito nets that people would like and would use.

Linked to this is also the issue of net durability in the GMS context. Durability studies have been conducted mostly in Africa and helped to establish the 3-5 year lifespan of a LLIN - depending on the environment in which they are used. Data on the average lifespan of mosquito nets (including LLINs, ITNs, and LLIHNs) is limited (if any) in Asian settings. Other

behavioural issues, such as washing frequency, type of detergents used, frequency of handling the nets, should also be taken into account.

Recommendations

Public Sector

Table 46: Public Sector recommendations

1. Develop clear **LLIN / LLIHN strategies** and distribution guidelines
2. **Increase engagement** with community-based organizations (CBOs) and faith-based organizations (FBOs)
3. Increase and improve use of innovative activities to reach **migrant workers**.
4. Support engagement and **collaboration with other non-health sectors**.
5. Taking lessons learned from HIV/AIDS advocacy efforts particularly in engaging employers, **top level advocacy** is required including among inter-sectoral government departments.

1) ***Develop clear LLIN strategies and distribution guidelines.*** With the exception of Cambodia, specific guidelines for the distribution of the LLINs and other prevention materials were not available. It would be useful to encourage countries to develop these guidelines in order to have a clearer picture of who is responsible for what, at the various levels of the NMCP, and the role of NGOs and community workers/structures, in the distribution. Strategies for LLIN distribution for pregnant women, military, and migrant populations should also be considered.

2) ***Increase engagement with CBOs and FBOs to increase access to malaria prevention services.*** Community-based organizations (CBOs) and Faith-based Organizations (FBOs) often work with marginalized and hard-to-reach populations. In order to improve access to these communities for malaria prevention services, there is a need for donors and governments to coordinate and harmonize efforts. This is particularly true of the states/divisions along the Thai/Myanmar/Burma border which are home to many of Myanmar/Burma's ethnic minority groups and remain inaccessible to both international NGOs and government workers due to insecurity and the politics of the region. The same is true for many illegal or unregistered Burmese immigrants in Thailand. Staff from CBOs and FBOs could reinforce BCC messages, as well as to identify communities and distribute LLINs and LLITks.

3) ***Increase and improve use of innovative activities to reach migrant workers.*** In Cambodia and Myanmar/Burma, many of the current innovative activities are carried out largely by NGOs, and most of them have not been properly evaluated to understand their cost-effectiveness, impact and identify areas of improvement. In many programs, activities directly with migrants are often implemented by NGOs and the UN system (IOM).

   Some areas of support from the public sector, include the development of migrant groups or centers such as those currently supported by IRC and IOM along the Thai-Myanmar/Burma border to access unregistered and short-term migrants with BCC messages and commodities. Trust needs to be built with these communities and their employers in order to assess whether initiatives such as the LLIN lending scheme and malaria corners could be sustainable options in some areas.
   Additionally, piloting activities such as pre-departure screenings and distribution of kits to migrants for malaria prevention in Myanmar/Burma and Cambodia – especially for short-

term migrants could benefit migrants when traveling to Thailand, but also mobile populations moving within Myanmar/Burma, Cambodia, and Thailand. Free screenings can also be offered in collaboration with employers and be offered where migrants congregate (markets, transport or bus stops).

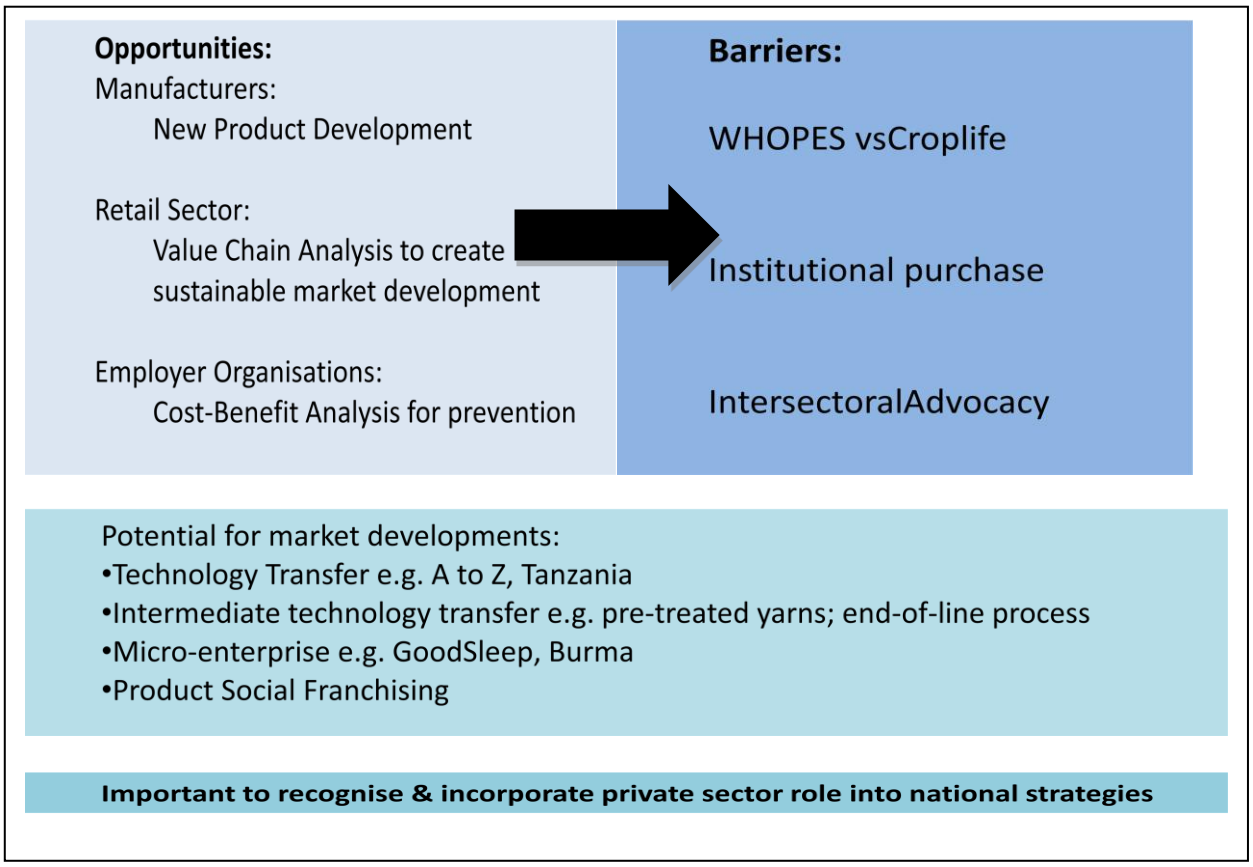
4) ***Increase engagement and collaboration with other non-health sectors***. Malaria risk in the Greater Mekong Sub-region is linked to population mobility induced by economic activity or security, and by development projects. This suggests that different sectors contribute to the malaria burden, yet malaria tends to be relevant only to the Ministry of Health. Increased multi-sectoral collaboration is essential, especially involving the mining, forestry, agriculture, irrigation, and water and energy ministries. Increased advocacy with these sectors is required for their understanding of the issues facing workers and communities affected by development projects and economic activities.

   In addition, the public sector could also provide support to small business development in the prevention of malaria. Women's groups engaged in income generating activities can be trained in sewing and treating nets as well as other materials (alternative methods). This activity could also be introduced in refugee camps along the Thai-Myanmar/Burma border.

5) ***Maintain top level advocacy.*** To ensure that malaria prevention remains high on the agenda of decision-makers, sustained advocacy (with a common voice) is required. Lessons from how HIV/AIDS prevention was able to be integrated into the workplace should be considered, particularly on approaches for engaging private business owners and stakeholders.

Improved Private Sector Engagement

Figure 4: Options for private sector engagement



There are opportunities for greater private sector engagement in the region. It is clearly a key sector and its potential needs to be better understood and accepted in malaria prevention planning. There are three key areas identified where the private sector can be engaged:

1) ***Approach manufacturers to work on new product development.*** As this assessment has documented, there is a strong demand and supply of mosquito nets (mostly untreated) in the GMS. A market for insecticide-treated materials for personal protection can be created by supporting the manufacturers' engagement in this industry and widening the scope to alternative methods of protection (e.g., treated clothing materials and repellents)

2) ***Perform value chain analyses in Myanmar/Burma, Cambodia and Thailand.*** The vast amount of nets being distributed free of charge may affect the markets and retail channels that need to be developed in the region. Value chain analyses can show how the private sector can still be harnessed for cost effective supply of LLINs or ITNs.

3) ***Advocate for increased engagement of employers in malaria prevention.*** The burden of malaria will economically affect employers of migrant workers who succumb to the disease. Lessons can be learnt from the AIDS Business Coalitions, which have approached companies to participate in prevention programs. Multi-sectoral support from other ministries in advocacy efforts could be very helpful to the national malaria program. Ultimately, the role of the private sector should be recognized and incorporated into national strategic plans.

Behaviour Change Communication

Table 47: BCC Recommendations

1. More **formative behavioural research** is required to better understand target at-risk segments, LLIN and/or other personal protection needs, preferences, and use
2. Develop **culturally appropriate BCC materials** and interventions for target population (including migrant workers and ethnic minorities) and use **multi-pronged approaches** to reinforce messages
3. **Community engagement** is needed from key stakeholders in distribution and other malaria related activities to ensure ownership
4. Community-based workers and volunteers need more training in communication skills, prevention, and net retreatment, and should **emphasize interpersonal methods**.
5. **Harmonize BCC messages** around LLINs/ITNs/retreatment.
6. **Routine monitoring and evaluation** of the impact of BCC at community-levels should be considered.

1) ***Conduct formative behavioural research that feeds into national BCC strategies.*** Behaviour change communication has been the key component of the malaria control programs of Cambodia, Myanmar/Burma and Thailand. All three countries have been using interpersonal communication through community volunteers, local media, radio and TV to promote malaria prevention and treatment messages and mosquito net use.

