The programme review is a mechanism to assess overall programme achievements and performance as well as to identify gaps. It provides an opportunity to propose strategic directions in order to improve the programme performance. The Ministry of Health, Republic of the Union of Myanmar, in collaboration with WHO, conducted the external evaluation of the malaria control programme during 30 July–9 August 2012. The review team noted a rapid increase in key intervention coverage spanning a large part of the country and improving timely service delivery at the village level over the past six years. The review team also observed a strong partnership as well as potential increase of funding for malaria control. Inadequate human resources for malaria control, overlapping of implementing areas of multiple partners, and emergence of artemisinin resistance are key challenges.
External Evaluation of the National Malaria Control Programme

Myanmar

30 July-9 August 2012
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Abbreviations

3DF Three Diseases Fund
ACT Artemisinin-based combination therapy
AMT Artemisinin monotherapy
AMTR Artemisinin monotherapy replacement project
AusAID Australian Agency for International Development
BHS Basic health staff
BCC Behaviour change communications
CHW Community health worker
CIDA Canadian International Development Agency
CSM Clinically suspected malaria
DFID Department for International Development, UK
DG Director General
DMR Department of Medical Research
DoH Department of Health
DNA Deoxyribonucleic acid
EDPT Early diagnosis and prompt treatment for malaria
FDA Food and Drug Administration Division
GFATM The Global Fund to fight AIDS, Tuberculosis and Malaria
GMS Greater Mekong Sub-region
GPARC Global plan for artemisinin resistance containment
HA Health assistant
HMIS Health management information system
IEC Information, education and communication
INGO International Nongovernmental Organization
IOM International Organization for Migration
IP Implementing partners
IRS Indoor residual spraying
ITN Insecticide-treated net
IVM Integrated vector management
JICA Japan International Cooperation Agency
LLIN Long-lasting insecticidal net
M-CCM Myanmar Country Coordination Mechanism
<table>
<thead>
<tr>
<th>Abbr.</th>
<th>Full Name</th>
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<tbody>
<tr>
<td>M&amp;E</td>
<td>Monitoring and evaluation</td>
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<tr>
<td>MARC</td>
<td>Myanmar artemisinin resistance containment</td>
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<tr>
<td>MCC</td>
<td>Myanmar Council of Churches</td>
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<td>MMA</td>
<td>Myanmar Medical Association</td>
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<td>MMMM</td>
<td>Malaria migrant mapping</td>
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<td>MoH</td>
<td>Ministry of Health</td>
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<td>MPF</td>
<td>Myanmar Pharmaceutical Factory</td>
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<td>MRCS</td>
<td>Myanmar Red Cross Society</td>
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<td>NHC</td>
<td>National Health Committee</td>
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<tr>
<td>NGO</td>
<td>Nongovernmental Organization</td>
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<td>NMCP</td>
<td>National Malaria Control Programme</td>
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<td>NSP</td>
<td>National strategic plan</td>
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<tr>
<td>PCR</td>
<td>Polymerase chain reaction</td>
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<tr>
<td>PHP</td>
<td>People’s Health Plan</td>
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<tr>
<td>PMI</td>
<td>President’s malaria initiative (USA)</td>
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<td>PPP</td>
<td>Public-private partnership</td>
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<tr>
<td>PSI</td>
<td>Population Services International</td>
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<tr>
<td>QDSTM</td>
<td>Quality diagnosis and standard treatment of malaria</td>
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<td>QGP</td>
<td>Quality certified general practitioners</td>
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<tr>
<td>RDT</td>
<td>Rapid diagnostic test</td>
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<td>RHC</td>
<td>Rural health centre</td>
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<td>SC</td>
<td>Save the Children</td>
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<td>SPR</td>
<td>Slide positivity rate</td>
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<td>SSA</td>
<td>Special service agreement</td>
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<tr>
<td>SSMOs</td>
<td>Supply system management officers</td>
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<tr>
<td>TSG</td>
<td>Technical and strategy group</td>
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<tr>
<td>TWG</td>
<td>Technical working group</td>
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<tr>
<td>UNAIDS</td>
<td>Joint United Nations Programme on HIV/AIDS</td>
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<tr>
<td>UNFPA</td>
<td>United Nations Population Fund</td>
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<tr>
<td>UNICEF</td>
<td>United Nations Children’s Emergency Fund</td>
</tr>
<tr>
<td>UNOPS</td>
<td>United Nations Office for Project Services</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>USD</td>
<td>United States dollar</td>
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<tr>
<td>USP</td>
<td>United States Pharmacopeia</td>
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<tr>
<td>VBDC</td>
<td>Vector-borne Disease Control Programme</td>
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<tr>
<td>VHV</td>
<td>Village health volunteer</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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Executive summary

1. Purpose of review and methods

This review of the Myanmar National Malaria Control Programme (NMCP) was carried out from 30 July to 9 August 2012, by a team of international and national experts, aided by senior officials of WHO. The objective of the review was to make a comprehensive assessment of the malaria situation and the control programme, its structure, financial and human resources, policies and strategies, operations, partnerships, achievements, and impact on malaria, and recommendations to further improve malaria control in the country. The review methodology consisted of examining programme reports and pertinent scientific literature, presentations by, and discussion with NMCP and its principal partners, and key UN agencies supporting malaria control in the country, field visits to some of the highly endemic districts, interviews with key stakeholders including endemic communities, and analysis of data from the national database and those received from the districts during the field assessments. The last review was conducted in 2005.

2. Current malaria situation and investments in its control

Malaria constitutes a major public health problem in Myanmar with more than two-thirds of its population living in areas of malaria risk. Around 70% of the population of Myanmar lives in malaria endemic areas, 15.6 million people in high-risk areas, 14.3 million in moderate-risk and 10.7 million in low-risk areas. All states/regions, and 284 out of 330 townships are endemic for malaria. Forest, mining and plantation-related occupations and migration for labour are the major risk factors. For the past several years, Myanmar reported the highest malaria morbidity and mortality rates in both the WHO South-East Asia Region, and in the Greater Mekong Sub-Region (GMS). Seven years ago, malaria control efforts were set back when the financial award from the Global Fund to fight AIDS, Tuberculosis and Malaria (GFATM) was abruptly terminated. However, donor support was swiftly restored through a Bridge Fund (~ US$ 0.53 million), followed by the 3-Disease Fund (3DF) in 2006 (US$ 20.495 million), which helped to rapidly expand intervention coverage for malaria control in many parts of the country until 2011. More recently, two further sources of funding have allowed these efforts to be reinforced and sustained - in January 2011, a GFATM (Round 9) grant for malaria control in much of the country(US$ 29.82 million for Phase I, 2011 – 2012), and following the detection of a decreased sensitivity of malaria parasites to artemisinin along the southeast border with Thailand, in mid 2011 a Myanmar Artemisinin Resistance Containment (MARC) Project (US$ 14.7 million for 2011 – 2015) funded by a group of donors for those states/regions.

The past six years have seen a tremendous effort in malaria control in Myanmar, resulting in a rapid increase in intervention coverage spanning a large part of the country and improving timely service delivery at the village level – this includes prevention with long-lasting and insecticide-treated conventional bed nets (LLINs and ITNs), population coverage with
early diagnosis and treatment, delivery of information, education and communication (IEC) and behaviour change communication (BCC) on the basis of a risk-based microstratification of villages. The review found that the technical policies and strategies adopted for malaria control are sound, consistent with WHO recommendations and up-to-date.

3. The National Malaria Control Programme (NMCP)

The NMCP located within the National Vector-Borne Diseases Control (VBDC) programme has a robust infrastructure and is staffed with people possessing a wide range of technical competencies at the central level, and a few staff positions at the state/regional level where malaria control is integrated into the general health services. At the township and village levels, basic health staff such as midwives and health assistants (HA), and village health volunteers (VHV) deliver malaria services with technical assistance and guidance from the state/regional NMCP staff. The NMCP is partnered by over 20 international and local nongovernment organizations (NGOs) which have received international financial support for malaria control. International nongovernment organizations (INGOs) operate in endemic areas defined by the Government and all NGOs work through their own VHVs in scaling up malaria control interventions. The activities of these implementation partners have been very helpful in rapidly scaling up antimalarial services in their areas of operation. However, a very large part of the service delivery for malaria control operations are being carried out by the public sector health services.

Over the years, the NMCP at the central level has suffered from continuing reduction in manpower due to their inability to replace posts vacated by retired malaria staff (budget constraints, and a hiring freeze) contributing to poor implementation of the programme. The state/region level is also under-staffed and under-resourced, with many critical NMCP positions still vacant weakened facilities and poor support for field operations also. In contrast, malaria intervention delivery at the township level has been greatly strengthened over the past six years – mainly at the rural health centre (RHC) and sub-centre and lower levels staffed by midwives, HAs and VHVs resulting in high coverage of antimalarial interventions. The field malaria programme staff and the basic health staff were consistently found to be highly motivated, delivering malaria control services including in some very difficult environments in spite of many constraints. However, states/regions are geographically large, the few NMCP staff and limited financial resources are inadequate to support these operations with malaria expertise on the ground or able to deal with emerging issues.

4. The health information system and impact of interventions

In 2011, the country reported 530,027 cases of malaria and 581 deaths. There is a robust health management information system (HMIS) routinely reporting core malaria programme indicators, and a NMCP reporting system that works in parallel and collects additional specific programme indicators. Data recording at the peripheral level by midwives, HAs and VHVs using standard forms is excellent. The routine reporting systems, however, do not yet include case data from NGOs and the private sector and this makes the reported figures quite incomplete.

There have been many improvements in case detection over the past six years. Prior to 2005, patients had limited access to health care, few patients were confirmed as having malaria, and several clinically suspected patients were treated and recorded as having malaria.
This has changed markedly with vastly increased numbers of patients being screened for malaria by rapid diagnostic tests (RDTs), and therefore many more being detected, confirmed and reported as suffering from malaria. This change in conditions for measuring malaria cases over the past 6 - 7 years makes it difficult to directly compare the nationally reported case incidence rates over time for the purpose of assessing the impact of interventions. However, data from most states/regions (with the exception of Kachin, Tanintharyi and Kayah) show a consistent trend between 2001 and 2011 of a declining proportion of malaria among those tested, leading to a 45% reduction in the proportion of malaria patients over this period. Similarly, data from 135 townships (where high intervention coverage was achieved between 2007 and 2011, and 100% of fever cases attending a VHV post were tested for malaria and reported) show that, for the period (2007 – 2011) the proportion of fever patients positive for malaria has decreased across all sites from an average of 41% (269 810 confirmed cases) to 24% (102 056 confirmed cases). These trends are all the more significant, considering that they have occurred despite a gradual increase in the number of patients attending the outpatient and inpatient health facilities and increasing numbers being tested for malaria by RDTs – against a backdrop of greatly improved health services in the country.

In Rakhine State, which still reports one of the highest malaria incidence rates in the country, starting in 2006, regional health statistics showed a massive increase of LLIN and ITN coverage (from less than 100 000 distributed in 2005 to more than 400 000 every year in 2009, 2010 and 2011) and high coverage with early diagnosis and treatment. Between 2006 and 2011, the regional malaria data shows a 50% reduction of morbidity and 75% reduction of mortality due to malaria, and a decline in the proportion of patients positive for malaria by 35%. There has also been a change in the \( P. falciparum/P. vivax \) ratio in most states/regions from 72% / 28% in 2006 to 59% / 41% in 2011, and this too implies a reduction of transmission.

Furthermore, the routine NMCP reported data on malaria mortality from in-patient health facilities shows an unambiguous and rapid decline in the number of malaria deaths between 2006 (~1500 deaths) and 2011 (581 deaths). Whilst acknowledging that the death reporting system may be underestimating the absolute number of malaria deaths, the review team is of the opinion that it provides a true picture of the malaria mortality trend, because the death reporting system has remained largely unchanged over the years – if any change, it was that more health facilities were set up in remote areas, thus increasing reporting coverage. The case fatality rate has declined by nearly 50% from 3.23% in 1999 to 1.66% - a likely impact of scaling up early diagnosis and treatment services. There is, thus, sufficient evidence of a significant reduction in the malaria incidence consequent to increased intervention coverage. The review team also found that a reduction in malaria cases countrywide is widely perceived by people living in endemic areas, by health workers, and by researchers who seek malaria cases for study. However, forest, plantation, and mining-related malaria transmission persists in many parts of the country, particularly at its international borders. Here malaria is more tenacious and will require specific interventions and new approaches to prevention and control.

5. Vector control and prevention

At regional/state level the entomological capacity is weak. At present, Myanmar’s transmission reduction programme relies almost entirely on achieving coverage with ITNs/LLINs. Other methods, especially IRS and larval control through environmental management are rarely used. Further, methods to address the significant problem of outdoor transmission in forests,
which is responsible for the persisting malaria burden, are currently lacking. The rapid scale-up in treatment of conventional nets with insecticide and distribution of LLINs by multiple partners has resulted in a mosaic of data on ITN coverage and needed retreatment (in the case of conventional nets) and replacement (in the case of LLINs) that is fragmented. There is no system to monitor insecticide persistence on LLINs.

6. Diagnosis and treatment services

One of the key achievements of the NMCP and its implementing partners has been the provision of quality diagnosis and treatment at the community level to populations across the country. This has been made possible by 1) the training and engagement of large numbers of basic health staff, whose services, particularly those of the VHVs, have made it possible to reach populations who may not have sought treatment in the formal health sector; 2) the provision of quality commodities through an effective supply chain system, and 3) the wide scale use of RDTs. Microscopy services have, however, been weakened due to lack of trained microscopists.

Although three WHO-recommended artemisinin-based combination therapy (ACTs) are adopted as national medicines policy, there are several other ACTs not recommended by WHO and not a part of the national treatment policy, which are registered in the country and being used in the private sector. Artemisinin monotherapies are still widely available in the country, but their use is decreasing due to a shift in treatment seeking behaviour from the private to the public sector where quality ACTs are now available free-of-charge. Some private medical practitioners have also been engaged in the malaria control efforts by the NMCP and its partners Myanmar Medical Association (MMA) and Population Services International (PSI), via refresher training programmes, and by engaging them in a franchise for high quality service provision.

7. Containment of artemisinin-resistance

The emergence of artemisinin resistance in GMS and the detection of decreased parasite sensitivity to artemisinin in southeastern Myanmar, the far western frontier of the GMS, present a formidable new challenge - of arresting the further spread of resistance in the country and beyond. This is being addressed through a strategic plan of the MARC project, which is operational in states/regions zonated as Tiers I, II and III. In Tier I, and to a lesser extent Tier II, a high level of implementation is underway. Efforts by the NMCP and MoH and their partners are underway to halt the registration, sale and use of artemisinin monotherapy, and measures are expected to come into operation by the end of the year. These and other more innovative strategies to halt the sale of monotherapies need to be pursued relentlessly. Although it may be too early to expect an impact of the MARC strategies on transmission reduction in these MARC areas, there are still foci of persistently high transmission, particularly among forest and plantation workers, which raises concern, and needs now to be the focus of attention. Vacant positions in NMCP’s professional staff cadres particularly those within MARC tiers I and II has led to overburdening existing staff, and is likely to slow the progress of implementation of this extremely important undertaking unless they are addressed with urgency.

Intervention scale-up efforts have been greatly supported by IEC/BCC strategies being implemented by NMCP in collaboration with the Bureau of Health Education and most partners. IEC materials by way of posters, pamphlets and television spots are available and some have been produced in the six main languages, including Shan and Karen.
8. **Malaria control partnerships**

Malaria control efforts led by NMCP have, in the past six years been technically supported by UN agencies, WHO, UNICEF and a bilateral agency JICA. They have been financially supported by the donor community, and complemented by the work of implementing partners. These efforts are showing impact. However, with more than 20 partners and stakeholders involved in malaria control and artemisinin-resistance containment, it has not been possible to avoid project-based implementation. Consequently, there is some degree of overlap of implementation areas of partners and a lack of effective coordination. As a result, the national programme appears to be a loosely connected set of fragments. Integrating the malaria programme jigsaw is a significant challenge for the VBDC and WHO, which play crucial roles in this regard.

9 **Advocacy for malaria control and future outlook**

Although advocacy for malaria control has been entirely informal in Myanmar, it has been effective. Planned advocacy campaigns have not been necessary, because donors have been eager to fund malaria control in Myanmar. Relationship networks among international actors are well established and this facilitates communication. It appears that in the near to short term, it will be less difficult for external agencies to channel funds directly to the MoH pending policy changes within the ministry itself. It will be up to the MOH to advocate internally for the necessary policy and regulatory changes, to donors. Prospects for external donor support for malaria control in Myanmar appear to be good, with strong links, rich networks and established relations with international and national agencies. An improving political and economic situation, and reasonably good data showing a decline in malaria which demonstrates to donors that their funds are having impact, are also conducive for receiving aid. Artemisinin resistance is injecting new urgency into calls for funding and support.

Overall, with a strong health infrastructure, good prospects for increased national and external investments in malaria control, and a very sound achievement of scaling up interventions in the past six years, Myanmar has every potential to achieve effective malaria control and further reduce the burden of disease. Enhancing current malaria control efforts is imperative, given the enormity of the burden and the threat of artemisinin-resistance spreading further. This will require vastly strengthening the NMCP, better coordination of the implementing partnership and working on the basis of a single operational malaria control plan. A far greater investment in operational research is called for, to provide evidence for local, risk-based approaches to malaria control in areas of, and population groups who currently suffer from intense transmission.

10. **Key recommendations**

(1) Strengthen the VBDC/NMCP at central and state/regional levels as follows:

(a) Fill all sanctioned posts immediately with qualified staff.

(b) Support field staff with technical guidance and increased travel costs and per diem in line with real costs.

(c) Pay special attention to the fields of epidemiology and entomology, as follows:

- Support state/regional malariologists with data assistants, and train them to analyse the state/regional epidemiological situation.

- Ensure that 1) each state/region is staffed by trained and equipped staff consisting of two each of entomologists, assistant entomologists, and
(d) Substantially increase direct financial investments by donors in the MOH to strengthen malaria control. For this to occur, a transparent financial management system must be in place. Increase funding to WHO to more effectively support the NMCP until it is directly supported.

(2) Finalize the national strategic plan and prepare an integrated annual malaria operational plan to include all implementing partners at central, state/regional and township levels. The latter should show the contribution to service delivery and results reporting by both government and NGO service providers, and include and integrate all special projects and initiatives. Convene annual and quarterly reviews of the plan with service delivery partners.

(3) Sustain current intervention coverage levels and rapidly expand coverage to highly endemic, currently poorly served areas and populations and high-risk groups (forest workers, miners, migrant labour populations).

(4) Construct a national malaria database linked to a map, which includes routine surveillance data from all NGOs and the private sector, survey data, and complete village micro stratification data. This database needs to be regularly updated and used for operational planning at the central, state/regional and township levels.

(5) Plan and conduct operational research a) to prevent forest malaria; b) to improve adherence to treatment, particularly to the 14-day treatment with primaquine for preventing relapse; c) to increase containment of artemisinin-resistance; and d) to carry out focused prevalence surveys linked to entomological and human behaviour studies in specific ecological zones and each state/region; e) to conduct research on personal protection measures suitable for migrants, forest workers, and miners to reduce outdoor transmission of malaria.

(6) Stringently monitor the impact of the MARC project on malaria transmission in the states/regions of implementation and to adopt responsive strategies to ensure containment of artemisinin-resistant *P. falciparum* malaria including expansion of therapeutic efficacy study sites in the country to increase vigilance on resistance to artemisinins; specific measures to reduce forest-related transmission in Tiers I and II, and supporting efforts to abolish the sale and use of artemisinin monotherapies.

(7) Coordinate a functional intersectoral partnership by high-ranking officials of MOH in order to effectively reduce the burden of malaria in the country.

(8) Focus advocacy efforts on 1) strengthening cross-border and intersectoral advocacy (economic development is driving movement of non-immune populations for occupational activities such as those related to natural gas and timber, together with other types of forest-related activities such as gold panning, gem-mining); 2) engaging the Minister of Health as the chief advocate for changes in how external funds are channelled; 3) directing more advocacy efforts towards other sectors within Myanmar (such as tourism) and cross-border cooperation; and 4) including advocacy in a revised communication and social mobilization strategy for malaria prevention and control in Myanmar (budget, human resource requirements, strategies and implementation).
Background

1. **Background to the external programme evaluation**

1.1 **Rationale of the external programme evaluation**

Myanmar has a long history of malaria control by the National Malaria Control Programme (NMCP) with significant successes, including in recent years. During the period 2006 – 2011, greater financial investments have been made in malaria control in Myanmar than in any other period in the past, with the exception perhaps, of the malaria eradication programme. From 2006 onwards, the country received substantial external funding for malaria control from the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) and bilateral donors, and also saw the engagement of several local and international NGOs in malaria control in some parts of the country. The combined efforts of the NMCP and its implementation partners during the past seven years have led to a rapid expansion of services for malaria prevention and control. Key antimalarial interventions, such as the use of rapid diagnostic tests (RDTs), artemisinin-based combination therapies (ACTs) and long-lasting insecticidal nets (LLINs), which were adopted in the early 2000s, have been scaled up in many parts of the country with support from behavior change communications programmes.

As expected, the efforts of the past seven years have led to more malaria cases being detected, treated and reported, and a decline in the reported malaria deaths. It may, therefore, not be possible to assess the impact of interventions on the mere basis of reported incidence figures - a more discerning analysis would be required to evaluate the impact of recent control efforts on malaria. Even if the burden of malaria has been reduced significantly, it still remains a major public health problem in Myanmar, and its control now faces yet another formidable new challenge - recent evidence indicates that artemisinin-resistant *P. falciparum* malaria which emerged in western Cambodia and eastern Thailand has now reached the southern and southeastern borders of Myanmar, posing one of the greatest threats to malaria control in the country and throughout the world. This development triggered a massive response in Thailand and Cambodia beginning in late 2008, and in Myanmar in mid-2011 through a Myanmar Artemisinin-Resistance Containment (MARC) project supported by external funding.

Thus, malaria control in Myanmar is at a critical juncture, with major efforts being underway to scale up interventions, with many implementation partners supplementing the work of the NMCP, and with substantial financial investments from several different sources, thus, making it difficult to avoid project-based implementation, and the situation calling for effective coordination. Simultaneously, the country is undergoing political reform and a greater degree of decentralization, creating an increasing potential for investments from newer sources. Furthermore, malaria in Myanmar is influenced by a large number of changing epidemiological and socioeconomic factors, all of which require regular review.
of tools and strategies. All these called for a comprehensive external evaluation of malaria control in the country.

1.2 Purpose of the programme evaluation

A comprehensive external evaluation of the malaria control programme was required to assess the epidemiological situation, outcomes and impact of financial investments on malaria control, identify lessons learnt and to formulate recommendations that could improve the programme. Such an evaluation would also be necessary to give assurance to investors in malaria control. The last external programme evaluation was conducted in October 2005. Since then, there have been assessments of several on-going and completed initiatives and an internal programme review including several subject-specific reviews. None of these constituted a comprehensive external evaluation of the programme although they could serve as useful background for one.

The findings and recommendations of an external programme review could serve to inform the directions of malaria control over the next 3 – 5 years; be useful for NMCP and its implementing partners when moving towards the next phase - Phase II of the GFATM (round 9), and artemisinin-resistance containment efforts; provide a reference for implementing partners when developing and/or updating their plans of action on malaria control; and aid development partners when considering future investments in malaria control in the country.

1.3 Objectives of the programme evaluation

The general objectives were to:

1. conduct comprehensive in-depth analysis of malaria situation and the national malaria control programme in Myanmar;
2. make recommendations to further improve the malaria prevention and control programme, including artemisinin-resistance containment, in Myanmar.

The specific objectives were to:

1. analyse the epidemiological situation of malaria in Myanmar during the past six years (2006 – 2011).
2. review the national malaria control strategy, including artemisinin-resistance containment, and the technical policies and implementation strategies in relation to the epidemiological, social, political and economic contexts of malaria in the country;
3. review the organizational structure and functions, the management and technical capacities and the financial resources of the national malaria control programme at national and sub-national levels;
4. assess the achievements in various programmatic areas of the national malaria control programme, the challenges and the lessons learnt, with special emphasis on the implementation of Three Diseases Fund (malaria component), the first year of Myanmar Artemisinin-Resistance Containment (MARC) and the first year of GFATM Round 9 grant and other related projects, during 2006 – 2011;
(5) assess the roles and contributions of Japan International Cooperation Agency (JICA), United Nations Children’s Emergency Fund (UNICEF), World Health Organization (WHO), INGOs, NGOs, the private sector and the communities at risk in the national response to control malaria;

(6) propose specific recommendations to improve the national malaria control programme.

2. Methodology

The review team comprised members whose expertise spanned a range of relevant disciplines (Annex 1). The composition of the team was determined jointly by WHO and the Ministry of Health, Myanmar. Preparations and arrangements for the review were facilitated by senior officials of WHO. Three weeks to a month prior to the review, the review team was provided with background information and recently published reports on malaria control in Myanmar.

The review began in Yangon with an introduction to malaria control in Myanmar, and a presentation on the work of NMCP by the Deputy Director-General of Health, Dr. Saw Lwin, and the Deputy Director, Malaria, Dr. Thar Tun Kyaw, and presentations by principle UN agencies supporting malaria control – United Nations Office for Project Services (UNOPS), UNICEF, WHO; a bilateral agency providing technical support – Japan International Cooperation Agency (JICA); and key implementing partners and NGOs - Save the Children, Myanmar Council of Churches (MCC), Myanmar Health Assistant Association (MHAA), Community Development Association (CDA), Medicins Sana Frontieres (MSF). The review team visited the Yangon offices of key donors and partners – Three Diseases Fund (3DF), United States Agency for International Development/President Malaria Initiative (USAID/PMI), Department for International Development (DFID) of the United Kingdom, Australian Agency for International Development (AusAID) and Population Services International (PSI); the headquarters of the Myanmar Medical Association (MMA); and the Myanmar Maternal and Child Welfare Association (MMCWA); and a key research partner of NMCP – Department of Medical Research, Lower Myanmar. Discussions were held with these key partners on their contributions to malaria control. Meetings were also held with national and international NGOs which function as sub-recipients of the GFATM grant.

Early on the second day, the review team left for the new capital city Nay Pyi Taw, where members of the team met with the Director-General of Health, and the director for international cooperation and spent the rest of the day at the offices of the NMCP where presentations were made by key staff of the programme, and discussions were held with them and NMCP staff on various aspects of programme capacity, and implementation. One team member went to visit the office of the Food and Drug Administration (FDA) and discussed with the director and his team. Preparations for the field assessment were discussed at the end of the day.
On day 3 of the review, members grouped into four teams left on field assessments in the following states/regions: 1) Thanintharyi region - Kawthaung township; 2) Southern Shan State, Thaungyi/Yat Sauk township; 3) Magway Region - Nga-phe and Salin townships and 4) Sagaing Region – Monywa, Ta-ze and Pale townships (Map 1). In each of the states/regions, and over a period of four days, the teams visited a range of offices, organizations and individuals who are concerned with malaria control, including, 1) Government offices – state/region health offices, NMCP offices, district medical offices, township medical offices, rural health centres, sub-centres; 2) private health sector institutions such as clinics of general practitioners, pharmacies and other medicine-outlets, and hospitals; 3) offices of, and health posts managed by implementing partners such as INGOs and local NGOs; 4) the private corporate sector such as palm oil plantations and their health care infrastructure; and 5) homes and workplaces of people who are at risk of, or suffering from malaria. Discussions were held during each of these visits, and key persons interviewed on their work in malaria control, their successes, and the challenges they face with a view to determining the state of implementation of current policies and strategies.
On return to Yangon, the four teams discussed and consolidated their findings, had discussions with the secretariat, and formulated the key findings of the review and recommendations. On the last day of the review, the key findings of the review were presented to representatives of the MoH including the Director of the NMCP and key stakeholders which included partners, UN agencies and donors, at a meeting convened by the Ministry of Health (MoH) and WHO. Feedback obtained during this meeting was taken into consideration in formulating this report.

3. **Country profile**

(Adapted from the National Strategic Plan for Malaria Prevention and Control 2010 – 2015)

3.1 **Geographic and sociodemographic features**

Myanmar is the largest country in mainland South-East Asia with a total land area of 676,578 square kilometers. It stretches 2200 kilometers from north to south and 925 kilometers from east to west at its widest point. It is bound on the north and northeast by the People's Republic of China, on the east and south-east by the Lao People’s Democratic Republic and the Kingdom of Thailand, on the west and south by the Bay of Bengal and Andaman Sea, on the west by the People’s Republic of Bangladesh and the Republic of India (Map 2).

The country is divided administratively into 17 states and regions (Map 2), and comprises 66 districts, 325 townships, 60 sub-townships, 2781 village tracts and 64 910 villages. The first level administrative area is the Region in the central parts of the country, and State in the periphery. The townships and villages are the core planning and implementation units. Myanmar falls into three well-marked natural divisions: the western hills, the central belt and the Shan plateau on the east, with a continuation of this high land in the Tanintharyi.

Three parallel chains of mountain ranges from the north to south divide the country into three river systems: the Ayeyarwaddy, Sittaung and Thanlwin. Myanmar has abundant natural resources including land, water, forest, coal, mineral, marine resources, natural gas and petroleum. Great diversity exists between the regions due to the rugged terrain in the hilly north, which makes communication difficult. In the southern plains and swampy marshlands, there are numerous rivers and tributaries criss-crossing the land in many places.

The climate in Myanmar is tropical with three distinct seasons: rainy, cold and hot seasons. The rainy season comes with the southwest monsoon, lasting from mid-May to mid-October, followed by the cold season from mid-October to mid-February. The hot season precedes the rainy season and lasts from mid-February to mid-May.

The population of Myanmar in 2006 – 2007 is estimated at 56,515 million with a growth rate of 2.02 percent. About 70 percent of the population resides in the rural areas, whereas the remaining are urban dwellers. The population density for the country as a whole is 77 per square kilometers.

The Union of Myanmar is made up of 135 national groups speaking over 100 languages and dialects. The major ethnic groups are Kachin, Kayah, Kayin, Chin, Mon, Bamar, Rakhine and Shan. About 89.4% of the population is Buddhists whilst the rest are Christians, Muslims, Hindus and animists. Adult literacy rate for the year 2005 was 94.1% while school enrolment rate was 97.58%, increasing respectively from 79.7% and 67.13% in 1988.
3.2 Health system

The Ministry of Health (MoH) is the major organization responsible for raising the health status of the people and accomplishes this through provision of comprehensive health services, viz promotive, preventive, curative and rehabilitative measures. The MoH is headed by the Minister who is assisted by two deputy ministers. The Ministry has seven functioning departments, each under a Director-General. They are the department of health planning, health, medical science, medical research (lower, upper and central Myanmar), and traditional medicine. All these departments are further divided according to their functions and responsibilities. The Ministry promotes collaboration with related departments and social organizations, and it also encouraged maximum community participation in health activities.
The MoH remains the major provider of comprehensive health care as well as the main organization of health care provision in Myanmar. It has a pluralistic mix of public and private systems both in the financing and provision. Health care is organized and provided both by public and private providers. The Department of Health (DoH) as one of the seven departments under the MoH plays a major role in providing comprehensive health care throughout the country including remote and hard-to-reach border areas. The health system is organized hierarchically and in accordance with the country’s administrative structure. Since 1978, health services integrated the vertical programmes into the basic health services through the primary health care approach. Some ministries also provide health care, mainly curative, for their employees and families, namely ministries of defence, railways, mines, industry, energy, home affairs and transport.

The private, for profit, sector mainly provides ambulatory care, though some also in recent years provide institutional care. Funding and provision of care is fragmented. They are regulated in conformity with the provisions of the law relating to private health care services. One unique and important feature of the Myanmar health system is the existence of traditional medicine along with allopathic medicine. Traditional medicine has been in existence since time immemorial and is well accepted and utilized by the people throughout the history.

In line with the national health policy, NGOs also contribute some service provision. Their roles are also becoming important as the needs for collaboration in health become more prominent. Sectoral collaboration and community participation is strong in the Myanmar health system thanks to the establishment of the National Health Committee (NHC) in 1989. It is a high level interministerial and policy-making body concerning health matters. It takes the leadership role and gives guidance in implementing the health programmes systematically and efficiently. Under the guidance of the NHC, various health committees are established at each administrative level.