However, one of the major gaps in BCC efforts is the lack of formative behavioural research conducted. Such research is essential to understand the behaviours, perceptions and beliefs of the community. It is also necessary to know preferred channels of communication in order to develop a well-informed, cost-effective BCC strategy for malaria prevention. Currently, the main focus has been limited to the development and production of IEC materials, without fully understanding the use and effectiveness of such tools, nor embedding them within an overall BCC strategy.

Research on consumer net preferences (colour, shape, size, textile type, opaqueness, etc.), acceptability of dipping with insecticides and willingness to pay for malaria prevention commodities is needed across all countries, but especially in Myanmar/Burma, which is one of the most ethnically diverse countries in the world and therefore has very different practices and behaviours within a small geographical space.

2) ***Develop BCC materials and media in different languages for target populations.*** Language barriers and lack of culturally appropriate BCC/ IEC materials are a major issue, preventing people from accessing care and preventive tools particularly among ethnic minority groups. There is also currently very little BCC/IEC targeted specifically for migrant/mobile populations. The approaches used for hard-to-reach populations should be multi-pronged and multi-sectoral.

3) ***Ensure community mobilization and engagement.*** The use of farm owners in the distribution and loaning scheme of LLINs/LLIHNs has been an innovative approach used in Cambodia. This scheme however requires sustained mobilization, advocacy and motivation to ensure ownership at the community-level. Farm owners, for example, should be properly sensitized and orientated on malaria prevention and control to provide health education when LLINs are distributed to migrants. Further monitoring and evaluation of such employer-based schemes is needed before scaling up.

4) ***Emphasize communication and interpersonal skills in health education training for volunteers and community workers.*** A further major gap is the effective training of community workers/volunteers in interpersonal communication and health education. Many of these community workers/volunteers, such VMWs and MMWs have limited skills in communications and training has been sparse, particularly for the retreatment of nets. Recent research and surveys have indicated that community-based workers and volunteers are one of the primary sources where people get their health information; this suggests that interpersonal communications are an important channel and health workers should be provided with appropriate training and skills. Maintaining motivation of volunteers is also critical. Regular supportive supervision, timely feedback, and regular capacity-building (refresher trainings) can increase motivation of volunteers.

5) ***Harmonize BCC messages around LLINs/ITNs/retreatment.*** In Myanmar/Burma and Cambodia, messages and materials have been developed to encourage mosquito net use and net retreatment/dipping. It is not clear from initial observations how effective the messages about long-lasting insecticides are being conveyed. Thailand relies on messages specifically for LLINs. In Cambodia, it is still unclear how to harmonize the BCC around bundling (treated net) messages and the use of LLIN (no treatment required). Similarly, timing of retreatment and provision of nets in the retail sector should be explored.

6) ***Improve monitoring and evaluation.*** In general, robust evaluations of BCC interventions are either absent or of poor quality. It has therefore been difficult to establish the relative effectiveness of tools developed or whether the outcomes of interventions have any bearing to the materials developed. In Cambodia, Malaria Consortium has been working with its partners to conduct BCC assessments in the framework of the GFATM Round 9 grant, but further evaluations are needed in Thailand and Myanmar/Burma. One possible approach would be to conduct smaller-scale, community-based monitoring over time of the absorption of messages and their impact on behaviour changes using community volunteers.

Further Prevention Research

Table 48: Further research recommendations

1. Behavioural studies of target population segments
    - Consumer Preference Studies for nets and other prevention products
    - Product Acceptability Studies
    - Appropriate Product Use Studies
2. Alternative personal protection product preference and feasibility studies
3. Mapping and analysis of private sector employers and potential schemes
4. LLIN and ITM efficacy studies, including net durability and life of net studies in Asian context
5. Maintaining optimal coverage of nets following distribution campaigns and appropriate net replacement strategies
6. Strategies and approaches for replacement of ITNs with LLINs

1) ***Conduct behavioral studies of target population segments.*** Examples of studies needed to understand the market for nets in the GMS include consumer preference studies for nets and other prevention products, product acceptability studies and appropriate product use studies.

2) ***Pilot preference and feasibility studies for alternative personal protection products.*** As biting habits of mosquitoes in the GMS are changing, forest workers and military personnel who spend evenings outdoors may be at increased risk of malaria and not have access to adequate personal protection methods. Piloting and appropriately scaling up new products such as hammock nets, insecticide-treated clothing, and spatial and topical repellents may have a significant impact on malaria incidence in these populations.

3) ***Map and analyze private sector employers and potential schemes.*** Learning about the locations and industry category of private sector employers of migrant and forest-based workers, will allow the national malaria program to work with the private sector in piloting and scaling up schemes, such as the LLIN loaning scheme and testing insecticide treated materials' feasibility and effectiveness. The NMCPs will also learn from private sector employers about what difficulties they have in delivering these commodities and any training they may need to deliver these correctly.

4) ***Implement LLIN and ITM efficacy, durability and life of net studies***. Further understanding of the efficacy of LLINs should be given consideration, given the high donor investments in LLINs (US$3.50 per net on bulk order) compared with retreatment kits for conventional nets (US$0.52 per tablet to treat one net). This is especially important in Myanmar/Burma, where JICA carried out a small study on WHOPES-approved LLINs suggesting that efficacy of LLINs is much weaker than previously assumed. Appropriate methodologies for how net durability and life studies might be done in Myanmar/Burma and the GMS in general need to be developed.

5) Maintain optimal coverage of nets following distribution campaigns and appropriate net replacement strategies. Rapid coverage monitoring (RCM) of net distributions has not taken place in Myanmar/Burma. Cambodia has recently implemented RCM for its latest distribution. This, in addition with net tracking, and net

durability/life studies would contribute to the development of strategies for net replacement or re-treatment, which are largely missing in the GMS.

6) ***Strategies and entry points for replacement of ITNs with LLINs.*** There is evidence that LLINs when used effectively and at optimal coverage can reduce malaria transmission. As a long-term strategy, replacement of ITNs with LLINs should not be discounted as a viable option.

ANNEXES

Annex 1: Bibliography of documents reviewed for assessment

- 3DF, Myanmar Annual Report, 2009
- 3DF, Myanmar Progress Report, 2010
- ACTwatch Household Survey Net Results, PSI Cambodia, 2009
- Back Pack Health Worker Team, *Chronic Emergency: Health and Human Rights in Eastern Myanmar/Burma*
- Brinkley, J. Cambodia's Curse, A Modern History of a Troubled Land, Public Affairs 2011
- Cambodia CNM, Cambodia Malaria Survey, 2010
- Cambodia CNM, Global Fund Round 9 Proposal, Malaria Component
- Cambodia CNM, Guidelines on Distribution Campaign of Long-Lasting Impregnated Mosquito net, Mosquito net for Family, and Hammock Net, 2011
- Cambodia CNM, Health Information System Strategic Plan 2008-2015
- Cambodia CNM, Malaria Bulletin, January - December 2010
- Cambodia CNM, Malaria Bulletin, January - September 2011
- Cambodia CNM, National Strategic Plan logical framework
- Cambodia CNM, National Strategic Plan M&E Plan
- Cambodia CNM, National Strategic Plan for Elimination of Malaria in Cambodia, 2011-2025
- Cambodia Containment Survey, Malaria Consortium, 2009
- Cambodia MoH, Health Strategic Plan 2008 – 2015
- Dapengl, L. et al, *Alphamethrin-impregnated mosquito nets for malaria and mosquito control in China, Transaction of the Royal Society of Tropical Medicine and Hygiene, (1994) 88, 625-628*
- DFID, Myanmar/Burma Operational Plan 2011- 2015
- Dolan, G. et al, *Mosquito nets for the prevention of malaria and anaemia in pregnancy*, Transaction of the Royal Society of Tropical Medicine and Hygiene, (1993) 87, 620-626
- Dr Priyaporn et al, Respondent-driven sampling on the Thailand-Cambodia border. Can malaria cases be contained in mobile migrant workers? Malaria Journal 2011, 10:120
- Erhart, A. et al, *Forest Malaria in Vietnam: A Challenge for Control*, Am. J. Trop. Med. Hyg., 70(2), 2004, pp. 110–118
- Garros, C. et al, *First Record of Anopheles minimus C and Significant Decrease of An. minimus A in Central Vietnam*, Journal of the American Mosquito Control Association, 21(2):139–143, 2005
- Garros, C. et al, *Review of the minimus Complex of Anopheles, main malaria vector in Southeast Asia: from taxonomic issues to vector control strategies,* Tropical Medicine and International Health, Volume 11 no 1 pp 102–114 January 2006
- Health Seeking behaviour Among Myanmar Migrant Workers in Ranong Province, Thailand, Thet Aung, Chulalongkorn University, 2008
- IOM, Report on Migration in Thailand, 2011
- Jonathan Cox, *Evaluation of community and health facility-based systems for the surveillance of cases of day-3 positive Plasmodium falciparum in Cambodia*, Malaria Consortium, October 2011
- Kamolratanakul, P. et al, *Cost Effectiveness and Sustainability of Lambdachyhalothrin Treated Mosquito Nets in Comparison to DDT Spraying for Malaria Control in Western Thailand*, Am. J. Trop. Med. Hyg., 65(4), 2001, pp. 279–284
- Kobayashi, J. et al, *The effectiveness of impregnated mosquito nets in malaria control in Laos,* Acta Tropica 89 (2004) 299–308