The DoH (Figure 1) is responsible for providing health care services to the entire population in the country. Under the supervision of the Director-General (DG) and three deputy directors-general (Deputy DGs), there are nine directors leading and managing the following divisions: medical care, nursing, national health laboratory, administration, planning, disease control, public health, occupational health, and food and drug administration.

The distribution of responsibilities among some of the divisions relative to malaria control and prevention is as follows:

- The Medical Care Division is responsible for setting hospital-specific goals and managing hospital services as well as medical supplies and equipment including medicines for all health institutions.
- The National Health Laboratory is responsible for routine laboratory investigation, special laboratory task force and public health work, training, research and quality assurance.
- The Disease Control Division covers prevention and control of infectious diseases, disease surveillance, outbreak investigation and response, and capacity building. The Division includes the Vector-Borne Disease Control (VBDC) Programme headed by a deputy director. At the national level, the programme is responsible for malaria, dengue, lymphatic filariasis and Japanese encephalitis control. Most of the staff and resources of VBDC at all levels, except in the biggest cities of the country, are focused on malaria.
- The Public Health Division is responsible for primary health care and basic health services, nutrition, environmental sanitation, maternal and child health and school health services.

- The Food and Drug Administration Division is responsible for the registration and quality control of medicines. The timeframe for registering prescription medicines on average is one and a half years, but there is a fast track procedure for urgently needed medicines. The Division also shares weekly information on counterfeit, sub-standard and unregistered medicines found on the market to all state and regional directors.

**Figure 1: Organogram of the Department of Health (DoH)**

A township health department (Figure 2) has the following health facilities and manpower complement: a township hospital managed by the township medical officer, a station hospital managed by a medical officer, 4 – 5 rural health centres (RHCs) led by health assistants, and 4 – 5 sub-rural health centres per station hospital and RHC. A public health supervisor is assigned to township hospital, station hospital and in each RHC. A lady health visitor is assigned to each RHC. Each sub-rural health centre has a midwife who delivers basic health services including malaria prevention and control.

**Figure 2: Organogram of Township Health Department**

Community health workers (CHWs) have been trained in the last two decades. To date, about 40 000 CHWs are already trained, and of these, it is estimated that 50%
are active. They are neither employed by the Government nor paid any salary, which may explain their high attrition rate. The CHWs are trained to provide health education, treat minor illnesses and assist in the control of infectious diseases. Now, they also perform malaria diagnosis using RDTs and deliver antimalarial medicines. Amongst the voluntary workers are auxiliary midwives who are trained for domiciliary deliveries.

There has been a steady growth in the number of basic health facilities as well as health manpower during the recent past. The hospitals at regions, states, and districts are reasonably well staffed. The almost doubling in the number of midwives over a 20-year period should be noted, as these are key providers of basic health services in rural areas.

Of 21,725 medical officers in 2007–2008, about 8,000 work as private practitioners, and the rest work in the public sector. Many doctors and other staff in public health service are engaged in private practice after their official working hours to supplement their income.

The Central Medical Stores Depot (CMSD) is the primary agency with regards to supplies procured through the Government budget, UN agencies and other donors as well as donated supplies. They indent medical supplies from Yangon CMSD and notify respective townships to get commodities or transit medical supply. Rural health centres store their supplies in small storerooms whilst the sub-rural health centres use lockable cupboards or storerooms.

Since 2002, in collaboration with DoH, UNICEF finances 35 project supply system management officers (SSMOs) to strengthen the supply and logistics system of the MoH. Their main duty is to monitor and supervise storage, distribution and utilization of all supplies and equipment.

Cost-sharing funds are organized at township and community levels. The following medicines must be provided free of charge: TB medications, antimalarials, leprosy medications, iron and folic acid supplement, deworming medications, scabicides, oral rehydration salts and vitamin A tablets.

Private distribution channels are through recognized wholesalers or directly from registered pharmaceutical companies. General practitioners (GPs) procure their medicines mainly through this channel.

Government yearly increases health spending on both current and capital expenditures. Total government health expenditure increased from kyat 464.1 million in 1988–1989 to kyat 48,017.3 million in 2006–2007 (Table 1). Considering the high rates of inflation, it is difficult to assess the real trend.

<table>
<thead>
<tr>
<th>Table 1: Government health expenditure, Myanmar, 1988–2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health expenditure (million kyat)</strong></td>
</tr>
<tr>
<td>Current capital</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>Per capita health expenditure (kyat)</td>
</tr>
</tbody>
</table>

Source: Health in Myanmar 2012
The health care delivery system is based on the principles of primary health care up to the community level with a committed and professional health work force, and strategies to make grossly inadequate resources stretch as far as possible have also been developed. However, the need to review the extent to which the population at high risk, especially the ethnic minorities and the hardest to reach access the health care delivery system is important for further reduction of the malaria burden.

(Adapted from the National Strategic Plan for Malaria Prevention and Control 2010 – 2015)

4.1 Geographical distribution of malaria

Most of malaria transmission in Myanmar occurs in forested foothill zones below 1000 meters altitude. Higher altitudes are usually too cold for malaria transmission, but the upper limit is highly variable and has possibly tended to move upwards in recent years. Many of these highland areas are close to international borders (Map 3).

Map 3: Malaria risk areas (A); ecological zones (B) in Myanmar, 2007

Based on an understanding of ecological determinants of malaria and long-term malaria data, the country has been divided into areas of no risk and low, moderate and high risk for malaria (Map 3; Table 2). The proportion of the population living within high and
moderate risk areas has fallen substantially since 1994 and especially since 2007. These risk categories are, however, not uniform, there being villages with little or no transmission in high risk areas, and similarly within the low risk areas there being villages with high transmission. Hence, microstratification was undertaken for more effective targeting of malaria prevention and control interventions. Eighty out of the 284 endemic townships already considered high risk were microstratified in 2007 – 2008 and it indicated that 75% of population resides in malaria risk villages. Since then microstratification has been extended with the aim of covering the entire country.

Table 2: Distribution of population by risk areas, Myanmar in 1988 – 2011

<table>
<thead>
<tr>
<th>Area</th>
<th>Year</th>
<th>1988</th>
<th>2007</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>High risk (%)</td>
<td></td>
<td>38</td>
<td>28</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>Moderate risk (%)</td>
<td>41</td>
<td>23</td>
<td>25</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Low risk (%)</td>
<td></td>
<td>13</td>
<td>17</td>
<td>16</td>
<td>23</td>
</tr>
<tr>
<td>Free risk (%)</td>
<td></td>
<td>8</td>
<td>32</td>
<td>37</td>
<td>38</td>
</tr>
</tbody>
</table>

Source: Vector-Borne Disease Control, Ministry of Health, 2011

4.2 Mosquito vectors and ecological determinants of malaria

Out of 37 species of anopheline mosquitoes in Myanmar, 8 species are malaria vectors (Map 4), classified into primary (An. dirus and An. minimus; sporozoite rates 2-4%), secondary (An. annularis, An. sundiacus, An. culicifacies; sporozoite rates 1-2%), and suspected vectors (An. aconitus, An. maculatus, An. vagus; sporozoite rates <1%) based on their relation to malaria, e.g. sporozoite rates.

Map 4: Malaria vectors in Myanmar, 2007

Source: Vector-Borne Disease Control, Department of Health, Ministry of Health, 2012
The primary vectors *An. dirus* complex (both forest and well breeding) and *An. minimus* complex are both generally anthropophilic. The habitats of the malaria vectors in Myanmar are shown in Figure 3. A more detailed description of the habits of vectors are provided in the National Strategic Plan, Malaria Prevention and Control, 2010 – 2015.

The characteristics of the vectors explain the geographical distribution of malaria in Myanmar. The forest environment, which is closely linked to hilly terrain, provides the ecology, which is most conducive to malaria transmission. Deforestation reduces the malaria risk, when completed, but the process of deforestation is often associated with heavy exposure. Plantations may lead to re-emergence or emergence of malaria. Malaria transmission is, at most, sporadic in cultivated plain areas and is absent in urban areas. Some malaria transmission occurs in coastal areas, especially if the environment has been disturbed by, for example, aquaculture.

### 4.3 Social and economic determinants

Most malaria cases and deaths probably occur among people residing in villages near or in the forests. These people are usually national races living from subsistence agriculture supplemented by forest activities, such as cutting bamboo or rattan or production of charcoal. Generally, in villages located within 1 km distance from the forest, malaria transmission occurs in the village itself during part of the year, with all age-groups being at risk. In villages
located at a somewhat greater distance from the forest, the risk is usually confined to adult men, who enter the forest periodically for agriculture, forest produce gathering, or hunting. These men usually go in groups and stay in the forest for several days in makeshift shelters that offer no protection from mosquito bites.

The other major risk group is internal migrants, who are often induced by economic opportunities such as logging or mining in forested areas or road or dam construction and maintenance. Displacement caused by dam construction may also lead to exposure. These population movements may be organized, in which case it is relatively easy to organize prevention and curative services. However, often the migrant groups are small, spontaneous and even clandestine and illegal, making it difficult to protect them.

Malaria risk also occurs in plantations, which offer forest-like environments such as rubber trees and oil palms. In such situations, it is usually relatively easy to organize control, but this then meets with technical obstacles in rubber plantations, where workers need to start before sunrise, when anophelines are highly active.

5. Malaria control strategy and artemisinin-resistance containment strategy

The malaria control strategy in Myanmar is in accordance with the Global Malaria Control Strategy promoted by WHO and adopted at the Ministerial Meeting in Amsterdam in 1992, namely:

(a) To provide early diagnosis and prompt treatment of malaria, wherever it occurs;
(b) To plan and implement selective and sustainable preventive measures, including vector control;
(c) To prevent or detect early, or contain malaria epidemics;
(d) To strengthen local capacity in basic and applied research to permit and promote the regular assessment of malaria situation in the country, in particular the ecological, social and economic determinants of the disease.

They also reflect the Regional Strategy for Malaria Control in the WHO Region for South-East Asia (WHO/SEARO 2005), based on the following guiding principles:

(a) Advocacy for Asian malaria;
(b) Revamping surveillance;
(c) Strengthening planning and management;
(d) Reaching out and empowering the population at risk of malaria, recognizing that malaria has become limited to distinct groups such as remote populations, ethnic minorities and migrants;
(e) Establishing and sustaining broader partnerships with other disciplines, sectors and organizations;
(f) Developing specific strategies to tackle *Plasmodium vivax* malaria;
(g) Increasing coverage and proper use of insecticide-treated nets (ITNs) as a part of integrated vector management (IVM).
5.1 Malaria prevention

5.1.1 Insecticide treated nets and long-lasting Insecticide-treated nets.

A national policy and implementation strategy to scale-up the appropriate use of ITNs/LLINs for malaria prevention and control in Myanmar was developed in 2003 and updated in 2009. The objective is to ensure that 80 per cent of the populations in moderate and high-risk areas are protected by ITNs/LLINs by the year 2015. Populations in these risk areas are now identified and mapped through microstratification. Aside from free mass treatment of existing mosquito nets before the start of the peak transmission season, the following complementary strategies are recommended to reach this goal and target:

(a) free distribution of ITNs/LLINs to populations at risk;
(b) social marketing for demand creation and stimulating the local commercial market.
(c) emergency relief for displaced populations affected by natural or human-made disasters in malaria-risk areas.

The outputs related to insecticide treatment of existing mosquito nets as well as the numbers of LLINs distributed are reflected in Table 3. However the “effective” coverage of the endemic population in the country is therefore still low (5.65% and 19.99% of households have at least one ITN/LLIN in 2008 and 2011, respectively).

Table 3 Number of mosquito nets treated and LLINs distributed in Myanmar, 2003 – 2011

<table>
<thead>
<tr>
<th>Year</th>
<th>States/regions</th>
<th>Townships</th>
<th>Villages</th>
<th>Households</th>
<th>Population</th>
<th>No. of LLINs distributed</th>
<th>Impregnation of treated nets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No. of nets treated</td>
</tr>
<tr>
<td>2003</td>
<td>13</td>
<td>35</td>
<td>682</td>
<td>264 735</td>
<td>1 257 163</td>
<td>60 895</td>
<td>76 802</td>
</tr>
<tr>
<td>2004</td>
<td>12</td>
<td>50</td>
<td>1146</td>
<td>95 506</td>
<td>488 467</td>
<td>62 631</td>
<td>118 441</td>
</tr>
<tr>
<td>2005</td>
<td>12</td>
<td>46</td>
<td>393</td>
<td>310 331</td>
<td>1 165 207</td>
<td>14 295</td>
<td>208 591</td>
</tr>
<tr>
<td>2006</td>
<td>17</td>
<td>65</td>
<td>3095</td>
<td>362 142</td>
<td>1 717 810</td>
<td>0</td>
<td>453 890</td>
</tr>
<tr>
<td>2007</td>
<td>13</td>
<td>39</td>
<td>2608</td>
<td>235 353</td>
<td>1 212 684</td>
<td>127 384</td>
<td>202 630</td>
</tr>
<tr>
<td>2008</td>
<td>12</td>
<td>53</td>
<td>3827</td>
<td>431 498</td>
<td>1 337 052</td>
<td>71 605</td>
<td>374 079</td>
</tr>
<tr>
<td>2009</td>
<td>15</td>
<td>89</td>
<td>8356</td>
<td>812 419</td>
<td>4 048 480</td>
<td>213 027</td>
<td>1 115 725</td>
</tr>
<tr>
<td>2010</td>
<td>14</td>
<td>91</td>
<td>5396</td>
<td>554 843</td>
<td>2 078 154</td>
<td>329 421</td>
<td>448 843</td>
</tr>
<tr>
<td>2011</td>
<td>16</td>
<td>98</td>
<td>7685</td>
<td>738 922</td>
<td>3 449 641</td>
<td>551 107</td>
<td>1 062 723</td>
</tr>
</tbody>
</table>

Insecticide tablet contains deltamethrin 25% (1.6 gm)
Source: Vector-Borne Disease Control, Ministry of Health, 2012

In view of the existing body of evidence and the burden of malaria as a public health problem in Myanmar, rapid scale-up of the appropriate use of ITNs/LLINs is planned to be undertaken in the most malarious areas, except where there is clear evidence that ITNs/LLINs do not contribute to malaria prevention.
With reference to long-lasting insecticidal nets (LLINs) and conventional insecticide-treated nets (ITNs), there is evidence that the former is becoming cheaper (due to increasing supplies) and are more cost-effective as retreatment cost is not required. In the meantime mass treatment of existing nets with long-lasting insecticidal tablets is another option, since millions of nets already exist and mass treatment could be easily done.

### 5.1.2 Indoor residual spraying (IRS) and other vector control methods

Routine IRS was suspended since 1993 due to various reasons (such as high operational and insecticide cost, vector resistance to insecticide, community acceptability, supervision, environmental pollution, among others). Selective IRS is indicated for rapid containment during outbreaks and outbreak prevention in new settlements and development projects in malaria risk areas, high outbreak risk areas and localized areas of multiple parasite resistant *P. falciparum* malaria.

IRS is the preferred intervention to control outbreaks and to prevent them in development projects in endemic areas, certain border areas and new settlements. The number of houses/dwelling units sprayed has declined from 7932 in 2003 to 1484 in 2007 (Table 4). The continuation or withdrawal of IRS depends on local entomological and epidemiological situation.

IRS in combination with ITN/LLIN is recommended in artemisinin resistance affected areas (Ref: MARC Framework April 2011) in order to maximize protection of population at risk.

Table 4 Outputs of indoor residual spraying in Myanmar 2003 – 2007

<table>
<thead>
<tr>
<th>Year</th>
<th>State/regions</th>
<th>Townships</th>
<th>Villages</th>
<th>Camps</th>
<th>Houses &amp; structures</th>
<th>Population covered</th>
<th>DDT 75% (kg)</th>
<th>Malathion 50%EC (litre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>8</td>
<td>20</td>
<td>53</td>
<td>17</td>
<td>7932</td>
<td>44 075</td>
<td>2772</td>
<td>209</td>
</tr>
<tr>
<td>2004</td>
<td>7</td>
<td>19</td>
<td>19</td>
<td>29</td>
<td>4165</td>
<td>19 764</td>
<td>1945</td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>4</td>
<td>13</td>
<td>48</td>
<td>17</td>
<td>4934</td>
<td>32 840</td>
<td>2472</td>
<td>0</td>
</tr>
<tr>
<td>2006</td>
<td>4</td>
<td>6</td>
<td>32</td>
<td>4</td>
<td>6116</td>
<td>33 391</td>
<td>1119</td>
<td>247</td>
</tr>
<tr>
<td>2007</td>
<td>5</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>1484</td>
<td>6 536</td>
<td>245</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Vector-Borne Disease Control, Ministry of Health, 2009

Other vector control measures such as larvivorous fish and environmental management are applied in very limited areas, where experience has indicated that they are effective.