- Lee, C.I. et al, *Internally displaced human resources for health: villager health worker partnerships to scale up a malaria control program in active conflict areas of eastern Myanmar/Burma,* Global Public Health
  Vol. 00, No. 0, Month 2008, 1 13
- Lengler, C. *Insecticide-treated mosquito nets and curtains for preventing malaria (Review),* The Cochrane Library, 2006, Issue 3
- Luxemburger, C. Et al, *Permethrin-impregnated mosquito nets for the prevention of malaria in schoolchildren on the Thai-Burmese border,* Transaction of the Royal Society of Tropical Medicine and Hygiene, (1994)8 8, 155-159
- Lynch C. & Roper C. *The Transit Phase of Migration: Circulation of Malaria and its Multidrug-Resistant Forms in Africa, PLoS Medicine, www.plosmedicine.org, May 2011, Volume 8, Issue 5*
- Malaria Consortium , Net Tracking Concept Paper, January 2009
- Malaria Consortium, Efficacy of Insecticide Treated Nets in South East Asia - Annotated Bibliography, Sept 2010
- Malaria Consortium, Report for the Fact-finding for treated Kramas study in Kratie province, Cambodia, July 2010
- Malaria Consortium, Report of the Greater Mekong Sub-Region Malaria Operational Research Symposium, October 2010
- Malaria in the Aftermath of Nargis, KyiKyi Win Oo, Graduate Institute of Geneva Thesis, 2012
- Malaria KAP & Media Survey Malaria, BBC Media Action, 2009
- Malaria Operational Research Symposium, Malaria Consortium, 2010
- MARC M&E Framework, April 2011
- Meek, S. et al, Presentation from External Review of Thai Malaria Control Program, August, 2011
- Mekong Malaria Program, Strategic Plan to Strengthen Malaria Control and Elimination in the Greater Mekong Subregion: 2010–2014
- Myanmar BVBD, Guidelines on Micro-stratification of Areas for Malaria Prevention and Control in Myanmar
- Myanmar External Review Report, 2005
- Myanmar Global Fund Round 9 Proposal, Malaria Component
- Myanmar Roll Back Malaria Country Profile
- Myanmar's National Strategic Plan for Malaria 2010-2015
- Myanmar's National Strategic Plan for Malaria M&E Plan 2010-2015
- NetWorks draft paper on *Developing evidence-based recommendations for private sector roles in continuous distribution systems for LLINs*, November 2011
- Outlet Survey Report, Cambodia, ACTwatch , 2009
- Overgaard, H. J. *Malaria Mosquito Resistance to Agricultural Insecticides: Risk Area Mapping in Thailand, International Waster Management Institute, 2006*
- Paredes-Esquivel, C. et al*, A molecular phylogeny of mosquitoes in the Anopheles barbirostris Subgroup reveals cryptic species: Implications for identification of disease vectors, Molecular Phylogenetics and Evolution 50 (2009) 141–151*
- Paredes-Esquivel, C. et al, *Molecular taxonomy of members of the Anopheles hyrcanus group from Thailand and Indonesia*, Medical and Veterinary Entomology (2010)
- PMI Communication & Social Mobilisation Guidelines, PMI
- Prakash A, et al, *Malaria control in a forest camp in an oil exploration area of Upper Assam, Natl Med J India. 2003 May-Jun;16(3):135-8*
- Presentation by Dr Myo Min, *Roles of Private sector in Malaria control, Myanar Health Research Congress, 2011*

- Presentation by Dr Coosemans at Greater Mekong Sub-region Malaria Operational research Symposium, The malaria vectors, October 2010
- Presentation by Dr Marc Coosemans at the RBM VCWG meeting on Outdoor Transmission, 12th March 2012
- Presentation by Dr Saw Lwin at the RBM VCWG meeting on Outdoor Transmission, 12th March 2012
- Progress Towards Malaria Control in Myanmar, Myanmar Health Research Congress, 2011
- Qualitative Impact Assessment of Cambodia, BBC Media Action, 2012
- Richards, A.K. et al, *Cross-border malaria control for internally displaced persons: observational results from a pilot program in eastern Myanmar/Burma/Myanmar,* Tropical Medicine and International Health Volume 14 no 5 pp 512–521 may 2009
- Richards, A.K. et al, *Prevalence of plasmodium falciparum in active conflict areas of eastern Myanmar/Burma:*
  a summary of cross-sectional data, Conflict and Health 2007, 1:9
- Roll Back Malaria VCWG, Consensus Statement on Continuous Distribution Systems for Insecticide Treated Nets, June, 2011
- Rwegoshora, R T. et al, *Biting Behavior and Seasonal Variation in the Abundance of Anopheles minimus Species A and C in Thailand*, Southeast Asian J Trop Med Public Health, Vol 33 No. 4 December 2002
- Sochanth, T. et al, *Insecticide-treated bednets for the prevention of Plasmodium falciparum malaria in Cambodia: a cluster-randomized trial,* Tropical Medicine and International Health, Volume 11 no 8 pp 1166–1177 august 2006
- Sochanth, T. et al*, Personal protection by long-lasting insecticidal hammocks against the bites of forest malaria vectors,* Tropical Medicine and International Health Volume 15 no 3 pp 336–341 march 2010
- Spatian Mobility & Social Vulnerability to Malaria in 3 remote areas of Cambodia, Boudier, 2010
- Thailand BVBD, National Strategy for Malaria Control and Elimination 2011-2016
- Thailand Containment Project M&E Framework
- Thailand Global Fund Round 10 Proposal, Malaria Component
- Thailand Malaria Control Program External Review, 2011
- Thailand National M&E Plan
- Thang, N. D. et al, *Long-Lasting Insecticidal Hammocks for Controlling Forest Malaria: A Community-Based Trial in a Rural Area of Central Vietnam,* PLoS ONE | www.plosone.org 1 October 2009 | Volume 4 | Issue 10 | e7369
- Thang, N. D. et al, *Rapid decrease of malaria morbidity following the introduction of community-based monitoring in a rural area of central Vietnam*, Malaria Journal 2009, 8:3
- The Bundling Strategy MAP Study Evaluating the Availability of Bundled Nets, PSI Cambodia, 2010
- The Bundling Strategy Pre & Post Interviews with Net Importers & Wholesalers, PSI Cambodia, 2010
- Trung, H.D. et al, *Behavioural heterogeneity of Anopheles species in ecologically different localities in Southeast Asia: a challenge for vector control*, Tropical Medicine and International Health, Volume 10 no 3 pp 251–262 March 2005
- VMW MMW Assessment Report, Malaria Consortium, 2012
- Walton, C. et al, *Population Structure and Population History of Anopheles dirus Mosquitoes in Southeast Asia*
- Webster, J. *Monitoring and evaluation of the net bundling project in Cambodia (Draft Report),* December 2010
- WHO, Country Profile Thai Malaria Control Program, June 2011

- WHO, Global report on antimalarial efficacy and drug resistance: 2000-2010, http://whqlibdoc.who.int/publications/2010/9789241500470_eng.pdf
- WHO, Malaria in the Mekong Subregion: Regional and Country Profiles, http://www.searo.who.int/LinkFiles/Malaria_MAL-260.pdf
- WHO, Mid-Term Review Meeting for the Strategy for the Containment of Artemisinin Tolerant Malaria Parasites, Meeting Report, December 2010
- WHO, Report of the informal consultation on Myanmar Artemisinin Resistance Containment (MARC) Nay Pyi Taw, April, 2011
- WHO, Second International Task Force Meeting for the Strategy for the Containment of Artemisinin Tolerant Malaria Parasites In South-East Asia Project, Meeting Report, February 2010
- WHO, Strategic Framework for Artemisinin Resistance Containment in Myanmar (MARC) 2011-2015
- Xu B et al, *Comparison of the effect of insecticide-treated mosquito nets and DDT residual spraying on the prevalence of malaria transmitted by Anopheles anthropophagus in China*, Trans R Soc Trop Med Hyg. 1998 Mar-Apr; 92(2):135-6.

Telephone Interviews for Assessment

Name:	Organisation:
Dr Jo Lines	London School of Hygiene and Tropical Medicine
Klaus Ostergaard	Vestergaard Frandsen
Adam Flynn	Sumitomo
Pernille Koch	BestNet
Maxime Besnier	Tana Netting
Egon Weinmuller	BASF
Gerhard Hesse	Bayer
Sanjay Bhatt	VKA Polymers
Yangjia	Yorkool
Mark Birchmore	Syngenta

Annex 2: Outline of assessment activities

12-17 March – BANGKOK, THAILAND

Meetings were held with key vector control focal points attending the RBM Outdoor Transmission and WHO Insecticide Resistance Workshops in Bangkok. We also attended the Cross-Border Workshop held on Saturday 17th by CAP Malaria with representatives from all 3 countries national and provincial health officials working along border sites (Burmese District officials could not be present). We also visited the Tana Netting LLIN factory and saw the end of the line treatment process for LLINs.