### 5.2 Malaria diagnosis and treatment

Early diagnosis and prompt effective treatment is the main intervention to reduce the duration and severity of malarial disease and prevent malaria mortality. The national malaria treatment policy which was developed in 2002 and updated in 2008 (and minor revisions made to in 2011) was based on the following principles:

(a) *P. falciparum* malaria cases should be treated with ACTs. The preferred ACT is artesunate + mefloquine. Since 2005, artemether-lumefantrine has been deployed as an alternative ACT.
(b) A single dose of primaquine is prescribed to all blood confirmed falciparum cases.
(c) *P. vivax* malaria cases should be treated with chloroquine for 3 days and primaquine for 14 days to prevent relapse. An eight-week dosage of primaquine is preferred in order to reduce the risk of intravascular haemolysis in G-6-PD deficiency patients.
(d) Malaria during pregnancy is treated with quinine + clindamycin in the first trimester, and ACTs in the second and third trimesters.
(e) Severe malaria is treated with quinine, artesunate or artemether.
(f) If confirmatory diagnosis is not available, clinically suspected malaria (CSM) should be treated with ACT in high transmission areas.
(g) Microscopy of blood-slides is the preferred diagnostic tool, but is currently available only up to the township level, though in some areas also at station hospitals as well as some RHCs.
(h) RDT (HRP2-based) for detection of falciparum malaria should be used, where microscopy is not available.
(i) Given financial and operational constraints, the priority is to deploy RDTs and ACTs in townships with the highest malaria burden.
(j) Diagnosis and treatment of malaria is free in the public sector.

5.3 **Resistance to antimalarial medicines**

Myanmar National Malaria Control Programme (NMCP) was one of the earliest to adopt ACTs for the treatment of *P. falciparum* malaria. In 2002, the country adopted a three day regimen of artesunate-mefloquine countrywide, with artemether-lumefantrine as an alternative. Due to the operational difficulties associated with the non-fixed dose combination of artesunate-mefloquine, in 2005, artemether-lumefantrine began to be used, and from then onwards, it became widely used in the public sector as the first-line medicine. Whilst the efficacy of these ACTs still remain high, in 2009, early evidence of artemisinin-resistance was detected in two locations within the country - in the Bago gold panning region and in the state of Tanintharyi in the deep south of the country, bordering Thailand on its east.

In the very recent past, resistance of *P. falciparum* to artemisinin as defined by the persistence of parasites in the patient on day 3 of treatment with an ACT was detected in western Cambodia and adjacent bordering provinces of Thailand. This raised an alarm worldwide, but particularly in neighbouring countries in the Greater Mekong Region because there are, as of now, no suitable alternatives to the life-saving artemisinin compounds for the treatment of potentially fatal *P. falciparum* malaria, the loss of which, therefore, predicts catastrophic consequences for endemic countries. In 2009 artemisinin resistance was also confirmed in two locations in Myanmar - the Bago gold panning area and in Tanintharyi (Map 5), placing the country in a far more vulnerable situation with respect to malaria, and charging it with the responsibility of arresting the emergence and further spread of resistant parasites.
5.3.1 Myanmar artemisinin resistant containment (MARC) strategy

This led to the formulation of a highly strategic action plan within a project titled Myanmar Artemisinin-Resistance Containment (2011 – 2015) based on the principles outlined by the GPARC, and financially supported by a consortium of donors. Implementation of this plan began in July 2011.

The overarching goal of MARC is to build on and strengthen existing control efforts to prevent, or at the minimum, significantly delay the spread of artemisinin resistant parasites within and without the country, and to reduce transmission, morbidity, and mortality of Plasmodium falciparum malaria, with priority to areas threatened by artemisinin resistance. It encompasses the following seven specific objectives:

1. improving access to and use of early diagnosis and quality treatment according to the national treatment guidelines;
(2) to decrease drug pressure for selection of artemisinin resistant malaria parasites by stopping the use of artesunate mono-therapies and sub-standard/fake drugs;
(3) to limit the transmission of malaria by mosquito control and personal protection;
(4) to increase migrant/mobile populations’ access to and use of malaria diagnosis, treatment and vector control measures including personal protection;
(5) to support containment of artemisinin resistant parasites through advocacy and BCC/IEC;
(6) to conduct studies and do operational research to support the development of evidence-based containment policies and strategies;
(7) to provide effective management and coordination to enable rapid and high quality implementation of the containment strategy.

Based on available data and results from in vivo therapeutic efficacy studies on ACTs, in 2011, the country was zonated into three geographical tiers for MARC activities as follows:

**Figure 4: Zonation according to ACT efficacy studies, Myanmar 2011**

<table>
<thead>
<tr>
<th>Tier</th>
<th>Definition</th>
<th>State/Region</th>
<th>Townships</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Areas with credible evidence of artemisinin resistance</td>
<td>Tanintharyi</td>
<td>all 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mon</td>
<td>all 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bago East</td>
<td>Shwegen</td>
</tr>
<tr>
<td>II</td>
<td>Areas with significant inflows of mobile populations from Tier I areas, including those immediately bordering Tier I</td>
<td>Kayin</td>
<td>All 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kayah</td>
<td>all 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bago East</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kachin</td>
<td>4</td>
</tr>
<tr>
<td>III</td>
<td>Areas with no evidence of artemisinin resistance and limited contact with Tier I areas</td>
<td>Rest of the country</td>
<td></td>
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</tbody>
</table>

### 5.4 Behaviour change communications, and social mobilization

One of the main strategies for malaria control programme in Myanmar is IEC. It aims to educate and raise the awareness of the target population for the malaria prevention and control. Advocacy is also an important part of IEC to mobilize support for malaria prevention and control programme.

In 2007, WHO, in collaboration with VBDC and in consultation with agencies working in malaria control, developed a “Communication and Social Mobilization for Malaria Prevention and Control in Myanmar”. It serves as the framework for behaviour change communication (BCC) activities since then. Moreover, WHO hired BCC consultants (national and international) to support partners in BCC training and in designing their BCC strategy and materials.
Key findings of the external programme evaluation

6. Malaria control programme management, policy and strategy

6.1 Organizational structure and staffing pattern

The NMCP, positioned within the National Vector-Borne Diseases Programme, is responsible for policy and strategy development and programme evaluation. The central office of VBDC is now located in the new capital city, Nay Pyi Taw, having moved from Yangon in late 2005. The organizational structure of the central VBDC is presented in Figure 5. It is staffed with a range of technical competencies and expertise. The VBDC has, in addition, a presence in all states/regions of the country. Historically, NMCP has been a strong and very important part of the public health services of the country; it has a robust infrastructure, a sound performance track record, and permeates all parts of the country.

Figure 5: Organogram of Central VBDC, 2012

Source: National Strategic Plan 2011 – 2015 (revised 2012) VBDC
Although malaria control operations are integrated into the general health services at the state/regional level, the NMCP does have a cadre of staff at that level tasked with the responsibility of technical guidance on policies and strategies, and it complements the state and district health system staff in the implementation of control and prevention of malaria (and other vector-borne diseases). At the township and village levels, malaria services are delivered by highly motivated township level staff referred to as basic health staff (MWs, LHWs, VHVs). The NMCP is partnered by several NGOs - international and local, in scaling up malaria control interventions in endemic townships (see Sections 9.2, 12 and 14). The activities of these implementation partners have contributed significantly to the rapid scale up of antimalarial services in the areas in which they operate. However, a very large part of the service delivery for malaria control operations are being carried out by the public sector health services with support from WHO, UNICEF, JICA, 3DF and other donors, in which the health manpower and facilities have been greatly enhanced over the past six years (Table 5), in particular, the service delivery sector at the community level (Figure 6).

### Table 5: Health manpower and health facility development, Myanmar, 2007 – 2012

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<tbody>
<tr>
<td>Heath supervisors (2)</td>
<td>1 444</td>
<td>1 484</td>
<td>1 645</td>
<td>2 080</td>
<td>1 718</td>
</tr>
<tr>
<td>Health supervisors (1)</td>
<td>529</td>
<td>529</td>
<td>529</td>
<td>541</td>
<td>612</td>
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<tr>
<td>Midwives</td>
<td>18 098</td>
<td>18 543</td>
<td>19 051</td>
<td>19 556</td>
<td>20 044</td>
</tr>
<tr>
<td>Lady health visitors</td>
<td>3 197</td>
<td>3 238</td>
<td>3 278</td>
<td>3 344</td>
<td>3 371</td>
</tr>
<tr>
<td>Nurses</td>
<td>22 027</td>
<td>22 885</td>
<td>24 242</td>
<td>25 644</td>
<td>26 928</td>
</tr>
<tr>
<td>Doctors (public)</td>
<td>7 976</td>
<td>9 583</td>
<td>9 728</td>
<td>10 927</td>
<td>11 460</td>
</tr>
<tr>
<td>Rural health centres</td>
<td>1 473</td>
<td>1 478</td>
<td>1 504</td>
<td>1 558</td>
<td>1 565</td>
</tr>
<tr>
<td>Hospital beds (public sector)</td>
<td>36 949</td>
<td>38 249</td>
<td>39 060</td>
<td>43 789</td>
<td>54 503</td>
</tr>
<tr>
<td>Hospitals (public sector)</td>
<td>839</td>
<td>846</td>
<td>871</td>
<td>924</td>
<td>987</td>
</tr>
</tbody>
</table>

Source: Ministry of Health, Myanmar: Health in Myanmar, 2012
6.2 Strengths and challenges

- The technical policies and strategies adopted for malaria control are sound, consistent with WHO recommendations, and up-to-date. However, the national strategic plan drafted in 2007 and updated in 2010 continues to remain an unpublished draft.

- The programme structure of NMCP comprising the central and state/regional levels, and the current posts and staff cadres are appropriate and adequate to mount an effective response to the malaria situation in the country, provided all cadre positions are filled and the structure functions optimally.

- However, NMCP at all levels has, over the years suffered from a continuing reduction in manpower. This is due largely to the following factors:
  - A failure to replace posts vacated by retired malaria staff (a policy of freeze-hiring) has resulted in some of the existing staff being heavily overburdened. At the state/regional level, many critical NMCP positions are vacant - the regional level is also under-staffed and under-resourced.
  - Increasingly, there are limited financial resources within the programme, which has led to weakened facilities – leading to demotivating competent staff, and poor support for field operations. As a result, NMCP is operating below its potential and is unable to respond optimally to the needs of malaria control.
  - States/regions being geographically large spanning vast areas, the few NMCP staff and limited financial resources are quite inadequate to support operations on the ground, and to deal with emerging issues.
The recent move of the central VBDC offices from Yangon to the new capital city has led to the loss of some critical components of its space, including laboratory and insectary space, as well as of some essential equipment. It will take time for VBDC to restore its physical infrastructure in its new location unless it is made a priority.

Lack of direct support to government from donors and minimal support from the Government to NMCP has weakened managerial and technical capacity at the central and state/regional levels over successive years.

In contrast, malaria service delivery at the township level being affected through the general health services has been greatly strengthened over the past six years – mainly at the RHC, SC, and VHV levels. The extensive network of basic health staff from township to village level, including in hard-to-reach interior and border areas has been effectively deployed to deliver health services for malaria, resulting in well-functioning service delivery for malaria in villages in most parts of the country.

In the context of an integrated health service, the township medical officers are responsible for all public health services including malaria, but their efforts are largely focused on hospital administration and curative service, with relatively little attention being paid to disease prevention and control programmes. As a result, there is not sufficient coordination of the activities of multiple implementing partners (local NGOs and INGOs) and the public sector operations at the township and district levels.

In the prevailing mosaic of implementing partners conducting malaria control operations in different parts of the country to complement the activities of the NMCP, geographical areas of work have been demarcated to avoid overlap, but there is still no single national operational plan, taking into consideration all the various implementing partners and the national programme.

6.3 Recommendations

(1) Direct financial investments in the public sector system for malaria control should be increased substantially. This is an urgent need, considering that the future of malaria control in the country, both in the medium and long-term, lies heavily in the hands of NMCP, and its success will depend very much on a strong national programme.

(2) It must be ensured that all the cadre positions of NMCP at central and state/region levels are filled immediately to ensure optimal functioning of the programme.

(3) A revised national strategic plan, and an operational plan at central, state/regional and township levels for malaria control, to include all implementing partners should be prepared and published.

(4) It must be ensured that, in the context of an integrated health system, the township medical officers focus more effort on, and increase their support to, public health programmes such as malaria.
7. Epidemiology, epidemic preparedness and response, surveillance, monitoring and evaluation

7.1 Epidemiology

Malaria epidemiology in Myanmar presents some unique features:

- Two thirds of the total population live in malaria endemic areas – 16 million in high-risk areas, 14 million in moderate-risk areas and 11 million in low-risk areas; (see Table 2 for percentages).
- All states/regions and 284 out of 330 townships are endemic for malaria.
- Forest, mining and plantation-related occupations and migration for labour are the major risk factors.

There are two major species of Plasmodium; *P. falciparum* and *P. vivax* with occasional reports of *P. malariae*, *P. ovale* and even rare zoonotic infections of *P. knowlesi*. The proportions of *P. falciparum* co-infections have fallen slightly from being nearly 80% in 2001 to just over 60% in 2011. The number of reported cases of clinically suspected malaria (CSM) in 2007 was 503,449. The annual incidence rate of reported cases of suspected malaria has fallen steadily since 1990, with a small upsurge from 1999 to 2003 (Figure 7).

![Figure 7: Annual malaria morbidity and mortality rates in Myanmar 1990 – 2010](image)

Source: Vector-Borne Disease Control, Ministry of Health, 2011

The total number of hospital inpatients recorded as malaria steadily declined, 103,031 in 1999, 62,073 in 2005, and 43,602 in 2010 and further dropped to 34,043 in 2011. There is a corresponding fall reported for the proportion of inpatients with malaria. During this period, the number of hospitals providing inpatient facilities in the public sector increased. However, the data is based on clinically suspected malaria and diagnostic rigour may have
increased. Taking all potential confounders into consideration, the decline in hospitalized cases provides strong evidence that the national level malaria burden has decreased.

Reported malaria deaths peaked in 1991 (>5000) and then fell steadily; 3744 deaths were reported for 1995, 1261 for 2007 and 788 for 2010. The reported number of deaths was the lowest ever recorded (581) in 2011.

7.1.1 Malaria distribution in men, women, pregnancy and children

Overall, analysis of the age distribution of reported cases indicates a modest over-representation of young adults among reported malaria cases (Figure 8). 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 malaria database in 2011 indicated that males accounted for some 65% of the total blood confirmed malaria infections.

The predominance of adult males among malaria cases is a reflection of the high risk of malaria; among them due to occupations (mining and forest-related activities such as slash-and-burn farming, construction and rubber tapping) that exposes them to malaria.

Figure 8: Age distribution of malaria cases in Myanmar, 2001 – 2011

Source: Vector-Borne Disease Control, Ministry of Health, 2012

7.1.2 Malaria in pregnancy

A review of 17 studies on malaria during pregnancy in Myanmar 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 (Mya Thida, 2002). Wide variations
in the prevalence of malaria parasitaemia in women attending antenatal care services were reported, ranging from 3% in the Tanintharyi Region to 37% along the Thai–Myanmar border, where the majority of the women were asymptomatic and infected with *P. falciparum*. The high level of parasite resistance to sulphadoxine-pyrimethamine in this area precludes the use of intermittent preventive treatment.

### 7.1.3 Seasonality

There is a typical seasonal trend in the malaria incidence, with malaria cases being higher in the monsoon and post-monsoon season, from June to December (Figure 9)

![Figure 9: Seasonal trend of malaria incidence, Myanmar, 2009](image)

Source: Dept. of Health, NMCP Myanmar, 2012

### 7.1.4 Malaria outbreaks, epidemic preparedness and response

The causes of malaria outbreaks in Myanmar are usually multi-factorial, but population migration is recorded as the most frequent cause. They may erupt when malaria is introduced by migrant workers (such as gold miners in Mandalay), while in other areas, non-immune migrants may develop outbreak of malaria while moving to endemic areas (such as rubber and plantation in Tanintharyi or prawn farms in Rakhine)). An analysis of recorded outbreaks is provided in the National Strategic Plan, Malaria Prevention and Control, 2010 – 2015.

Annually, several outbreaks of malaria are reported in the country (Figure 10). The trend in the number of villages and townships affected seems to be declining. Malaria epidemics in Myanmar are commonly associated with two major factors: one, the massive and sudden influx of non-immune populations into malaria endemic areas, and two, a sudden increase in the number of malaria breeding sites. Historically, malaria outbreaks were reported and investigated in new settlements as a result of dam and road constructions. Currently,
movement of people from urban to rural and border areas due to various occupational
opportunities in the forest also contribute to a larger pool of non-immune people living
side-by-side with immune population in areas where malaria mosquitoes are in abundance.
Changes in ecology related to changes from dry to wet plantation, single crops to double or
multiple crops plantation, mining for gems and gold, and prawn farming increase the breeding
sources of malaria mosquitoes. (Six-Year Achievement Report, NMPC, draft, July 2012)

There is little clarity on how and when to report an unusual increase of suspected
malaria cases/fevers from the community (from rural health centres), in spite of guidelines
for surveillance and response to epidemics being available at the national level. The review
found that these guidelines were not available at the township/rural health centre levels.

Figure 10: Number of malaria epidemics in Myanmar, 2001 – 2011

Source: Vector-Borne Disease Control, Ministry of Health, 2012

7.2 Surveillance system, burden of disease and impact of interventions

There is a robust HMIS routinely reporting core malaria programme indicators, and a NMCP
reporting system, which operates in parallel and collects additional specific programme
indicators. There is excellent data recording at the peripheral level by basic health staff such
as midwives and VHVs using standard data recording forms. The routine reporting systems,
however, do not yet include case data from NGOs and the private sector, which makes it
incomplete. Efforts are underway from earlier this year to collect and include data from NGOs
and the private sector in the routine reporting system and these should be closely monitored.

The countrywide malaria incidence rate and mortality rate based on routine reporting
by the NMCP show a declining trend since 1999 (see Figure 7). However for several obvious
reasons, the morbidity (incidence) trends-based reported figures cannot be taken at face
value to make inferences on changes, if any, that have taken place in malaria transmission
in the country. First, as stated above, it is widely accepted that reporting of both cases and deaths from the national system is incomplete because it does not capture data from the private sector, nor does it include unconfirmed malaria cases, and therefore, a proportion of true malaria cases would not have been reported for lack of a confirmed diagnosis. Secondly, nationally aggregated data will not adequately capture focal changes in transmission that may have taken place. Thirdly, and most importantly, the methods used in the detection of cases have undergone a series of significant changes over time.

There have been many improvements in case detection over the past six years. Prior to 2005, patients had limited access to health care, few patients were confirmed as malaria, and several clinically suspected patients were treated and recorded as malaria. This has since changed markedly, with now, vastly increased numbers of patients being screened for malaria by rapid diagnostic tests (RDTs), and therefore many more being detected, confirmed and reported as malaria. This change in conditions for measuring malaria cases over the past 6 – 7 years makes it difficult to directly compare the reported case incidence rates over different periods of time for the purpose of assessing the impact of interventions. However, a more discerning analysis of data below indicates that in many parts of the country, malaria incidence has decreased significantly. Furthermore, the routine NMCP-reported data on malaria mortality from in-patient health facilities shows a rapid decline in the number of malaria deaths between 2006 (~1500 deaths) and 2011 (718 deaths). Although, as is widely acknowledged that the reported deaths may be an underestimate of the actual numbers, the death reporting system itself has remained unchanged over the years, and therefore, reported deaths are likely to represent the actual trend.

The reported case fatality rate has declined by nearly 50% from 3.23% in 1999 to 1.66% reflecting, if this were the true trend, the impact of scaling up early diagnosis and treatment services. (Figures 11 and 12). Sources of data are in-patient malaria cases (serious hospitalized malaria).

**Figure 11: Case fatality rate of *P. falciparum* malaria, 2001 – 2011**

![Case fatality rate chart](source: Dept. of Health, NMCP 2012)
The following is evidence of a declining trend of case incidence. Routine data from most states/regions (with the exception of Kachin, Tanintharyi and Kayah) show a consistent trend between 2001 and 2011 of a declining proportion of malaria among those tested, leading to a 45% reduction in the proportion of malaria patients among those tested for malaria over this period. In 2011, malaria accounted for 6.4% of those tested. This is despite a gradual increase in the number of patients attending the health facilities (OPD and IPD) (Figure 13) and increasing numbers being tested for malaria by RDTs – i.e. against a backdrop of improving health services.

Data from 135 townships (where high intervention coverage was achieved between 2007 and 2011, and 100% of fever cases attending a VHV post were tested for malaria and reported) (Source: Save the Children, 2012) indicated that, for the period 2007 – 2011, the slide positivity rate (SPR) for malaria has decreased across all sites from an average of 41% (269,810 confirmed cases) to 24% (102,056 confirmed cases), this too has been achieved amidst improving access to diagnosis and treatment. The SPR for *P. falciparum* dropped from 24% (158,963) to 13% (53,840) and for *P. vivax* from 17% (110,847) to 11% (48,216). In these 135 townships, the ratio of *P. falciparum*/*P. vivax* changed from 80/20 in 2007 to 60/40 in 2011.

In Rakhine state, which still reports one of the highest malaria incidence rates in the country, prior to 2005, there was very limited intervention coverage, and a sustained high reported malaria incidence, but starting in 2006, it saw a massive increase of LLIN / ITN coverage (from less than 100,000 distributed in 2005 to more than 400,000 every year in 2009, 2010 and 2011) and high coverage with early diagnosis and treatment. Between 2006
and 2011, the state malaria data show a 50% reduction of morbidity and 75% reduction of mortality due to malaria, and a decline in total malaria positive rate by 35%. There was also a change in the P. falciparum/P. vivax ratio from 72%:28% in 2006 to 59%:41 % in 2011 (Figure 14) - all of which point to a decrease in malaria transmission.

Figure 13: Yearly trend of TPA and malaria cases in OPD 2001-2011

Figure 14: Malaria trend and interventions in Rakhine state

Source: Dept. of Health, NMCP Myanmar, 2012. (TPA – total patient admissions)
VBDC, with support from UNICEF, JICA and WHO have, over the past two years developed a basis for microstratification of villages for malaria risk, using simple and available ecological, social and epidemiological indicators to classify an area or village as malarious, potentially malarious (i.e. areas receptive to malaria transmission) and non-malarious. The malarious areas are then further sub-classified as high, moderate or low risk. Using this approach, microstratification has been completed in 130 townships, is ongoing in 50 and being planned for the remaining townships.

### 7.3 Monitoring and evaluation

There are annual NMCP meetings at the central level, focused on administrative aspects and technical progress. An annual progress report on malaria control is not being published. At the state/region level, six-monthly meetings are held with township medical offices, which include programmatic aspects of NMCP. At the township level, rural health centres bring monthly reports/forms (both HMIS and NMCP) and their completeness and timelines are monitored. The regional malariologists make supervisory visits; however, the review team did not find any plans/checklists/records of such visits.

### 7.4 Recommendations

1. A national malaria database linked to a spatial map should be constructed, based on routine surveillance data from all NGOs and the private sector, survey data, and complete microstratification data. The database should be regularly updated and used for operational planning at the central, state/regional and township levels.

2. Malaria programme monitoring, data analysis and feedback at the regional/state level should be strengthened, with a focus on completeness, timeliness, quality of the reports and feedback to townships. In this context, the regional epidemiologist could play an important role in coordination and in the technical aspects of malaria control in the region, together with the NMCP team.

3. Guidelines on epidemic preparedness and response should be updated, including immediate reporting of an increase of unusual events in the community such as fever cases, and distribute to all service providers.

4. Standard methodology on data quality assessment in NMCP data quality monitoring should be regularly used.

5. Analysis and utilization of data, and strengthening surveillance system is required. This should be supported by focused cross-sectional parasite prevalence surveys linked to human behaviour studies to enable better understanding about where, when and how much transmission is occurring, and who are most at risk.

6. The case reporting system should be extended to record the possible place of the origin of the infection in the standard malaria case register (last column under “remarks”). This, and not just the household address of the patient which is currently recorded, will indicate where transmission is occurring. This information will be helpful for planning malaria control at the local level.

7. A national malaria survey inventory should be created and survey results made available.
Collaboration with the national immunization programme to help track some migratory populations and for integrated delivery of interventions as appropriate should be considered.

8. Entomology and vector control

8.1 Situation analysis

In Myanmar, malaria is transmitted by multiple species, both indoors and outdoors, in a wide variety of habitats and ecological zones. The most recent comprehensive review of Anopheles in the Asia–Pacific region (Sinka et al 2011) maps the distribution of the 19 dominant vector species in the region. Eleven of these are widely distributed in Myanmar, and of the 11 species, seven are species complexes. While we have some knowledge of the diversity of larval habitats and adult behaviour of these species, much remains unknown. Indeed, few studies have differentiated the many species complexes that occur in Myanmar, including Anopheles minimus, An. dirus, An. sundaicus, An. barbirostris, and others.

Variation in the mosquito fauna is matched by great diversity in human behaviour and culture in the country. Many ethnic groups traditionally live in the forest, making their living via trade and agriculture, while others have migrated to the forest for logging, mining, or to work on palm oil or rubber plantations. The combination of high mosquito diversity coupled with a mobile human population living in multiple ecological zones results in a remarkably complex and poorly understood pattern of malaria transmission.

At present, the NMCP makes the reasonable simplifying assumption that much transmission occurs in forests, with the principal vectors the An. dirus and An. minimus species complexes. This assumption is the basis for the Myanmar’s microstratification plan, which ranks endemicity according to distance from the forest and distance from the nearest health centre. A more refined and accurate stratification of malaria risk will require additional information on the interaction of mosquito and human behaviour coupled with systematically collected information on the probable location of malaria transmission gleaned from interviews with malaria patients. Updating and improving the microstratification plan will require more complete information on vectors and their interaction with humans.

Present data on the effectiveness of transmission reducing strategies in Myanmar are mixed. The NMCP officially adopted and have implemented the use of ITNs/LLINs since 2003, but it was only in the past two years that it rapidly scaled up their distribution and use. Incidentally, treatment with either chloroquine or sulfadoxine-pyrimethamine was changed to an ACT in 2002. It is likely that reliance on LLIN distribution alone will have variable impact on transmission, according to the habits of mosquitoes and humans. It is unlikely that resistance to insecticides has evolved, as recent survey data from the NMCP show high sensitivity to the pyrethroid insecticides used on ITNs and LLINs.

Myanmar must find ways to effectively and broadly reduce malaria incidence through prevention of transmission for its malaria control programme to succeed. Such reduction is also essential if Myanmar is to play its part in efforts to contain the spread of artemisinin resistance. The lower the level of transmission, the fewer the drugs that will be used for treatment; and the less the drug is used, the less likely it is that parasites will evolve resistance. This fundamental biological fact underlines the necessity for Myanmar to better understand patterns and malaria transmission in different regions and ecological zones of the country.
8.2 Strengths

- Myanmar has strong entomology staff in two locations: the central VBDC located in Nay Pyi Taw and the departments of medical research (DMR) in Yangon (lower Myanmar) and in Nay Pyi Taw (central Myanmar). Staff at these institutions is skilled and dedicated. The DMR in lower Myanmar is well equipped and carries out high quality research. The staff at the central VBDC are excellent field entomologists and carry out high quality surveys. At state/regional level, the limited staff that exist are skilled in field entomology.

- JICA has effectively supported the entomology programme in Myanmar for the past eight years, with support for field surveys and through some training, though the last broad and comprehensive training occurred in 2004. Since then, some staff members have been trained in India with support from WHO.

8.3 Challenges

- With the move to Nay Pyi Taw, central VBDC staff lost access to their insectary and laboratory. The equipment available in the NMCP offices in Nay Pyi Taw is limited, with only one microscope available for identification of specimens. Without the means to detect sporozoites in mosquitoes via either dissection or ELISA, the results of surveys to incriminate vectors will remain questionable. In addition, as most of the anopheles transmitting malaria in Myanmar are members of species complexes (with morphologically identical species possibly exhibiting different adult behaviour or colonizing different larval habitats) that can be differentiated only via molecular methods, the identity of the mosquito species transmitting malaria in Myanmar remains in doubt. Clearly, basic knowledge on the identity of the mosquitoes transmitting malaria in Myanmar is fundamental to the design of effective transmission reduction measures.

- At regional/state level, entomological capacity is weak, with lack of trained staff and insufficient equipment. The regional/state entomologists that do exist require additional support from central level staff.

- As is common in many country programmes, entomologists may lack the skills in epidemiology that allow them to fully participate as members of the malaria control team. In consequence, entomologists may be viewed as mere mosquito collectors with very specialized technical skills. In fact, an entomologist well-trained in epidemiology and malariology can contribute significantly to the success of a national malaria control programme.

- The rapid scale-up in treatment of conventional nets with insecticide and distribution of LLINs by multiple partners has resulted in a mosaic of data on ITN coverage and needed retreatment (in the case of conventional nets) and replacement (in the case of LLINs) that is fragmented and unsystematic. No system to monitor insecticide persistence on LLINs exists.

- Myanmar’s transmission reduction programme relies almost entirely on ITNs. Other methods, especially IRS and larval control through environmental management are rarely used. Further, methods to address the significant problem of outdoor transmission in forests are lacking.

- Operational research on transmission reduction depends upon effective partnership amongst the NMCP, the DMR, universities, and foreign partners. The
NMCP’s relationship with the DMR is not yet sufficiently intimate. Potential links with regional researchers in Thailand and Indonesia remain largely unexploited, as are a broad range of potentially useful more distant foreign partners.

8.4 Recommendations

(1) The core entomological capacity of the NCMP control programme should be strengthened through the following specific actions:

- Ensure that each state/region is staffed by trained and equipped staff consisting of two each of entomologists, assistant entomologists, and insect collectors. Equipment should consist of, at the minimum, two good microscopes for mosquito identification and equipment for mosquito collection.

- It must be ensured that central level staff have these needed facilities: laboratory space, an insectary, four good microscopes for mosquito identification, equipment for mosquito collection, and equipment for detection of sporozoites in mosquitoes via ELISA.

- All entomological staff, at central and state/regional levels, should have core capacity in epidemiology. They should be fully functional members of units who focus on reduction of malaria transmission.

(2) Operational research on relevant vector control problems should be strengthened through enhanced collaboration with the DMR, universities, the military health system, countries in the region facing similar problems, and other international partners. Such research should include the participation of the VBDC, but it may be led by one of its partners. This research should include:

- Surveys coupled to parasite surveys and human behaviour, in specific ecological zones and each state/region. The mosquito surveys should be backed up by partners with capability for polymerase chain reaction (PCR) and DNA sequencing to definitively identify the vector species involved.

- Research on personal protection measures suitable for migrants, forest workers, and miners to reduce outdoor transmission of malaria.

(3) Core functions of transmission reduction group at the NMCP should include:

1. Participation in the design and interpretation of surveys and operational research, as above, and participation in such activities if time allows.
2. Monitoring the durability of ITNs and LLINs in a systematic manner.
3. Monitoring insecticide resistance in major vectors every two years.
4. Developing capacity of state/regional entomology teams in their basic functions, which include mosquito collection and identification, IRS, environmental management, and bed-net retreatment.

(4) IRS capacity should be established within each state/regional entomology services for response to epidemics and outbreaks.