- Dr Saw Lwin, Deputy Director, VBDC, MoH, Myanmar/Burma
- Piyaporn Wangroongsarb, Public Health Technical Officer, BVBD, MoH Thailand
- Dr Prayuth Sudathip. Public Health Technical Officer, BVBD, MoH Thailand
- Dr Piti Mongklangoon, MoH Thailand
- Siriporn Yongchaitrakul, Public Health Technical Officer, BVBD, MoH Thailand
- Dr Than Thun Kyaw Director, VBDC, MoH Myanmar/Burma
- Dr Charles Delacollette, Coordinator, MMP
- Maxime Besnier, Global Liaison & Regulatory Affairs Manager, Tana Netting (LLIN manufacturer)
- Michael Attard, Technology Transfer & Sourcing Manager, Tana Netting (LLIN manufacturer)
- Aye Aye Thwin, USAID Office of Public Health, RDMA
- Mike MacDonald, PMI, USAID, USA
- Wayne Stinson, PMI, USAID, Bangkok
- Chris Raymond, Kenan Institute Asia, Private Sector Consultant for CAP Malaria
- Dr Kheang Soy Ty, Regional Director URC (for CAP Malaria)

18-22 March – PHNOM PENH, CAMBODIA:

We travelled to Phnom Penh, Cambodia and were hosted by the Malaria Consortium office staff in the capital and the field. Assessment team members, Sara Canavati and Sophal Uth, accompanied Karen while in Pailin. We met with stakeholders from government and the NGO sector. Karen was able to visit a local net producer in Phnom Penh and visit the wholesale market to assess availability and pricing. Stakeholders met included:

- Dr Siv Sovannaroth, Chief of Technical Bureau, CNM, MoH, Cambodia
- Steven Mellor, Information Systems Manager, Malaria Consortium
- Ngor Pengby, Data Manager, Malaria Consortium
- Kinsy Hood, Malaria Analyst, CHAI, Cambodia
- Dr Steve Bjorge, WHO Cambodia
- Dr Abdul Rashid, WHO Cambodia
- Henrietta Allen, Malaria Technical Advisor, PSI Cambodia
- Yasmin Madan, Country Representative, PSI Cambodia
- Sok Sothun, Net Bundling Coordinator, PSI Cambodia
- Song Ngak, Technical Director and Head of Operations, FHI 360 Cambodia
- Andrew Martin, Country Director, Health Poverty Action, Cambodia
- Pernille Koch, Key Account Manager, BestNet, Denmark (representing LLIN Manufacturers)
- Retailers/Wholesalers at Olympic Market, Phnom Penh
- Kong Hen, Local Net Producer, Phnom Penh
- Mr Vibol, M&E Officer, Health Poverty Action Cambodia
- Dr Derek Charlwood, Liverpool School of Tropical Medicine, researching efficacy of spatial repellents in Pailin

21-24 March – MAE SOT, THAI/MYANMAR/BURMA BORDER:

Mitra travelled to Mae Sot, Thailand (bordering Myanmar/Burma) meeting with various NGOs (including SMRU, IRC and IOM), district health officials, clinics, volunteer malaria post workers and checking availability of nets in the retail market. Stakeholders met included:

- Dr Verena, SMRU, Thai-Myanmar/Burma Border
- Dr Vasil Gajdadziev, Migrant Health Officer, IOM
- Lanna Walsh, Migrant Labour Officer, IOM
- Lin Yone, Health Information Systems Manager, Mao Tao Clinic, Mae Sot, Thai-Myanmar/Burma Border
- P'Jan Jiraporn, District Health Officer, Prob Prah District
- Sudarat Tunyee, Malaria Post Worker, Prob Prah District, Thai-Myanmar/Burma Border
- Net retailers, Mae Sot Market, Thai-Myanmar/Burma Border
- Dr Aung Kay Tu, Medical Training Coordinator, IRC, Mae Sot
- Ms Daraporn, Tak Province Border Health Manager, IRC, Mae Sot

22-24 March – PAILIN, CAMBODIA/THAI BORDER:

Karen and Sara travelled to Pailin, Cambodia (on the Cambodia-Thai border), where Sophal is based, to assess LLINs available in the markets, to do some field investigations on workplace distribution schemes, focus group discussions with farm owners and migrant workers.

- Sophal Uth, Field Officer, Malaria Consortium, Pailin Office
- Lim Kimseng, FHI360, SBC Officer, Pailin Office
- Dr Sovan, Deputy Director of Provincial Health, Department of Disease Control, Pailin
- On Thorn, Village Malaria Worker, O'Ktimg Village, Pailin
- Farm Owners/workers; Taxi Drivers; Net Wholesalers and Retailers - on both Cambodia and Thai sides of border

It was not the season for many migrants while we were present in Pailin. However, we held a number of discussions with farm owners who were part of the 'LLIN Loaning Scheme' for migrant workers and some who were not part of the scheme. We also spoke to workers on the farms and saw their living accommodation and discussed net use. We met with a Village Malaria Worker and discussed malaria prevention as well as treatment. We also met with a number of Taxi drivers who were part of the malaria sensitisation program with migrant labourers who take taxis to the farms. We also were able to see BCC materials used.

25-29 March – RANGOON, MYANMAR/BURMA:

Discussions in Yangon with PSI/Myanmar, Save the Children, WHO/Myanmar, Myanmar Medical Association, Myanmar Business Coalition on AIDS, Merlin, 3DF, JICA, DFID, and others, including:

- Dr Krongthong Thimasarn, WHO Myanmar/Burma
- Dr Masatoshi Nakamura, JICA
- Chris White, Malaria Technical Advisor, PSI Myanmar/Burma
- Khin Tun, Sales and Distribution Director, PSI Myanmar/Burma
- Dr Hnin Su Su Khin, Deputy Director, AMT Replacement Malaria Program, PSI Myanmar/Burma
- Dr Hla Myo Kyaw, Country Program Manager Mekong Project (USAID), PSI Myanmar/Burma
- Dr Myo Min, Project Manager Myanmar Medical Association
- Kamma Blair, M&E Officer, 3DF, Myanmar/Burma
- Dr Pietro Di Mattei, Head of Program Unit, 3DF
- Aye Yu Soe, Public Health Officer, 3DF
- Petrus Bolland, Procurement 3DF, Myanmar/Burma
- Dr Jennifer Hall, Health Advisor, DFID, Myanmar/Burma

- Kelland Stevenson, Country Director, Save the Children, Myanmar/Burma
- Greg Irving, Program Manager Migration Health, IOM, Myanmar/Burma
- Dr Khin Aye Aye, Executive Director Myanmar Business Coalition on AIDS/Malaria/TB
- Aye Aye Mu, Administration Manager, Good Sleep (Local net manufacturer)
- Dr Paul Sender, Country Director, Merlin Myanmar/Burma
- Retailer, Wholesalers in Insein Wholesale Market, Yangon.

Karen travelled with the Sales and Distribution Director of PSI out to a local social enterprise*, Good Sleep,* producing nets for retail. We also visited the largest wholesale market in Rangoon and met net wholesalers and assessed net availability and pricing.

30 March – BANGKOK, THAILAND
Debriefing at Malaria Consortium office, with David Sintasath and Diana Picón

4th April – BANGKOK, THAILAND
Debriefing with Wayne Stinson, at USAID office (via conference call for Karen)

Annex 3: Assessment SoW

Public Sector

The consultant agrees to the following activities and deliverables:

1. Conduct review/assessments of vector control and prevention strategies of national malaria programmes (Thailand, Myanmar, and Cambodia), including strategies that target vulnerable and hard-to-reach populations such as mobile/migrants and pregnant women)
2. Provide practical recommendations for improved LLIN distribution and other vector control strategies involving the public sector, including but not limited to the following:
   - Current national strategies in each of the three countries (Thailand, Myanmar, and Cambodia) related to ITN/LLIN distribution systems and promotion in the public sector
   - Stratification criteria for net distributions in the three countries
   - Improving access to LLINs among hard to reach populations (mobile/migrants and pregnant women, included)
   - Gaps and opportunities for complementary distribution between public and private sectors
   - Identification of operational research gaps for providing access to hard-to-reach populations
3. Assist the assessment Team Leader in coordinating researchers' work, as well as in the consolidation of the report.
4. Submit timely draft preliminary report prior to international meeting presentation (10 April 2012) and final report for final consolidation.

Deliverables:

1. Draft report containing review of national public sector strategies for vector control in each country, discussion of how to improve LLIN distribution and other prevention strategies, and practical recommendations outlined above
2. Final report that consolidates the information in Deliverable 1 and the team's assessment in other areas and feedback from partners and donor

Timing:

1. Three weeks in Southeast Asia (one week each in Thailand, Cambodia and Myanmar) to collect data, interview national malaria programme staff and key partners.
2. Up to 4 days of report writing. **Draft preliminary report** to be submitted by 10 April 2012. **Final report** to be submitted by 16 April 2012 to Team Leader.

Programme Liaison

Technical Task Manager: Dr David Sintasath d.sintasath@malariaconsortium.org

Private Sector

Background:

Assess current strategy for vector control in each country (Thailand, Cambodia, Myanmar/Burma), as related to ITN/LLIN distribution and promotion in the private sector.

Provide recommendations for net distribution strategies (both LLIN and bundled net) using private sector, addressing (but not ltd to):

1. Barriers to private sector sales of LLINs – both structural and marketing
2. Ways to shift market to LLINs
3. Current and improved promotional activities related to H/h purchase and use
4. See if Institutional sales or workplace progs e.g. farmers, plantations, and other employers is viable as a strategy to reach at-risk populations in an efficient manner.
5. Identify gaps and opportunities for complementary distribution between public and private sectors.

Annex 4: Overview of malaria funding and major donors in Myanmar/Burma

According to 2001-2002 estimation of national health expenditure, the funding sources for health care services are: private out-of-own-pocket (73.4%), government (13.6%), external aid (12.1%), community contribution (0.54%) and social security system (0.36%). Government health expenditure was about 886 Kyats (US$1.0) per capita in 2008-2009. Myanmar/Burma receives only US$4 per person per year (2007) in humanitarian aid. This is 15 times less than what nearby Lao People's Democratic Republic receives. The country does not currently access resources from the World Bank or the Asian Development Bank.

The Burmese Government provides the VBDC approximately US$200,000 per year for staff salaries and around US$60,000 for drugs and supplies. VBDC has more than 2300 approved posts, though only around 1600 are filled. Myanmar/Burma obtained a round 3 grant from GFATM, but this was terminated by GFATM in 2005. The $125 million Three Disease Fund (3DF) was then set up to help address the funding shortfall. Other major sources for funding include UNICEF, which supports the national program in 80 townships and in the period 2006-08 supported with $5.2 million. In the same period, JICA/Japan grant Aid gave $3.8 million for national malaria control. The GFATM Round 9 has a total budget of 74 million dollars over five years and an annual budget of USD 13-19 million per year. Approximately 60% of PMI's CAP project funds are also expected to be spent in Myanmar/Burma.