(5) Systematic studies on bionomics of malaria vectors should be conducted. As knowledge and mapping of vectors increases, measures to control larvae through environmental management, as appropriate should be begun.
9. Diagnosis and treatment

9.1 Current policies and strategies

During the past six years, the NMCP has updated its policies and strategies on diagnosis and treatment in conformity with WHO recommendations, and in responding to the needs of malaria control. Although RDTs were adopted as a diagnostic test as a supplementary tool to microscopy as early as in 2002, it was in 2005 and 2006 that their use was scaled – using, first, monovalent RDTs for *P. falciparum*, and more recently changing to a bivalent RDT which detects both *P. falciparum* and *P. vivax* (as well as *P. ovale*, and *P. malariae*). In contrast to the increasing availability of RDTs and hence the overall improved access to diagnostic services, especially at the village level, microscopy services have deteriorated over the past few years. Although as stated in the national policy, the preferred diagnostic tool is microscopy of blood films, and is meant to be available down to the township and even the rural health centre level, functional microscopy services are available only in a minority of places. In 2006, 700 microscopes were distributed up to the RHC level, but importantly, many microscopist posts are vacant. In the past, when monovalent RDTs were being used, this would have resulted in under-diagnosis of *P. vivax* malaria, but this has now been compensated for, with the switch to bivalent RDTs.

In 2002 Myanmar moved away from a treatment policy based on monotherapies for the treatment of *P. falciparum* malaria to adopting an ACT – artesunate plus mefloquine on the basis of therapeutic efficacy testing. In 2005, another ACT recommended by WHO, artemether-lumefantrine was introduced as alternative first-line medicine. In 2008, dihydroartemisinin-piperaquine was adopted as an additional first-line medicine option. At present there are, thus three alternative first-line ACTs for the treatment of *P. falciparum* malaria. A single dose of primaquine (0.75 mg/kg), adult dose of 45 mg) is added to the ACT as a gametocytocide in the treatment of *P. falciparum*. Treatment of *P. vivax* is with chloroquine and primaquine, the latter as an anti-relapse medication (although testing for G6PD deficiency is not being done). Although parenteral artesunate was adopted as first choice for treatment of severe malaria, in practice, treatment is either parenteral quinine, artesunate or artemether. Pre-referral treatment for severe malaria is not being widely used.

In terms of strategies for delivering timely diagnosis and treatment, the country has adopted and implemented a service delivery system, which is integrated into the general health services, and covers all 330 townships. This diagnosis and treatment service spans all levels of the health care system from the tertiary hospitals down to the community level. It utilizes an extensive countrywide network of township and station hospitals, rural health centres and sub-centres run by basic health staff such as health assistants, midwives and village health workers (volunteers) who have, in the past six years, been trained in the use of rapid diagnostic tests and to dispense medicines for malaria on the basis of a species-diagnosis. To date, NMCP and its implementing partners that included national and INGOS have trained 6100 VHVs. Diagnosis and treatment for malaria is provided free-of-charge in the public sector. Thus, current policies and strategies are consistent with WHO recommendations, and are up-to-date.
9.2 Implementation of policies and strategies on diagnosis and treatment

Implementation within the public sector:

The review found the current coverage of diagnosis and treatment services to be extensive, in most parts of the country, reaching people at risk close to their homes at the village level. This is the result of a major scale-up effort over the past six years which included the following: a) training of medical officers, basic health staff and VHV's in malaria diagnosis and treatment, b) establishing a supply chain management system to ensure that commodities (RDT's and medicines) are available at all health institutions- hospitals and clinics, and with VHV's, c) establishing a quality assessment and control system for services and commodities. Prior to these scale-up efforts, access to treatment was much more limited, and as a consequence, detection of malaria cases was low and treatment delayed and often based on a clinical diagnosis. Now, service delivery at the peripheral level by basic health staff and VHV's is very effective; they were found by the evaluation team to be highly motivated, very committed and competent.

Implementation through partnerships:

Several local and international NGOs and faith-based organization (FBOs) have played a significant role in delivering services for diagnosis and treatment of malaria, thus supplementing the implementation of programmes within the MoH. These implementing partners include MMA, Myanmar Council of Churches (MCC), Myanmar Health Assistants Association (MHAA), Community Development Association (CDA), PSI, Cooperazione e Sviluppo (CESVI), Save the Children, MSF (Holland), MSF (Switzerland), MERLIN, World Vision, World Concern, and many of them were and are recipients or sub-recipients of the 3DF (2006 – 2011) and the GFATM Round 9 grant (2011 onwards). They operate in specific sites and locations designated by the Government of Myanmar. Most of them have established their own malaria diagnosis and treatment centres in endemic areas, staffed by VHV's (and in some by medical officers, health assistants and laboratory technicians), and trained by them in accordance with national policies. MMA which has a membership of about 16 000 registered medical practitioners in the country, plays an active role in engaging private general practitioners, currently in 12 highly endemic states/regions of the country, and providing them with continuing medical education to ensure adherence to standard clinical practices in the diagnosis and treatment of malaria. MMA operates a programme on the quality diagnosis and standard treatment of malaria (QDSTM). In 2006, with GFATM Round 3 funding, they trained 50 quality general practitioners (QGPs) in 11 townships and continued in 2007 with bridge funding from the 3DF. As at June 2012, the programme had 237 participating QGPs in 62 townships and had trained 81 village health workers. MMA also conducts seminars on malaria diagnosis and treatment for most of their members with support from WHO. The programme has suffered from uneven funding.

Important partners who have provided critical technical and operational support to NMCP for malaria diagnosis and treatment services and helped to build capacity over the years are the UN agencies – WHO and UNICEF, and JICA as a bilateral donor agency. UNOPS served as the fund manager of the 3DF from 2006 to 2011 and as a principal recipient of the GFATM award from 2011 onwards and works on development and operational aspects of malaria control as well as through its sub-recipients.
Despite some impressive achievements in scaling up diagnosis and treatment services from 2006 onwards, there are still some important gaps in implementation yet to be filled. These include service provision to 1) some of the most high-risk population groups who inhabit remote, rural and hard-to-reach areas of the country including forested areas and international borders where movement of migrant labour is rampant, where service delivery is more challenging and 2) people who seek treatment in the private sector where regulation of the quality of care and commodities – medicines in particular – is extremely important, but difficult. Some positive developments in this context have been a) that the greatly improved public sector service provision for diagnosis and treatment has significantly reduced the numbers that seek treatment from an unregulated private sector, and b) increasing engagement by the NMCP and its NGO implementing partners of commercial and plantation sectors such as palm oil plantations, rubber plantations, prawn farms, and gold and gem-mining companies whose employees constitute high risk groups through the provision of technical assistance, and quality control of their medical services. Some private medical practitioners have also been engaged in malaria control efforts by the NMCP and its partners - MMA and PSI, through refresher training programmes, and in some instances, engaging them in a franchise for high quality service provision.

9.3 Containment of artemisinin-resistance

With the aim of arresting the emergence and further spread of artemisinin-resistance, a highly strategic action plan was formulated in the context of a Myanmar Artemisinin-Resistance Containment (MARC) Project (2011 – 2015). This was based on the principles outlined by the Global Plan on Artemisinin Resistance Containment (GPARC), and financially supported by a consortium of donors.

Implementation of the MARC project commenced in July 2011. Although a detailed evaluation of the MARC project was not the focus of this review, it made the following observations pertaining to achievements and challenges within the scope of MARC:

- In general, the implementation of all malaria control measures has been enhanced in Tier 1. All its villages in Tier I townships have been micro-stratified.
- LLIN and ITN coverage is high, approaching 100% in most of the Tier I townships.
- Service provision for diagnosis and treatment is also good, with all villages being provided with RHCs and sub-centres adequately staffed and provided with an uninterrupted commodity supply.
- Case surveillance has been enhanced and mobile migrant populations have been mapped in collaboration with partners – DMR and International Organization for Migration (IOM).
- Therapeutic efficacy studies (TES) are being conducted as planned by DMR Lower and Upper Myanmar.
- IEC/BCC and baseline surveys on behaviour have been conducted and measures initiated by NMCP’s partners, MMA and PSI, to improve treatment practices in the private sector, although coverage is still quite limited.
- Active engagement of the private corporate sector has also been accomplished for the provision of quality services for its employees at risk of malaria.
Although it may be too early to expect an impact of these measures on transmission reduction in these MARC areas, there are still foci of persistently high transmission, particularly among forest workers. This is of grave concern, and needs to be the current focus of attention of MARC.

Steps are being taken to introduce regulation to stop the registration and sale of artemisinin monotherapies in the country. The international NGO PSI has, in collaboration with NMCP, initiated an Artemisinin Monotherapy Replacement Project (AMTR), the first stakeholder meeting for which was held in Yangon while this review was being conducted. The Myanmar FDA has revoked the registration of artesunate single-product with effect from December 2012, and is in the process of considering a review of artemether single-product. AA Pharmacy, the largest market-sharing company importing artesunate in Myanmar, has agreed to stop importing the product since 2010 and the last batch was delivered out of their warehouse around December 2011. Through collaboration with PSI, AA pharmacy will distribute quality ACTs at the subsidized rate with the goal of having an ACT product available for the end users at 300 kyats (one third of the regular market price of the full course for adult therapy). The possibility must not be overlooked, though, that despite the removal of registration for artemisinin based monotherapies (AMT), and the action initiated to halt its importation of AMT by AA pharmacy, other AMT (artesunate single-product imported by other companies and artemether single-product) may persist in the market for a period. There remains a strong need to determine all potential options to minimize the use of AMT especially in the private sector. The price difference between ACT and artesunate single-product raised concerns about the quality of the latter, being much cheaper. Another potential solution has been raised, which is support for Myanmar Pharmaceutical Factory (MPF) to produce ACT in Myanmar. This option is likely to be more sustainable if implemented successfully. However, with minimal information about MPF and its policy, it is not possible to assess the feasibility of this option at this point in time.

NMCPs staffing in the Tier I states/regions are far from optimal, there being several vacant positions in professional cadres. This has led to an enormous burden of work being imposed on existing regional staff – these include the few malaria officers, and epidemiologists in these regions/states. The most significant achievement in terms of mitigating the risks of artemisinin-resistance in Myanmar has been the greatly enhanced implementation of malaria transmission control interventions throughout the country, including in, Tiers I and II. Sustaining and extending these interventions to the currently high risk and poorly served areas of the country would be essential for MARC to achieve its goals.

9.4 Strengths

- Access to malaria diagnosis and treatment has been greatly enhanced widely throughout the country by,
  - The expansion of service provision at all levels of the health system, but most importantly at the most peripheral level in villages near people’s homes, through the training of basic health staff - midwives and VHWs;
  - The provision of commodities (RDTs, and medicines) to all levels of the health system;
  - The recent introduction of bivalent RDTs which can detect and differentiate between \( P. falciparum \) and \( P. vivax \) malaria;
Addressing service provision to high risk groups such as plantation workers through specific strategies – these include:

Active engagement of the corporate private sector such as palm oil plantations, rubber plantations, prawn farms, gold panning and gem-mining industries by establishing partnerships with them to enhance their health services to employees for malaria, by the provision of technical guidance on preventive strategies, diagnosis and treatment, IEC/BCC programmes, and seeking malaria surveillance information from them.

Establishing malaria diagnosis and treatment centres at regular intervals along international borders – particularly at the southeastern border with Thailand’s Ranong Province in order to provide migrant workers frequently crossing the border and at high risk of malaria, better access to diagnosis and treatment.

- Procurement and supply chain for RDTs and medicines operates effectively to provide uninterrupted supplies of these essential commodities to all levels of the health system. For a more detailed assessment of this aspect see section 10).
- The engagement of several local and international NGOs as partners of NMCP to deliver malaria diagnosis and treatment services at the village level to supplement the public sector services in some specific locations of the country.
- A high level of implementation is underway in the context of the MARC project. Action has been initiated on all of the seven objectives in Tier I, including on halting the registration and sale of artemisinin monotherapies. Some objectives are nearing being fully achieved in Tier I.

9.5 Challenges

- Microscopy services have, in contrast to expanded use of RDTs, been weakened due to lack of trained microscopists.
- A quality assurance and quality control system for microscopy has been initiated jointly by the NMCP and NHL in 2005 with support from WHO and JICA. From 2009 onwards, this system is being further strengthened with support from the WHO Mekong Malaria Programme and ACTMalaria. However, the system’s coverage is still low, and needs to be expanded. The same is true of a quality assurance and quality control system for RDTs – it has been initiated, but is not fully functional.
- Three WHO-recommended ACTs are adopted as national drug policy. However there are several other ACTs which are not recommended by WHO and not a part of the national treatment policy which are registered in the country and being used in the private sector.
- AMTs are still widely available in the country, but their use appears to be decreasing due to a shift in treatment-seeking behaviour from the private to the public sector where quality ACTs are now available. Efforts by the NMCP and MoH supported by WHO, are also underway to halt the registration, sale and use of AMT, and measures are expected to come into operation by the end of the year.
- There are still remote rural areas, migrant populations who engage in high risk occupations, people working in development projects, and some national races which are poorly served by the system where coverage with diagnosis and treatment services is poor, and consequently errant practices, low quality diagnostic services and medicines are prevalent.

- Vacant positions in NMCP’s professional staff cadres in the states/regions, particularly those within MARC Tiers I and II has led to overburdening existing staff, and is likely to slow in progress implementation of this extremely important undertaking.

### 9.6 Recommendations

1. The cadre of microscopists should be expanded and vacant posts filled as a matter of urgency, and the quality assurance and control system for microscopy implemented at a more comprehensive level of coverage.

2. Expansion of access to diagnosis and treatment should be continued to particularly, cover the currently poorly served areas at international borders, in forested and remote areas, and in areas inhabited by some national races; and specific strategies developed to deal with the foci of persistently high transmission associated with forest-related occupations.

3. Operational research should be conducted to improve a) adherence to treatment - the 14 day treatment with primaquine for preventing relapses of *P. vivax* malaria, b) parasite prevalence surveys in particular high risk areas linked to entomology and human behaviour.

4. Measures to halt the sale and use of AMT, and also of ACTs that are not included in the national malaria treatment policy should be relentlessly pursued. The rational use of recommended and quality assured ACTs should be ensured.

5. The formal private sector (general practitioners) should be actively engaged in the provision of quality case management.

6. The professional and other staff cadre positions in the NMCP at state/regional level should be optimized and all vacant posts filled as a matter of urgency, particularly in Tiers I and II MARC project areas so that implementation can proceed smoothly.

7. The therapeutic efficacy study sites should be expanded in order to increase vigilance on the possibility that resistance to artemisinins may emerge or spread to new locations in the country.

8. The impact of MARC on malaria transmission in the states/regions of implementation should be stringently monitored and responsive strategies adopted to ensure containment of artemisinin-resistant *P. falciparum* malaria.
10. Procurement and supply chain management system and product quality control

10.1 Situation analysis

Medical supplies of LLIN, RDT, and ACT are mostly procured by UNICEF, WHO, JICA, 3DF, UNOPS and Save the Children, and other organizations. NMCP implemented a pull-type supply management system in 2011 in some states/regions to minimize stock-outs and currently are in a process of expanding the system in other states/regions. NMCP is directly responsible for distributing these products to all public sectors at all levels including VHV/CCMP through the VBDC officer at state/region level, while Save the Children was also involved with the distribution to the community health workers.

The overall supply of commodities has been adequate with minimal stock-outs. The evaluation team found a number of expired or nearly expired products distributed, especially in the public sector under NMCP. One of the postulated causes for the delay of distribution is excessive administrative requirements at the principal recipient level. Despite guidelines for malaria control supply management system and training provided to staff involved in the supply chain system, there remain variations in the practice of supply management. These variations are likely to be due to diverse managerial skills of personnel. Other challenges include a need to use public transportation (no temperature control), sub-standard storage conditions, and a lack of good practice of inventory control and information management.

The issue of product quality has also received attention from a number of stakeholders. VBDC is installing Minilab® test kit while DMR is currently evaluating a sample of ACTs in the market with support of the United States Pharmacopeia (USP). In the meantime, Food and Drug Administration Division (FDA) has performed post-approval quality evaluation of ACT in the last five years and found some substandard products and made a recall accordingly. These activities need to be integrated among all stakeholders. FDA has expressed an interest in taking responsibility for developing a routine surveillance system for controlling product quality both at the entrance and post-marketing levels. Despite the strong interest of FDA, there remains a need for human resources and laboratory facility development.

10.2 Recommendations

(1) Support for good practice of supply chain management system is needed at the inventory management level and the infrastructure development level such as temperature-controlled storage rooms/warehouses. In addition, delays in procurement and distribution need to be better understood and prevented. A system for product sharing in case of emergencies should be available and in place.