3DF is a multi donor trust fund established in August 2006, following the termination of the GFATM Round 3 in 2005. The overall objective was to reduce the burden of communicable disease in Myanmar/Burma and its purpose to resource activities to reduce transmission and enhance provision of treatment and care for HIV/AIDS, TB and malaria. Funds were committed from the following six donors: European Commission (EC), DfID, Australia's Aid Program (AusAID), Norway, Netherlands and Sweden. A Fund Board was appointed to act as a working committee on behalf of the donors and UNOPS was contracted to manage the funds. In 2012 3DF will transition to a fund for the three health related millennium development goals (3MDG), and only approximately 10% of its new budget has been allocated to the three diseases, the majority going towards maternal and child health activities.Up to its end in December 2011, 3DF was the biggest source of financial support for malaria control in the country. A limited number of activities are continuing on to June 2012 (most of which are directly related to the MARC framework).

The GFATM Round 9 covers 14 of the 17 States and Divisions with a population estimated to be approximately 40.9 million (2008). Most of the target townships for the GFATM are in the eastern and southern part of the country where treatment failures and prolonged parasite clearance time for Artemisinin-based Combination Therapies (ACTs) have been reported. Mass treatment of existing ordinary mosquito nets with long lasting insecticides will be done in the remaining 115 priority townships. The GFATM Round 9 grant does not include Yangon division, Ayeyawaddy division, Kayah state, and some townships in the Wa Special region and in Northern Sagaing. Through the GFATM grant, existing nets will be treated in 170 townships where 86% (479,942) of the total malaria cases and 84% (1,545) of malaria deaths were reported between 2003 and 2007. The total population in these townships is 27.6 million (or 52% of the total population at risk). In 55 priority townships 1.8 million LLINs

will be distributed free of charge and the existing ordinary mosquito nets will be treated with long-lasting insecticide to ensure coverage of 94% and above from year 2 onwards. Two LLINs per household will be distributed in these 55 priority townships where 17% of the population lives and where 22% of malaria cases and 32% of malaria deaths were reported in 2003–2007 (5-year average). In 2012 and 2013, 900,000 LLINs are expected to be distributed and 2.2 million conventional nets will be retreated with GFATM support. Overall, the coverage is expected to increase from 2.3 million residents in 2008 to 4.25 million in 2011, 7.7 million in 2012, and sustained at over 8.6 million residents thereafter.

WHO provides technical collaboration through an International Medical Officer and three National Professional Officers as well as staff and consultants from the WHO Regional Office for South-East Asia (WHO/SEARO) and WHO Headquarters (WHO/HQs). This collaboration comprises assistance in preparing a strategic plan, a national malaria treatment policy, and a national ITN policy, recommendation on malaria control during pregnancy, monitoring and evaluation. Further, this collaboration contributed to research capability strengthening in the area of monitoring parasite resistance and quality of antimalarials, small grant proposal development and GFATM proposals. WHO also provides support in the area of local and overseas training in different areas of malaria prevention and control. Over many years, WHO supports cross-border collaboration, especially between Myanmar/Burma and Thailand. During 2004-2006 WHO administered a grant from Germany for procurement and distribution of rapid diagnostic tests (RDTs) and ACTs. WHO provides essential support to the program, and its role as an external neutral source of technical advice and a facilitator among other partners is critical given the limited engagement of outside support and the limited access afforded to partners.

The United Nations Children's Fund (UNICEF) provided inputs to 80 Townships with a population of 10 million, and 50 of these include high transmission areas. From 2001 to 2005, UNICEF supplied large quantities of ITNs, re-treatment kits and IEC materials. UNICEF promotes innovative strategies for procurement and distribution, with supportive supervision and monitoring. Since 2006, malaria control is a distinct project within UNICEF. Microstratification at township level has now become the main tool for planning, monitoring and evaluation which promotes decentralized planning. In this context, capacity strengthening strategies are being developed. Data generated with support from UNICEF comprised national under-five mortality survey in 2003, maternal mortality survey in 2005 and national micronutrient survey in 2005. UNICEF has provided significant and practical support, especially with regards to addressing issues of better monitoring of supplies through supplies monitoring officers. This is indeed helpful in terms of .greater national accountability for assistance.

JICA has a special program of support, addressing key bottlenecks to better malaria control. A long-term expert has been based in Myanmar/Burma since June 2003, with short-term Experts (about four per year) in epidemiology, social anthropology, community health and quality control for diagnosis, visiting. JICA has successfully piloted the promotion and re-treatment of ITNs by CHWs and is currently assessing the use of insecticide-treated blankets for people entering the forest. While the program is of a small-scale nature, it provides valuable information for the national program. A community-based project is supported in Oak Pho Township in West Bago Division. Based on a malariometric survey, entomological and socio behavioural studies, the Township is stratified into the following:

- High transmission area with transmission in the villages
- Moderate transmission areas with only seasonal malaria
- Malaria in male forest workers and temporary migrants
- Low transmission areas
- No transmission areas

PMI is supporting LLIN procurement and distribution in the cross-border focus area of Tanintharyi division through CAP Malaria, which started in October 2011 and includes cross border activities in Myanmar/Burma-Thailand and Thailand-Cambodia. Depending on resources, additional border areas e.g. Myawaddy township area, in Kayin state, will also be assessed for gaps under CAP. PMI expects to distribute approximately 100,000 to 130,000 LLINs in Myanmar/Burma in 2012.

Annex 5: Microstratification guidelines for malaria prevention in Myanmar/Burma

Background and rationale

Malaria transmission, particularly in Asia, is highly focal. Its intensity varies from one locality to another depending on the different epidemiological factors prevailing in each locality.

Good epidemiological stratification of the malaria problem by locality (or village) is essential for better planning, implementation, monitoring and evaluation of the malaria control program. *Stratification* is defined as "the process of uniting areas, population or situation that exhibit a relative resemblance of a set of specified relevant characteristics, thereby distinguishing them from other areas, populations or situation dissimilar by the same set of characteristics".[43] It is intended to reduce and simplify a complex problem, to facilitate its understanding and to formulate solutions.[44] It is the process of identifying the areas where different approaches to control would be indicated.[45]

In Myanmar the areas are stratified as described below.[46]

High risk areas

These areas are usually hyper endemic or holoendemic and mostly related with hilly forested environments where the main vectors are *An. dirus*, and *An. minimus*, and range in distribution from Kachin state through Mandalay division to Mon state and Tanintharyi division in south. Estimated population: 29% of total population.

Moderate risk areas

These areas are usually mesoendemic either in coastal or plain areas. Coastal areas extend from Sittwe in Rakhine state to Dawai in Tanintharyi division through Ayeyarwady and Mon state and under the influence of *An. sundicis*, and/or *An. annularis*. Estimated population: 24% of total population.

Low risk area

These areas are usually hypoendemic plain areas. Central-dry-zone belt of Mandalay, Sagaing, Magway, Bago and Yangon divisions which are under the influence of *An. culicifacies*, *An. hyrcanuss* and *An. aconitus*. They are prevalent with possibility of epidemics. However, malaria is generally sporadic in most towns of these areas. Estimated population: 18 % of total population.

No risk areas

It is non-endemic and cases reported in these areas, are predominantly imported from endemic areas. Estimated population: 29% of total population

---

[43] Report of the Informal Consultation on Stratification for Planning Antimalarial Action, Moscow, USSR, 1985. WHO/INF/CONS/WP/85.0

[44] Beales, P. F. and Gilles, H. M. Rationale and technique of malaria control. In *Essential Malariology*, 4th ed., Warrell D. D and Gilles, H. M., eds., Arnold, 2002.

[45] WHO Technical Report Series, No. 936, 2006. Geneva, World Health Organization, 2006.

[46] Vector Borne Disease Control, Department of Health, Ministry of Health, Myanmar

The information at national level does not clearly indicate how the stratification is done and how it is being updated. Moreover, over the years there have been ecological changes due to deforestation / reforestation; construction of dams, irrigation and roads; mining; expansion of agriculture and aquaculture; extraction of forest produce, etc. These have significant impact on the malaria epidemiology and consequently on planning appropriate control measures. It is therefore essential to update the stratification of malaria in the country.

This document is intended to guide the VBDC staff and the Basic Health Staff in stratifying the villages under their responsibility based on the recommended parameters described herein.

Operational definitions and criteria for stratification
Each village will be classified as either malarious (stratum 1), potentially malarious (stratum 2) or non-malarious (stratum 3). The malarious villages will be further stratified into high risk, moderate risk and low risk. The main parameters for stratification will be: presence or absence of indigenous cases, presence or absence of main vectors of malaria, and ecology. Other supporting parameters are:

Stratum 1. *Malarious villages*
A village is considered *malarious* if there is evidence of local transmission as indicated by one or more of the following conditions:

- presence of indigenous malaria cases (malaria acquired within the village);
- presence of the main vectors (*Anopheles minimus* and *Anopheles dirus*) and there are malaria cases reported even if the status (either indigenous or imported) is not known;
- the topography (i.e., hilly, forest fringe, forest) and altitude (not more than 1,000 meters above sea level) of the village indicates the presence of main the vectors (*Anopheles minimus* and *Anopheles dirus*), and there is historical information that malaria transmission is occurring in the village

Each *malarious* village is further stratified as either *high risk*, *moderate risk* or *low risk* depending on the level of endemnicity and other factors as described below.

Stratum 1a: *High risk village*
A high risk *malarious* village is either holoendemic or hyperendemic for malaria and has the following characteristics:

Holoendemic village
Parasite rate: constantly over 50% among children aged 2 – 9 years
Spleen rate: Constantly over 75% in children aged 2 – 9 years; but low in adults

Hyperendemic village
Parasite rate: constantly over 50% among children aged 2 – 9 years
Spleen rate: Constantly over 50% in children aged 2 – 9 years; also high in adults (over 25%)

In the absence of the above information on endemicity, a *malarious* village is considered high risk if it has one or more of the following characteristics:

- located in the forest
- plain or hilly or mountainous areas within 1 km from the edge of the forest
- development project sites where the main vectors (*An. minimus and/or An. dirus*) are present
- resettlement areas where the main vectors (*An. minimus and/or An. dirus*) are present
- aside from indigenous population, there are significant numbers of temporary or seasonal settlers / workers / subsistence farmers
- isolated or remote village where access to the nearest public health facility takes more than three hours by the most common means of travel available

Stratum 1b: *Moderate risk village*

A moderate risk malarious village correspond to mesoendemic area which has the following characteristics:

- *Mesoendemic village*
- Parasite rate: between 11% and 50% in children aged 2 – 9 years
- Spleen rate: between 11% and 50% in children aged 2 – 9 years

In the absence of the above information on endemicity, a malarious village is considered moderate risk if it has one or more of the following characteristics:

- located between 1 – 1.5 kms from the edge of the forest
- access to the nearest public health facility takes 1 – 3 hours by the most common means of travel available

Stratum 1c: *Low risk village*

A low risk malarious village correspond to hypoendemic area:
Parasite rate: not exceeding 10% in children aged 2 – 9 years but may be higher for the part of the year
Spleen rate: not exceeding 10% in children aged 2 – 9 years

In the absence of the above information on endemicity, a malarious village is considered low risk if it has one or more of the following characteristics:

- plain and foothills located more than 1.5 kms from the edge of the forest
- there is historical information on the existence of local malaria transmission
- access to the nearest public health facility takes least than 1 hour by the most common means of travel available
- less population movement to and from the forest

Stratum 2. *Potentially malarious villages*

These are coastal, plain and foothill villages where only secondary vectors are present or villages more than three kms away from the nearest area where the primary vectors thrive but no historical information of local transmission in the past three years. There is significant population movement to and from malarious areas and therefore the risk of introducing malaria is high. The reported cases are acquired outside of these villages.

Stratum 3. *Non-malarious villages*

These are villages that are either urban, peri-urban, agricultural plains and high altitude (beyond 1,000 meters) with no malaria vectors (primary and secondary) and located more

than 3 kms away from potential or known breeding sites of the main vectors. There is no historical evidence of malaria transmission. Population movement to and from malarious areas may or may not be significant. The reported cases are acquired outside of these villages.

Annex 6: Myanmar Artemisinin Resistance Containment (MARC) framework

In early 2011, WHO established a Global Plan for Artemisinin Resistance Containment (GPARC). The goal of the GPARC is to protect ACTs as an effective treatment for *Plasmodium falciparum* malaria. Based on this, the MARC framework was developed as five year strategy with the goal to build on and strengthen existing control efforts to prevent, or at minimum, significantly delay the spread of artemisinin resistant parasites within Myanmar/Burma and beyond its borders. This implies intensification of present activities and an expansion of specific interventions also to pay more attention to migrants and mobile populations, set up extra sentinel sites to monitor efficacy of antimalarial medicines, increasing advocacy to engage local authorities and relevant stakeholders, engaging the private sector and bridging interventions with neighbouring countries. There is currently funding for one year (July 2011 - June 2012).

MARC has seven specific objectives, three of which are directly related to malaria prevention:

- To limit the transmission of malaria by vector control and personal protection
- To increase migrant/mobile populations' access to and use of malaria diagnosis, treatment and vector control measures including personal protection
- To support containment of artemisinin resistant parasites through advocacy and BCC/IEC

Under MARC, the country has been divided into zones (tiers referred to as tiers in GPARC), which are geographically defined in accordance with WHO's latest recommendations. Extra attention and effort will firstly focus on tier 1 where there is credible evidence of artemisinin resistance and secondly in bordering areas (tier 2) with yet unclear evidence, but close to areas with suspected resistance in Myanmar/Burma and Thailand. Additionally, the surveillance system and monitoring should be strengthened in the rest of the country (tier 3). Many of the townships included are difficult to access, especially in the rainy season putting even higher demands on the planning of distribution of supplies, data management and good supervision and reporting by staff located at township and health care levels.

Table 2: MARC tiers

Tier	Area	Number of Townships	Justification
1	Tanintharyi Region: All 10 townships Mon State: All 10 townships Bago East: Shwegyin township (East Bago Region)	21	Strong evidence of suspected resistance. Widespread ecological and social risk factors. Intensive population movement. Ongoing big development projects
2	Kayin State: All 7 townships Kayah State: All 7 townships Bago East: Remaining 13 townships Kachin State: 4 townships	31	Unclear evidence of suspected resistance; Very near suspected resistance areas in Myanmar/Burma, Thailand and China

Annex 7: Overview of malaria funding and major donors in Cambodia

Domestic financial contributions are principally financed through the World Bank as well as national funding resources. Contributions from the World Bank cover costs for partial procurement, limited civil works, key control operations, monitoring and supervision, training and capacity building.

USAID funds CNM through WHO with an average annual allocation of $500,000 mainly supporting therapeutic efficacy studies in sentinel sites to update national antimalarial policy and to provide salaries for Technical Assistants. Some partners are also recipients of USAID funding including URC, PDF, and Malaria Consortium. Approximately 30% of the funds from the USAID/PMI CAP Malaria project will be directed to activities in Cambodia, including procurement and distribution of LLINs if necessary.

Funding from external sources is usually not secured. USAID is committed to $500,000 per year to conduct drug resistance monitoring activities; however, it is not certain that these funds will be made available for the duration of the proposal. Through the Health Sector Support Project (HSSP) DFID provides funding to support TAs and capacity building activities. In 2008, DFID provided $276,660 for operational research projects and for a short-term international consultant placed at CNM. DFID has also committed to providing $250,000 each year but as with USAID, these funds are guaranteed.

CNM receives funding from a number of external donor agencies including the Global Fund, DFID, USAID, and the WHO. Some of this support is channelled through the Health Sector Support Project, some through the WHO, and some goes directly to CNM or its implementing partners via the MoH.

Cambodia received GFATM support for malaria control in Rounds 2, 4 and 6, and the Rolling Continuation Channel (RCC) was approved to continue and expand activities started in Round 2. The focus of Round 4 ($9.7M approved for “Strengthening of the National Malaria Control Program by Broadening Partnerships and taking to Scale Proven BCC Interventions and Ushering in a ‘People’s Movement for Malaria Control’”) was primarily scaling-up of IEC/BCC activities and the provision of preventive measures (e.g., ITNs) from Round 2. Round 6 (about $31.1M committed for “Renewed Efforts to Achieve High Coverage of Proven Malaria Control Interventions and Scaling Up the Response to High Antimalarial Drug Resistance in Cambodia”) built on the malaria prevention and treatment efforts undertaken as part of Round 2 and Round 4 while also beginning to address among key objectives the issues of counterfeit and substandard drugs and multi-drug resistance in Cambodian provinces bordering Thailand. The RCC funding (about $41M), which continued activities from the expiring Round 2 grant, started in May 2009 to “Further scale-up proven malaria control interventions towards pre-elimination of malaria in Cambodia.” Its aim is to strengthen and scale up the most successful activities from Round 2 and to consolidate the other two ongoing GFATM grants (R4 and R6) into a single funding stream by the end of 2012.

Cambodia has also recently received funds for GFATM Round 9, to use the lessons learned in the first and second phases of resistance containment to expand these containment

efforts to the rest of the country, (with the exception of four non-malarious provinces) particularly in the eastern part of the country. In addition, by 2015, it is expected that the target zones will meet the criteria of less than 5% transmission to plan for pre-elimination/elimination. Since the majority of the activities planned in Round 9 are a continuation of activities designed specifically to address the problem of drug resistance in zone 1 and scaling up containment efforts throughout the country, the activities are additional to those in previous Global Fund Rounds.

Funding from the BMGF for the containment project (covering the Thai-Cambodia border region) was agreed for two years (Jan 2009 – Dec 2010, with a no-cost extension to Dec 2011) on the understanding that CNM and partners would raise financial support for containment efforts to continue. The total award of $9.5M (for Cambodia) was only half of the originally estimated $21M required for phase 2 of the Containment Project. This two-year funding for the Containment Project which was frontloaded in Y1 with many activities not fully-funded in the second year, which ended Dec 2010 although a no-cost extension was granted through October 2011. One of the primary objectives of the containment project was to strengthen existing cross-sectoral and cross-border efforts to ensure effective prevention and treatment of malaria in migrant and mobile populations. Specific strategies included examining in greater depth their patterns of mobility, working with them to ensure better access to health services, providing tailor-made prevention tools and specific behaviour change and communication strategies, and attempting to incorporate them into routine surveillance systems. Containment activities have been continued though GFATM Round 9 funds (approximately US$102 million over five years).

Annex 8: Global Fund Round 9, Cambodia

The GFATM Round 9 is the main source of finances for malaria prevention activities in Cambodia. The implementation strategy draws heavily on the lessons from phase 2 of the Containment Project, which has been used for detailed planning beyond the initial containment zones 1 and 2. The targeted populations in each zone and the key strategies to be used are shown below:

Table 6: GFATM Round 9 Zones

Zone	Target Population	Activities
1	267,748 (8 AD in 5OD in 4 provinces)	Continue from phase 2 of Containment Project Expand VMWs where needed Ensure replacing of LLINs over time
2	4,023,241 (9 provinces, excluding town areas)	
3	7,959,0934 (10 provinces)	Distribution of LLINs (note that RCC already covers much of the need including some distribution costs) as per normal CNM strategy (1 net/ 2 people living <2km from forest). Special efforts to make available to mobile populations

Objective 3 of the GFATM Round 9 is to decrease transmission by scaling up preventative measures. The focus is primarily on mobile and migrant populations and several innovative approaches to prevention are planned using VMWs and Village Health Volunteers (VHVs) to identify those at risk and to provide either standard LLINs or LLIHNs for those sleeping in the forests. Free LLINs and LLIHNs are also being provided to the general population in areas of known transmission. Several of the province-based NGOs are engaged in promoting ownership and use of LLINs and of utilization during visits to forested areas. A second part of the prevention strategy responds to the extremely high levels of ownership and use of untreated mosquito nets, which are bought in markets throughout the country but often originate from a small number of wholesalers in markets in Phnom Penh.