(2) FDA, DMR, and VBDC should develop an operational plan on a sentinel surveillance system for monitoring product quality on a regular basis.

11. Financial resources

11.1 Situation analysis

External funding from donors is the major source of financing for malaria control activities in Myanmar since 2004. The total support received was more than US$ 100 million. In
principle, most malaria patients receive diagnosis and treatment free-of-charge, because of the financial support from all sectors.

One of the key observations of the review was that more than half of all funding was used for goods and commodities, while less than 5% was used for capacity development and training for employees in the public sector. As derived in Tables 6 – 8 the proportion of the total budget allocated to capacity building was 2.9%, 3.0%, and 0.5% for the years 2009, 2010, and 2011 respectively. The budget allocated to capacity building was based on what has been stated in data sources obtained from WHO and VBDC. There might have been other non-documented budgets used for capacity building within VBDC not captured here.

**Table 6: Components of government budget (US$) contributing to VBDC**

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<tr>
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<tr>
<td>Salary</td>
<td>394 592 432</td>
<td>430 144 860</td>
<td>701 198 860</td>
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<tr>
<td>Travel cost</td>
<td>23 632 922</td>
<td>26 719 708</td>
<td>28 759 213</td>
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<tr>
<td>Labour cost</td>
<td>57 683 439</td>
<td>52 224 383</td>
<td>56 807 299</td>
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<tr>
<td>Maintenance cost</td>
<td>40 388 245</td>
<td>54 508 400</td>
<td>33 642 800</td>
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<tr>
<td>Training cost</td>
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<td>841 000</td>
<td>-</td>
<td></td>
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<tr>
<td>Building cost</td>
<td>469 080 000</td>
<td>459 690 000</td>
<td>468 740 000</td>
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<td>Total (kyats)</td>
<td>985 377 038</td>
<td>1 024 128 351</td>
<td>1 289 148 172</td>
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<tr>
<td>Total (US$)</td>
<td>1 155 190</td>
<td>1 200 619</td>
<td>1 511 311</td>
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**Funding/Expenditure by category and source**

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<thead>
<tr>
<th>Year</th>
<th>CASH</th>
<th>GFR3</th>
<th>Bridge fund</th>
<th>3DF</th>
<th>GFR9</th>
<th>SUPPLIES</th>
<th>UNICEF</th>
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<td>2004</td>
<td>0.723</td>
<td>2.169</td>
<td>0.529</td>
<td>20.495</td>
<td>74.953</td>
<td>4.6</td>
<td>1.6</td>
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<tr>
<td>2005</td>
<td>0.723</td>
<td>0.529</td>
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<td></td>
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<tr>
<td>2006</td>
<td>0.723</td>
<td>0.529</td>
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<td></td>
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<td></td>
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<tr>
<td>2007</td>
<td>4.099</td>
<td>0.529</td>
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<tr>
<td>2008</td>
<td>4.099</td>
<td>0.529</td>
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<td>2011</td>
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<td>2012</td>
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<td>0.529</td>
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**Expenditure for capacity building**

| WHO-training | 0.1967 | 0.1967 | 0.1988 | 0.1988 | 0.1425 |
| Total VBDC budget | NR | 1.1552 | 1.2006 | 1.5113 | NR |
| VBDC-training | NR | 0 | 0.001 | 0 | NR |
| Sum - CB/training | 0.1967 | 0.1967 | 1.0398 | 0.1988 | 0.1425 |
| % spent on capacity building | 2.3% | 2.9% | 3.0% | 0.3% | 0.4% |

Source: VBDC
Table 7: WHO budget contributing to VBDC and DMRs

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<tr>
<th>Biennium</th>
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<td>2008 – 2009</td>
<td>393 350</td>
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<tr>
<td>2010 – 2011</td>
<td>357 500</td>
</tr>
<tr>
<td>2012 – 2013</td>
<td>285 000</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>1 035 850</strong></td>
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Source: WHO

Table 8: Tabulation of all funding by source for malaria control in million US$ (2004 – 2012) and estimation of proportion of funding used for capacity building within VBDC

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<tbody>
<tr>
<td>GFR3</td>
<td>2.169</td>
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<td>3DF</td>
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<td></td>
<td></td>
<td></td>
<td>74.953</td>
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<table>
<thead>
<tr>
<th>SUPPLY</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
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<tbody>
<tr>
<td>UNICEF</td>
<td>4.6</td>
<td>1.6</td>
<td>1.3</td>
<td>0.8</td>
<td></td>
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</tbody>
</table>

| Cash- non GFR9 | 0.723 | 0.723 | 0.723 | 4.099 | 4.099 | 4.099 | 4.099 |       |      |
| Cash- GFR9     | 0.529 |      |      | 37.477| 37.477|      |      |      |      |
| Total budget   | 0.723 | 0.723 | 1.252 | 4.099 | 8.699 | 5.699 | 5.399 | 42.376| 37.477|

| WHO-training  | 0.1967 | 0.1967 | 0.1988 | 0.1988 | 0.1425 |
| Total VBDC budget | NR     | 1.1552 | 1.2066 | 1.5113 | NR     |
| VDVC - training| NR     | 0      | 0.001  | 0      | NR     |
| Sum - CB/training | 0.1967 | 0.1967 | 1.0398 | 0.1988 | 0.1425 |
| % of CB / all funding | 2.3%   | 2.9%   | 3.0%   | 0.5%   | 0.4%   |

Because of the evolving political environment in Myanmar and changes in foreign policy in the country and consequently the upcoming discussions among some donors on policies on financial transfers, there is a strong need to have a transparent financial management system in place within the country. The development of a sound financial management system takes time and all donors may consider exploring systems development together. If there is a change in financial transfer policy, the NMCP programme would be greatly strengthened. This would contribute to greater sustainability in human resources and infrastructure development, which are critical for malaria control in the mid and long-term.

11.2 Recommendations

(1) More than half of the donor funding should directly support the national malaria control programme.
(2) Considering the small proportion of financial resources used for human resources and infrastructure development, there is a need to develop strategies and a sound plan for strengthening the human resource capacity of NMCP and to allocate adequate financial resources to support these plans in order to achieve long-term sustainability.

(3) Given the possibility of there being changes to the financial transfer policies on the part of some donors in the near future, there is a strong need to have a sound government financial management system in place.

(4) Health economics studies are needed to determine the cost-effectiveness of interventions/measures used for malaria control in different situations in Myanmar. The findings will provide donors a value-for-money basis on which to make their investments in antimalarial interventions/measures.

12. Coordination and partnership

12.1 Situation

Central Level: The Myanmar Country Coordination Mechanism (M-CCM), formed with 20 member organizations at the advent of the GFATM Round 9 grant, oversees and coordinates the national response for malaria, TB, AIDS across all stakeholders. The M-CCM meets twice annually and/ or as needed.

A Malaria Technical and Strategy Group (TSG) comprising the VBDC and various implementing partners is responsible for overall technical review and coordination across organizations. The member secretary of the TSG is WHO/VBDC. The TSG is supposed to meet quarterly; its mandate will be enhanced to ensure transparency by a requirement for all partners to present their plans, budgets, and progress reports.

Within the TSG, there are Technical Working Groups (TWG) on prevention, case management, advocacy and BCC, monitoring and evaluation, and the Myanmar Artemisinin Resistance Containment (MARC) Task Force. Within the TSG, a core group comprising JICA, UNICEF, VBDC and WHO hold periodic meetings for improved coordination. It is responsible for preparing an annual national operational plan including the contributions of all partners and submitting it for approval by MoH, the Technical Advisory Group and the Technical and Strategy Group.

State/regional level: The Director/VBDC team leader is responsible for coordination, while at the township level, the medical officer performs this role. The VBDC recognizes that while it is necessary to have structures and mechanisms at central and state/regional levels for overall coordination; it is equally imperative to ensure optimum use of resources, maximize coverage in high risk malaria areas, standardize programmatic data recording and reporting, and avoid duplication of efforts at the township level. State/regional/township health committees do not meet regularly and do not include non-public sector partners. Generally, non-public sector partners do not participate in monthly meetings at the townships, with some exceptions. Save the Children will develop a coordination mechanism at the township level.

It is evident that the MoH is the authority to determine policies and strategic directions. However, it is also helpful to appreciate the value of the VBDC programme as a unified programme within the health system with huge capacity for achieving high coverage with interventions through collaboration with the basic health services, other sectors, national NGOs, and international partners who bring added value.
12.2 Strengths

Myanmar National Malaria Control Programme is working closely with partners and donors. Gradually, as the perceived complexity of the problem and the resources increased, the regularity of the interaction increased. In 2003, the partnership became more structured with the process of developing and managing the Round 3 GFATM proposal, which was submitted in 2004. The Malaria TSG, with WHO as the secretariat, held periodic coordination meetings and was instrumental in coordinating malaria control partners with the application and implementation of the Bridge and 3-Diseases Fund Projects and formulation of successful proposals for Round 9 GFATM and for MARC. In areas covered by the MARC project, quarterly coordination meetings were held at the state/regional level; however, this was not the case in non-MARC areas.

12.3 Challenges

More than 20 partners (see Annex 2) and stakeholders are involved in malaria control and artemisinin resistance containment, including donors, MoH, national and international NGOs. While partnership was successfully built during the 3DF project implementation, it is almost impossible to avoid project-based implementation and overlapping of implementation areas of partners without effective coordination. With many donors, implementing partners, and malaria control projects, the national programme appears to be a loosely connected set of fragments and integrating the malaria programme jigsaw is a significant challenge for the VBDC and WHO, which play crucial roles in this regard.

Stakeholders and implementing partners expressed the perception that more frequent and regular meetings of the TSG are needed to increase coordination and dialogue among all partners and stakeholders to coordinate planning, implementation, monitoring and evaluation, and to share information and best practices. At the state/regional and township levels, effective mechanisms for coordinating the malaria programme are not well developed.

The stakeholder analysis shows that different malaria control partners have different comparative advantages. A true partnership is more than coordination and exchange of experiences to avoid overlap, but must be based on solidarity and trust as well as transparency in a framework of regular joint planning and monitoring exercises.

12.4 Recommendations

1. Under the leadership of the VBDC and with support from WHO, integrated annual malaria operational plans should be formulated at the national, state/regional, and especially at township levels, which show the contribution to service delivery by both government and nongovernment service providers. The development of the plan and reports against it will support coordination between service delivery partners at township level.

2. Annual review/evaluation and planning meetings with all implementing partners should be organized at the central, state/regional, and township levels with representatives from partner organizations. A report of annual review/evaluation should be prepared and disseminated to all partners, including donors.

3. Review meetings should be organized with all partners at township level. These meetings will discuss progress in performance, programmatic and coordination
bottlenecks and gaps, data quality and capacity building issues and suggest steps for resolutions. These meetings will serve as important platforms for strengthening linkages and networking across public and non-public sectors.

(4) Funding to WHO should be increased to more effectively support the NMCP until it is directly supported. A greater role for WHO’s country office is foreseen in supporting malaria control in Myanmar until direct support for the NMCP can be obtained.

(5) A very functional intersectoral partnership for malaria control led by high ranking officials of MoH should be coordinated.

13. Community participation

13.1 Situation

The MoH, national and international NGOs have established thousands of community health workers and village malaria volunteers to provide prevention and treatment services. They assist in mass treatment of ITNs, health education, diagnosis with RDTs and treatment with ACTs. VHV’s are highly dedicated and well appreciated by their communities in highly malarious areas. Village health committees and household health workers are mostly non-functional. Temporary migrant communities are not covered by activities aimed at community participation.

13.2 Strengths and challenges

- Different implementing partners have different systems in recruiting, training, and incentive systems (VBDC does not offer in-cash) posing confusion and problems.
- Overlapping and uncovered villages were identified in certain areas due to multiple implementing partners.
- In certain areas, volunteers are non-functioning due to lack of motivation.
- Many village health committees are non-functional.

13.3 Recommendations

(1) Where possible, existing or retired community health workers should be selected as village malaria volunteers.

(2) Efforts should be made to harmonize the volunteer system of all implementing partners in volunteer recruitment, training, and incentive system.

(3) To avoid repeating overlapping and gaps, village mapping planning should be used for geographical location of volunteers.

(4) Village health committees should be revitalized to catalyse proactive participation of communities in high-risk malarious villages.
14. Advocacy, IEC/BCC

14.1 Situation

Most partners are doing some form of IEC/BCC. Although VBDC has no dedicated unit for IEC/BCC but they do seem to enjoy a good working relationship with the Bureau of Health Education. At the township level, there appears to be a high level of informal coordination and cooperation among and between INGOs and government health agencies, although there is some variation across regions and states.

A dozen or more donors and agencies support NMCP in malaria control in all aspects, including IEC/BCC. There are IEC materials (posters, pamphlets and television spots). Some were produced in the six main languages, including Shan and Karen, but we saw no local language materials during our field visits.

WHO worked with NMCP to develop an IEC strategy and tools for the Shan in Eastern Shan State. UNICEF assisted NMCP and PSI to develop a communication programme on BCC in malaria prevention through mobile video units and conduct BCC sessions at community level. JICA developed an IEC plan for the Ko Kang ethnic groups in northern Shan State and selected population in Bago Region. The review team was unable to find any documentation on these plans. Several national NGOs and associations are involved in malaria control and prevention, each with their own approach to IEC/BCC (Myanmar Council of Churches, Myanmar Medical Association, Myanmar Health Mother and Child Welfare Association, Community Development Association, Myanmar Health Assistants Association).

All materials are supposed to be reviewed/approved by the Health Education Bureau, but it was not possible to determine to what extent this happens in practice.

In June 2007, WHO published a report, “Communication and Social Mobilization [Strategy] for Malaria Prevention and Control in Myanmar”. The report includes details on IEC/BCC activities of international and local NGOs and faith-based organizations along with an outline of the “media landscape” in Myanmar (television coverage and viewing preferences and literacy rates.). Media also includes word-of-mouth networks, traditional media and point-of-information channels. According to a survey conducted by Merlin, there were (in 2007) 16 print materials consisting mostly of leaflets and pamphlets and five flipcharts, six videos produced by international NGOs aired on the national TV station and shown in video parlours. The report does not mention radio or the role of the Health Education Bureau. The plan was never implemented. It is mentioned in the soon-to-be finalized National Malaria Strategy, but needs updating and revision.

Despite the piecemeal nature of IEC/BCC, the intended aims are being achieved: basic health staff are being trained and getting key messages out via volunteer health workers. The emphasis is on regular use of bed nets, insecticide-treated nets and early seeking of quality diagnosis and appropriate treatment. While specific attribution to IEC/BCC is difficult, government hospitals and INGO projects report that referrals are up and malaria cases are down. The evaluation team was of the opinion that the data are sufficiently reliable to support this conclusion.
14.2 Main findings

The first point to note is the misuse of terminology. Advocacy, IEC and behaviour change communication are distinctly different undertakings (Box 1). While the definitions of IEC and BCC are very close (hence the use of IEC/BCC), in practice, IEC implies more emphasis on materials (pamphlets, posters, and T-shirts.). In the reports we reviewed, the terms are used interchangeably or lumped together in arbitrary combinations (e.g. advocacy/IEC, BCC/advocacy). Clarity is essential to good practice.

**Box 1: Definition of terms**

**Advocacy**

Advocacy is a political process by individuals or groups aiming to influence public policy and resource allocation decisions within political, economic, and social systems and institutions. Advocacy may be motivated by moral, ethical or faith principles or the need to protect an asset of value or interest. Advocacy can include media campaigns, public speaking, commissioning and publishing research and any other activity or event designed to exert influence on policy makers. This external evaluation is an exercise in advocacy. The aim is to persuade international donors to continue or expand their funding to the national malaria control programme.

**Behaviour change communication**

Behaviour change communication is any intervention with individuals or communities to develop communication strategies to promote positive behaviours appropriate to their settings. The aim is to provide a supportive environment enabling people to initiate and sustain the desired behaviours (e.g. sleeping under LLINs).

**Information, education and communication**

Information, education and communication combine strategies, approaches and methods that enable individuals, families, groups, organizations and communities to play active roles in achieving, protecting and sustaining programme goals and objectives. Embodied in IEC is the process of learning that empowers people to make decisions, modify behaviours and change social conditions. Activities are developed on the basis of needs assessments, sound educational principles, and periodic evaluation using a clear set of goals and objectives.