Specific malaria prevention activities funded by GFATM Round 9 include:

- Distribute LLINs and retreat conventional existing nets to cover the whole population in all transmission areas and maintain full coverage with LLINs in all transmission areas (whole country).
- Provide free LLINs and LLIHNs to mobile/migrant populations, including cross-border, seasonal workers, and new settlers) coming from outside CNM's malaria target zone of 2 km of a forest. Quantification will be based on assessments by VMW, VHVs, and MMWs.
- Ensure that commercially supplied nets and hammock nets are given long lasting treatment (a) before sale at main source of supply chain including wholesale markets to protect populations visiting rather than living in transmission areas and (b) at village level through public sector (whole country)

- Distribute free LLIHNs, LLINs and/or repellents (Partners for Development (PFD) will be piloting a field study on use of repellents) for personal protection to target local resident households with family members going temporarily into the forest (whole country)
- Massive health promotion & community mobilization to ensure high turnout for ITN campaign and to promote appropriate use of nets (whole country)
- Provision of personal protection against malaria to military, police and other organizations working in forested areas along the Thai-Cambodia border
- Conduct research on acceptability of all net types; entomological study in areas of changing forest ecology; assess additional protection of using repellents
- Implement comprehensive BCC/IEC including inter-personal communications campaigns, community mobilization, and regular media communications with input and assistance from relevant sectors such as education, women welfare, defence, interior, etc
- Continue ongoing monitoring of BCC implementation and undertake periodic survey to measure impact and behaviour change outcomes
- Inform incoming and outgoing mobile/migrant populations about malaria risk, prevention and diagnosis and treatment, through peer education (MMWs) and targeted BCC campaigns at source communities and through employers and agents at work sites
- Training on comprehensive BCC packages at all levels
- Deliver community-based prevention measures through Village Volunteers
- Harmonize and coordinate BCC for cross-border mobile/migrant populations in cooperation with Thai counterparts and other partners
- Develop and assess effectiveness of interventions with mobile/migrants population movement and behaviour in collaboration with relevant partners
- Conduct social research: Cultural norms towards antimalarial treatment and preventive methods among the people

Annex 9: Cambodia LLIN Distribution Guidelines

1. **Distribution Location**
   - 1.1. Forty five (45) operational districts within 20 provinces are determined as target villages facing malaria. The targets are defined by the National Centre for Parasitology, Entomology and Malaria Control. The list of the villages has already been sent to the forty five operational districts of the 20 provinces facing malaria.
   - 1.2. The National Centre for Parasitology, Entomology and Malaria Control makes decision on the malaria-endemic areas (e.g. the one along the border) upon request of the Ministry of Defence and the Ministry of Interior.
   - 1.3. The malaria-endemic areas have mobile people, who are doing business such as plantation, farming and hydroelectricity. The malaria-endemic areas are evaluated by the National Centre for Parasitology, Entomology, and Malaria Control.

2. **People to Receive Impregnated Mosquito net from the Mosquito net Distributing Campaign**
   - 2.1. People facing malaria live in the target villages, determined by the National Centre for Parasitology, Entomology and Malaria Control, will receive the impregnated mosquito net. All monks living in the above-stated villages will also obtain one.
   - 2.2. Additionally, people who live in the target villages and are vulnerable to malaria will be provided to one impregnated hammock net for each family. The extra item is intended for those who need to stay in the jungle. Thus, the decision whether to hand one hammock net is made by the person in charge of anti-malaria program based on the reality.
   - 2.3. Armed forces (armies and police) and their family staying in above-stated malaria-endemic areas will also get one mosquito net. It will be provided to them by the person responsible for anti-malaria program of Ministry of Defence and Ministry of Interior under the observation of National Centre for Parasitology, Entomology and Malaria Control.
   - 2.4. Mobile people coming to stay or doing business in the malaria-endemic areas will also be handed a mosquito net.

3. **The Calculation of Impregnated Mosquito nets To Be Distributed to the Target and Mobile people**
   - 3.1. Each target person (including monk) will be provided with one impregnated mosquito net regardless of his/her age and location.
   - 3.2. For each mobile individual, one impregnated mosquito net will be provided or lent, based on the duration of his/her stay and the technique determined by the Nation Centre for Parasitology, Entomology and Malaria Control.
   - 3.3. For armed forces (armies and police) and their families staying in the malaria-facing location (as determined above), one impregnated mosquito net will be provided for each.
   - 3.4. Note: All of the target people (as stated in section 2) who had already obtained a long lasting impregnated mosquito net (one mosquito net for two people) three years ago (since2009), will receive one more mosquito net (one mosquito net for two people) because effectiveness of the long lasting impregnated mosquito net can last up to three years only.
   - 3.5. For all target groups to receive the mosquito net, one impregnated hammock net will additionally be handed for each family.

4. Budget for mosquito net distribution and transportation

4.1. The transportation costs from the central pharmacy to operational districts will be borne by the National Centre for Parasitology, Entomology and Malaria Control. The source of the fund comes from Global Foundation.

4.2. Operational districts will be responsible for the costs of transportation (including loading and unloading) from operational districts to health centres and villages. The rate is USD 0.03 per mosquito net. The source of the budget is Global Foundation.

4.3. Budget for mosquito net distributing process is determined base on the standard, which is set forth by Global Foundation. The rate is USD 0.2 per mosquito net. It includes dissemination of information prior to the distribution, distribution process, and survey in which household cards are used to follow the each family's receipt of mosquito net. Note: The payment is made based on the reality (e.g. per diem).

5. Type of Mosquito nets to Be Distributed

5.1. *Long lasting impregnated mosquito net* (LLIN): The target people in sections 2.1, 2.2 and 2.3 will receive this mosquito net.

5.2. Long lasting impregnated hammock net (LLIHN): The target people in sections 2.1 and 2.1 will obtain this hammock net.

6. Usage of Household Cards in the Survey

6.1. Every family living in the afore-mentioned malaria endemic areas will receive a household card prior to the distribution of the mosquito net. All family members must be listed in the provided household card. Monks also need to register their names with the head of monks. He acts as a head of family while all monks are the family members. Survey will be conducted by health centre's staff in cooperation with local authority and volunteers. They have to remove the carbon sheet of household card (HC) displaying information of the family members and copy it into the form of HC1 for verification during distribution.

6.2. Each family has to show HH card when receiving the mosquito net.

6.3. The number of mosquito nets to be received will be recorded in this booklet when the mosquito net is given to each family head during the distribution process. The family head or family member (more than 15years old) has to thumbprint in this book as the proof of receipt.

6.4. Other people are not allowed to use HH card for the receipt of mosquito net.

7. Meeting of Special Teamwork to Eliminate Malaria at Provincial Level Prior to Bed Bet Distribution

7.1. This teamwork has to hold a special meeting in the first week of November.

7.2. The agendas of this meeting focus on preparation of mosquito net distributing campaign. They include as follows:

7.2.1. To coordinate and assist anti-malaria programs at provincial level and operational districts in order to keep the mosquito nets in the safe place;

7.2.2. To coordinate and assist anti-malaria program at operational districts in order to transport mosquito nets to health centres or villages. The large number of mosquito nets is not allowed to store in the health centres for more than three days. Therefore, planning details are required;

7.2.3. To coordinate and assist anti-malaria program at operational districts, health centres, local authority and the volunteers in villages in order to conduct census by using HH card before distribution; and

7.2.4. To coordinate and assist anti-malaria program at operational districts, health centres, local authority and volunteers in villages in mosquito net

distributing campaign. The distribution information must be disseminated to people in advance.

7.3. The report on the meeting outcomes must be submitted to National Centre for Parasite, Entomology and Malaria Control, which will forward it to the Minister of health.

8. Health Centres' Distribution Planning Details

Since the mosquito nets cannot be kept for long days at health centres, the anti-malaria program at operational districts must cooperate with the health centres and plan it accordingly. The planning details should include as follows:

8.1. To give the information of target villages facing malaria, determined by the National Centre for Parasitology, Entomology and Malaria Control;

8.2. To determine the number of mosquito net to be distributed, as stated in section 3 (one mosquito net for each or one mosquito net for two people in the villages who got it three years ago).

8.3. To determine the process of mosquito net distribution

8.3.1. To determine the duration of HH card to be completed in their zones (less than seven days);

8.3.2. To determine the date and place for distribution at least 3days in advance;

8.3.3. To determine the time of distribution in each village. This process must not exceed seven days in each health centre.

8.4. This planning must be given to health centres, anti-malaria program at operational districts and provinces and sent to five observation groups of National Centre for Parasitology, Entomology and Malaria Control for verification.

9. Identification of Mosquito net Distributing Strategy for the Mobile People Facing Malaria

9.1. The mobile people (including armed forces) include:

9.1.1. Those from other areas with no risk of malaria coming to stay in the malaria endemic areas. They have no experience, knowledge and immunity to malaria; thus, they are vulnerable to malaria;

9.1.2. Those coming from an area with malaria coming to live in another malaria endemic area.

9.2. Mobile people's jobs are also taken into account. Two types of jobs are connected to mosquito net distributing strategy. They are:

9.2.1. Plantation, farming, factory, hydroelectricity or other jobs requiring rally, which has a manager and can be either long or short term; and

9.2.2. Clearing land for family's farming that requires stay in small group for long term.

9.3. Mosquito net Coverage Strategy for Mobile People

9.3.1. Mosquito net lending: it is practiced with mobile people in section 9.1.1 living for short term. The survey is done without using HH card but other form (Worker Form). Volunteers in the villages, local authority, and health centre staff are responsible for doing the survey from the farm owners who hire them. The farm owners must also consent to the lending contract (HC5). There must be an observation on the use and the lending in order to guarantee that every mobile individual receives the mosquito net.

9.3.2. Mosquito net distribution: it is done with the people in sections 9.1.1 and 9.1.2, who stay for long term. The survey is done without using HH card but using a different form (HC3). Volunteers in the villages, local authority and health centre staff are responsible for conducting the survey. The process of distributing mosquito net to the mobile individuals is same as that of distribution for the target groups.

10. Five Successful Steps for Mosquito net Distribution

Mosquito net distributing campaign starts from November for the first arrival of mosquito nets targeting six provinces and from December for the second arrival of mosquito nets targeting twenty provinces.

Mosquito net distribution must be done in a gathering manner (e.g. in one village or one area) by choosing a suitable location to rally people. The location must be easy and known by the people to receive the mosquito nets.

10.1. Step 1: Apart from the tasks described earlier, the survey must be conducted first by using HH card.

10.2. Step 2: After the date for mosquito net distribution is determined, it must be disseminated, at least three days ahead, to the people who will receive the mosquito net. The information should include the place and time, HH card (mosquito net receiving card), and ban on substituting representatives. Those who miss the chance to get the mosquito net during the campaign must be informed that they can pick up one at the health centre later.

10.3. Step 3: During the distribution, there must be participation of representatives of local authority, village volunteers, and health centres/operational districts. Before the mosquito net distribution, health education particularly transmission of malaria, prevention of the illness and effectiveness (duration and laundry) of the mosquito net must be imparted.

10.4. Step 4: Health centre must write the report for anti-malaria program at operational districts and submit it to anti-malaria program at provincial level and the National Centre for Parasitology, Entomology and Malaria Control via electronic data system.

Note: Documents that must be maintained:

- At village level: there must be (1) HH card as an evidence.
- At health centre level: there must be (1) a carbon copy of HH card as an evidence, (2) distribution document (HC1), and (3) summary document with signature (HC2) *[please refer to the sample provided by the National Centre for Parasitology, Entomology and Malaria Control]*. The HC2 must be sent to anti-malaria program at operational districts in the meeting. In addition, the health centre must produce a report on mosquito net distribution to mobile people:
    - (4) mosquito net distribution to mobile people using HC3 & HC4
    - (5) mosquito net lending to mobile people using HC5 & HC6 (with farm owners form introduced)

      The report must b provided to anti-malaria program at operational districts during the meeting.
- At operational districts level: (1) a copy of summary health care documents (HC2) (HC4) & (HC6). (2) A copy of report printed from malaria information system (MIS) will be signed and forwarded to anti-malaria program at provincial level. Moreover, target districts must (3) prepare a report on mosquito net distribution to mobile people in the form of (OD1 & OD2) *[Please refer to provided samples]*. It must be sent to anti-malaria program at provincial level during the meeting.
- At provincial level: (1) a copy of document printed from malaria information system (MIS) with the signature of operational districts and (2) a copy of documents printed from malaria information system (MIS) at provincial level with the signature. These documents will be submitted to the National Centre for Parasitology, Entomology and Malaria Control. Furthermore, the anti-malaria program at provincial level must (3) write a report on mosquito net distribution to mobile people in the form of (PHD1 & PHD2) *[Please refer to*

provided samples], which will be sent to the National Centre for Parasitology, Entomology and Malaria Control.

10.5. Step 5: All levels must make an observation by using a check-list, which is a key to assessment in order to guarantee the coverage of mosquito net with transparency.

11. Duty of the five Mosquito net Distributing-Observation Groups of the National Centre for Parasitology, Entomology and Malaria Control

11.1. To coordinate and assist special anti-malaria teamwork at provincial level in order to arrange meetings focusing on mosquito net distribution in their own location;

11.2. To follow up and coordinate the process of storage, warehouse rent and transportation of mosquito nets;

11.3. To follow up and control registration of family members by using household card in order to guarantee that every family member is enrolled;

11.4. To control and guide the staff to keep the household card for subsequent use and as proof presented to donors;

11.5. To control and instruct health centre staff to keep documents (a duplicate copy of household card as evidence presented to donors in order to follow up the process and for preparation of report to operational districts. The operational districts will forward the report to the provincial and the central levels via electronic system;

11.6. To follow up and control the process of mosquito net distribution in order to guarantee that the distribution is accurate;

11.7. To use checklist to follow up the process for the evaluation of effectiveness. Checklist is prepared by Monitoring and Evaluation Group (M &E) of the National Centre for Parasitology, Entomology and Malaria Control.

11.8. To furnish information to leaders of the National Centre for Parasitology, Entomology and Malaria Control, whenever necessary,

11.9. To prepare a summary report on observation and evaluation, enclosed with checklists as a reference, to leaders of the National Centre for Parasitology, Entomology and Malaria Control

Annex 10: Overview of malaria funding and major donors in Thailand

A limited domestic budget from the Thai Government is available for malaria control (non-elimination) activities targeting Thai citizen and M1s which will be progressively integrated into the routine health care system under the national universal health care scheme adopted in 2001. However, the domestic budget currently does not address M2 migrants and refugees. Therefore, the GFATM Round 10 is the primary financial support available for interventions to address containment/elimination of artemisinin resistance along the Thai-Cambodia and Thai-Myanmar/Burma borders, especially targeting [unregistered] M2 migrants.

PMI is also providing some financial support under CAP Malaria, to ensure cross-border reach in Thailand, particularly focused along the border areas of Ranong (Burmese border), Trat (Cambodian border), and possibly Tak (Burmese border). Special efforts will be made to reach cross-border migrant populations and other vulnerable groups (forest, plantation, and farm workers).

With the successfully GFATM Round 10 application, further major financial support for LLINs or ITM procurement for Thailand is unlikely, as funding is thought to be sufficient. However, there is room for further targeted support for migrants in the targeted cross-border areas, particularly on the Thai-Myanmar/Burma border, as well a further piloting of ITMs among migrant workers.

Annex 11: IOM Dispute Mediation Brief for Thai – Myanmar/Burma border[47]

Under the USAID-funded Migrant Rights Project, six multi-stakeholder migrant working groups were officially set up in Mae Sot and Prob Prah districts. At first, IOM expected to establish the community dispute mediation teams that the six sub-district working groups themselves would mediate disputes at the sub-district level. However, it was realized that village-level mediation teams would be the best approach to start with because the communities/villages have faced disputes related to migrants on the ground. Therefore, after the informal consultations with a sub-district local administrative office authority and Thai village headmen, IOM presented the idea of community dispute mediation at the village level in order to pilot two villages in Mae Sot district. IOM overwhelmingly received positive feedback from Thai village headmen and four villages expressed willingness to pilot the initiative of community dispute mediation in their villages. Later, IOM approached four villages to draft the composition list of community dispute mediation teams. Thai village headmen took a lead role in contacting the proposed names in the list to make sure their willingness to join the teams. Each team consisted of 15-20 members (Thai village leaders, senior Thai village leaders, and approx 5 migrant leaders/representatives).

In August 2011, focus group meetings with the community dispute mediation teams were organized for them to finalize the name list. The first meeting of the teams was later organized. Later, the teams would like IOM to contact with the Mae Sot District to officially set up the teams with the district's order. IOM drafted the district's order indicating the details of the role and responsibilities of the teams. Later, the teams were officially set up by the Mae Sot District's Order. In the district's order, the teams were responsible for 1) mediating community disputes that mediators can be compromised according to law (minor civil or minor criminal offences e.g. alcohol-induced quarrel, stealing, loan disputes); and 2) organizing peaceful co-existence activities between Thais and migrants. Case record template was also produced in Thai and Burmese for the mediation teams to record cases. Training on community mediation was also conducted to increase knowledge and skills on mediation. Also, IOM helped the teams in drafting the guideline on community mediation. The draft was done and shared with the teams to review. However, the project has come to an end. Therefore, the draft guideline was left with the teams for their review after the project ended.

Note: the teams mediated disputes related to migrant vis-à-vis migrant and migrant vis-à-vis Thai.

<u>Achievements:</u>

- A good start to reduce gaps between Thais and migrants. Although some disputes were between migrant and migrant. The unsettled disputes can cause negative images/perceptions towards migrants among Thai people or lead to some social problems in the communities.
- The project was able to involve migrants in protecting their own rights in an amicable way, rather than going through the typical way of legal protection process.

[47] Personal correspondence with Lanna Walsh, Field Coordinator for IOM's Labour Migration Program in Mae Sot Thailand.

- Migrant representatives received acceptance to be integrated into the society to solve community problems.
- According to the interview with migrant representatives in the mediation teams, they said that with IOM's presence, IOM served a good role of being a middleman between Thais and migrants. So migrant representatives believed that IOM could help negotiate with Thais to ensure that migrants' voices are heard and assistance to migrants is fairly provided.

Challenges:

- Lack of funding by villages to continue to maintain the work of the mediation teams after the project ended.
- There should be more time for IOM to continue to build trust among Thai and migrant team members. IOM saw the possibility to strengthen the relationship between two groups if more time was allowed.

Opportunities:

- IOM can expand the pilot project to other villages of Mae Sot District. And try to make the pilot villages as "Model" for other villages/districts/provinces to replicate this initiative to reduce disputes and promote long-term happy, peaceful living between migrants and Thais. This would pave a way for migrants to be integrated and accepted by Thai society.