14.3 Advocacy

The term ‘advocacy’ should be reserved for discussions about policy interventions and resource mobilization at the ministerial level within Myanmar, with counterpart agencies in neighbouring countries with international agencies, including donors. Figure 15 illustrates how this would work on the issue of advocacy for more direct funding to the Ministry of Health.

The WHO Communication and Social Mobilization Strategy confuses efforts in this area by applying the term to all programme areas.
Advocacy for malaria control in the sense we think it should be used is entirely informal and unplanned in Myanmar, but nonetheless effective. Planned advocacy campaigns have not been necessary because donors have been eager to fund malaria control in Myanmar. Relationship networks among international actors are well established and this facilitates communication. This is likely to change in the near future, particularly in regard to how funds are channelled.

Up until recently, it has been necessary to channel funds through external agencies for largely political considerations. This situation is changing. Western countries are now moving towards more “user friendly” relations with Myanmar (Box 2). It appears that in the near to short term, it will be less difficult for external agencies to channel funds directly to the MoH (pending policy changes within the Ministry itself). It will be up to the Minister of Health to advocate internally at the ministerial level for the necessary policy and regulatory changes, and external to donors. AusAID is anticipating this and will soon initiate studies on direct funding mechanisms that minimize fiduciary risk. There may be some reluctance within other donor agencies and primary recipients who have invested in people and administrative systems to channel funds. This is where a more planned approach to advocacy may be required.
Box 2: The changing resource mobilization environment

EU lifts sanctions against Burma for 12 months in recognition of moves towards democracy after 50 years of military rule

By Daily Mail Reporter


http://www.dailymail.co.uk/news/article-2133990/EU-lifts-sanctions-Burma-12-months-recognition-moves-democracy.html

US green light for Myanmar aid work

Al Jazeera, 18 Apr 2012 07:01

The United States has eased financial sanctions against Myanmar to enable US-based non-government organizations to operate in the country in recognition of recent political reforms in the South-east Asian nation. Washington says it will meet "action with action" as it lifts restrictions on NGOs and charities in response to reforms.


ILO to lift restrictions on Myanmar

Financial Times

By Gwen Robinson in Bangkok June 13, 2012 11:15 pm

In June, 2012, the International Labour Organization voted at its annual conference to lift restrictions on Myanmar, paving the way for its admission to membership and preferential treatment for its exports to EU markets.

Burma donors urged to lift aid restrictions

Report by Refugees International says the West's lifting of some sanctions on Burma will boost humanitarian aid and the role of reformists in the country

The Guardian, Mark Tran, Wednesday 11 January 2012 12.23 GMT


"The picture of Burma as a monolithic government is not right," she said. "There are new decision-makers and we need to support those who want to help these people."

14.3.1 Strengths

(1) Strong links, rich networks and established relations with international and national agencies;
(2) Improving political and economic situation;
(3) “Reasonably good” data showing decline in malaria (demonstrates to donors that their funds are having impact);
(4) Artemisinin resistance injecting new urgency into calls for funding and support.
14.3.2 Challenges

(1) Strengthening the national database to better direct and support advocacy efforts;

(2) Strengthening cross-border and intersectoral advocacy (economic development is driving movement of non-immune populations for occupational activities such as in natural gas and timber, together with other types of forest-related activities such as gold panning, gem-mining).

14.3.3 Recommendations

Highest Priority

(1) The Minister of Health should be engaged as the chief advocate for changes in how external funds are channelled.

High Priority (in order of importance)

(1) Advocacy should be clearly defined to distinguish it from IEC and BCC.

(2) More advocacy efforts should be directed towards other sectors within Myanmar (such as tourism) and cross-border cooperation.

(3) Advocacy should be included in a revised communication and social mobilization strategy for malaria prevention and control in Myanmar (budget, human resource requirements, and implementation strategies).

14.4 Information-education-communications/behaviour change communication

WHO, UNICEF and JICA support the NMCP in malaria control in all aspects, including in the area of IEC. Various IEC materials have been produced - for example posters, pamphlets and television spots. Some of them have been produced in six main languages, including Shan and Karen (although they were not seen by the review team). WHO has worked with NMCP to develop IEC strategy and tools for the Shan in eastern Shan State. UNICEF has assisted NMCP and PSI to develop a communication programme focusing on behaviour change in malaria prevention through a mobile video unit and conduct BCC sessions at community level. JICA has developed an IEC plan for the Ko Kang ethnic groups in northern Shan State and selected population in Bago Region.

However, the arbitrary order of the findings below reflects the piecemeal nature of IEC/BCC activities. This is largely because the WHO strategy has never been comprehensively implemented and because VBDC has no resources for coordination.

A general point concerns indicators for IEC/BCC. The only indicators are quantitative measures of programme outputs or outcomes (number of people trained, number of training sessions held and number of people who slept under a net the previous night). There are no qualitative data on training approaches or trainee performance as a result of training. The only data on materials (again numbers only) is buried in financial reports. There are no assessments of peoples’ perceptions of materials.

The first strategy of the National Malaria Control Programme is: “Widespread dissemination of health information and education reach the rural areas.” Towards this end, the village health volunteers (VHV) programme was launched in 2005. To date, the NMCP has trained 6100 VHVs. National coverage needs to be doubled at least.
VBDC has no dedicated IEC/BCC unit. There is one training coordinator funded by WHO to manage and supervise training activities supported by the Global Fund.

In year one of implementation of the GF grant, the results achieved for social marketing of LLINs were low due to delays in the procurement of nets. However a plan to overcome the delay is in place and closely followed up by UNOPS. Training targets for VHVs were nearly achieved (2486 of 2753) and also for basic health staff (216 of 354).

PSI has been mandated to manage a national IEC/BCC strategy. What they can do is not only limited by the funding available but also by their own corporate agenda and approach. PSI has launched a successful quality seal programme for all malaria products endorsed by the Ministry of Health. PSI’s other BCC initiatives in Myanmar for malaria prevention and treatment focus on ensuring correct and consistent use of LLINs and appropriate treatment seeking behaviour; compliance with the treatment regimen recommended by the Ministry of Health; improving community participation in indoor residual spraying campaigns; and encouraging pregnant women to seek antenatal clinic services and comply with national recommendations for treatment of malaria in pregnancy. They provide insecticide tablets at subsidized prices and operate mobile health units. They also provide rapid diagnostics and ACTs at subsidized prices to private general medical practitioners in areas in which they successfully operate a franchise. Coordination with other NGOs and township authorities seems to be good.

Save the Children (SC) has reached 2,386,364 households through behaviour change interventions (44 townships: prevention and case management; 91 townships with social marketing of LLINs) and trained 2,753 village health workers and 354 basic health staff (no overlap with VBDC training). They report a decline of 75% \( \text{P}. \text{falciparum} \) and 60% \( \text{P}. \text{vivax} \) cases in SC target areas.

The UNICEF logo was prominently displayed on many of the IEC materials which the review team saw in rural health centres, township hospitals, centres and sub-centres and mother and child clinics. In terms of BCC, their strategy is to focus on the most vulnerable families rather than apply a “blanket approach”. A village malaria volunteer programme was initiated in five pilot townships in 2007 which has increased to 45 by 2012. They aim to cover more than 650 hard-to-reach communities through volunteer community case management by the end of 2012. A standard training module has been developed by VBDC with inputs from all the partners. UNICEF is also contributing to the MARC project by providing support to containment of artemisinin-resistant parasites through BCC.

JICA also provides community health worker (CHWs) training for the staff of forestry projects, LLIN distribution to forest camps, and collaboration with the road construction department). The number of positive cases treated by CHWs and basic health staff went from under 50 – 100 (January – September 2011) to over 350 in December 2012. JICA’s research is also contributing valuable knowledge to the socio-demographic and behavioural aspects of migrant and mobile populations in remote areas.

UNOPS administered the following amounts (in US$) for IEC/BCC and related activities through Round 9 GFATM via NMCP, MCC, MMA, MRCS and WHO:

- BCC for ITNs, diagnosis and treatment: 106,757
- Empowerment of community volunteers: 818,196
- Advocacy and social mobilization: 72,500
- Capacity development (training): 561,204
The Department of Medical Research has a social science research centre that can offer facilities for training and education at national and regional/extra regional levels in malaria research and control. Activity 7 is to conduct national workshops on drug resistant malaria, diagnosis, clinical practice, laboratory procedure and etymology. These efforts should be incorporated into the preparation of IEC/BCC training curricula and materials.

14.4.1 Strengths

- Lots of expertise available from INGOs and national NGOs and associations.
- Highly committed staff at all levels, especially volunteer networks.
- Good training systems in place.

14.4.2 Challenges

- Building capacity within NMCP for training and materials development.
- Expanding coverage, especially to remote areas and to mobile and migrant populations.
- Sustaining and expanding the volunteer network and retaining/recruiting national and INGO staff as more opportunities open up in the private sector (brain drain).

14.4.3 Recommendations

Highest priority

1. The WHO plan for communication and social mobilization for malaria prevention and control in Myanmar should be updated in close collaboration with the NMCP.

2. All stakeholders, including public and private sector media operators and the Health Education Bureau should be included in IEC/BCC.

3. The VBDC should be provided with the resources to coordinate implementation of the plan. Overall coordination should not be outsourced to NGOs but include them as partners.

High Priority (in order of importance)

1. The village health volunteers, auxiliary midwives and community case management providers are the backbone of IEC/BCC initiatives for all stakeholders. Adequate funding needs to be allocated to extend coverage, especially to high risk areas, train more trainers and make training more participatory, and budget for expenses for travel, meetings and transport. Sustaining a volunteer network has to be predicated on the realities of volunteers’ capacities (such as their literacy levels,) and predictable turnover due to marriage or other commitments.

2. Under a reanimated TSG, an IEC/BCC subgroup should be established for coordination and for sharing and exchanging lessons learnt and best practices.

3. IEC/BCC training should be extended to include general practitioners and private sector retailers through the NMCP, the Health Education Bureau and local NGOs.
and associations such as the Myanmar Medical Association. Research data should be available to IEC/BCC implementers in a timely manner, i.e. during preparation of materials.

(4) Capacity should be built within the NMCP for material development and BCC.

(5) Myanmar citizens no longer require a licence to purchase a radio. Cooperation should be explored with military radio stations, which have nearly national coverage.

(6) Innovative approaches to BCC, such as positive deviance approaches, have been implemented but not fully evaluated. More extensive evaluation of BCC/IEC strategies and activities will be important to refine strategies throughout the region. A challenge has been to identify meaningful and measureable qualitative indicators of behaviour and knowledge change. Household surveys have provided useful data on trends in some of the countries, but more understanding of reach of information to, and influence of communication on, key mobile and migrant target groups will be important.

(7) The strong emphasis on joint strategy development and messaging and bilingual materials development between Thailand and Cambodia has not been replicated among other neighbouring countries in the region. The process of working across the border was central to early response activities, and could provide lessons for other border areas. International advocacy has been quite successful in spite of sanctions and restrictions. However, there is a risk of losing momentum as the story becomes “old news”. There is also a need to enhance the impact of local advocacy to expand political interest at local government level. Artemisinin resistance is injecting new vigour into advocacy efforts.

15. Conclusions and general recommendations

The past six years have seen a tremendous effort in malaria control in Myanmar, resulting in a rapid increase in intervention coverage spanning a large part of the country and improving timely service delivery at the village level – this includes coverage with early diagnosis and treatment, prevention with long-lasting insecticidal nets (LLINs) and insecticide-treated conventional mosquito-nets (ITNs), delivery of IEC and BCC on the basis of a risk-based microstratification of villages – in some areas, intervention coverage approaches 100%. This has been made possible through a significant increase in health manpower in the public sector of the health system, particularly those in peripheral health institutions and at the village level. These efforts have been greatly supported by the donor community mainly through the Three Diseases Fund, Global Fund, UNICEF, and JICA, and the implementing partners of the NMCP – namely several local and international NGOs, and technical and management support from WHO.

There is evidence of a significant reduction in the malaria incidence consequent to increased intervention coverage in several states/regions and situations. The evaluation team also found that a reduction in malaria cases countrywide is widely perceived by people living in endemic areas, health workers, and researchers who seek malaria cases for study. Reported malaria deaths have declined markedly. However, there are still several population groups, which are poorly served by the health system and by malaria services, such as those living in remote border areas, migrant populations, forest workers and miners, where malaria transmission is intense. Forest, plantation, and mining-related malaria transmission persists
in many parts of the country – particularly at its international borders – is more tenacious, and will require specific interventions and new approaches to control.

In the states/regions targeted by the MARC project, implementation of malaria control is being heightened and is on the way to reaching targets. Although it may be too early to expect an impact on transmission reduction in these MARC areas, there are still foci of persistently high transmission, particularly among forest workers, which raise concern, and need now to be the focus of attention of MARC. It would be important to stringently monitor the impact of the MARC project on malaria transmission in the states/regions of implementation and to adopt responsive strategies to ensure containment of artemisinin-resistant *P. falciparum* malaria.

Specific recommendations on each of the components of the malaria control strategy are provided in some detail under the relevant sections of the report. Recommendations of a general nature for overall improvement of programme performance are provided here.

(1) The VBDC should be strengthened at central and state/regional levels as follows:
   - All sanctioned posts should be immediately filled with qualified staff.
   - Field staff should be supported with technical guidance and increased travel costs and per diem in line with real costs.
   - Special attention should be paid to the fields of epidemiology and entomology, as follows:
     - State/regional malariologists should be supported with data assistants, and training them to analyse the state/regional epidemiological situation.
     - It should be ensured that 1) each state/region is staffed by trained and equipped staff consisting of two each of entomologists, assistant entomologists, and insect collectors; 2) central level staff have the necessary laboratory space, an insectary and equipment, and 3) entomological staff at central and state/regional level have core capacity in epidemiology.

(2) Direct financial investments in the Ministry of Health should be substantially increased to strengthen malaria control. For this to occur, a transparent financial management system must be in place. Funding to WHO should be increased to more effectively support the NMCP until it is directly supported.

(3) Current intervention coverage levels should be sustained and access to, and population coverage with be expanded to prevention and early diagnosis and treatment services to highly endemic, currently poorly served areas and populations and high-risk groups (forest workers, miners, migrant populations).

(4) The National Strategic Plan should be finalized after taking into account the recommendations made by the evaluation team, and an integrated annual operational plan should be prepared to include all implementing partners at central, state/regional and township levels. Annual and quarterly reviews of the plan should be conducted.

(5) A national malaria database linked to a map, which includes routine surveillance data from all NGOs and the private sector, survey data, and complete micro stratification data needs to be constructed. The database must be regularly
updated and used for operational planning at the central, state/regional and township levels.

(6) Operational research should be made a priority to improve a) prevention of forest malaria; b) containment of artemisinin-resistance; and c) adherence to treatment, particularly to the 14 day treatment with primaquine for preventing relapse. Focused prevalence surveys linked to entomological and human behaviour studies should be carried out to better inform local epidemiology and to guide implementation strategies and plans at the local level.

16. Acknowledgements

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Dr Leonard Ortega, Regional Adviser, Malaria, WHO SEARO New Delhi, India and Dr Krongthong Thimasarn, Medical Officer, Malaria, WHO Myanmar conceptualized the review, provided guidance in the preparation of key documents for review, participated in the conduct of the review, provided inputs to the external review team in writing the report, and reviewed and refined the report. Dr Mya Sapai Ngon, National Professional Officer, Malaria, WHO Myanmar and Dr Myo Myint Naing, National Technical Officer, Malaria, WHO Myanmar, assisted in organizing the review, compiled the documents and data for the review, facilitated field visits and contributed in the discussions for the preparation of the review report. Dr Sai Naw Ngin, WHO Central Project Coordinator and Dr Khin Than Win, WHO Training Coordinator for GFATM project, Central Vector-Borne Disease Control Programme office, Department of Health/Ministry of Health, Nay Pyi Taw, assisted in compiling documents and data needed for the review and facilitated field visits of the review team.
List of reviewers

External Reviewers

1. Dr Kamini Mendis, Independent Consultant, Colombo, Sri Lanka  
   Retired WHO staff, former Coordinator, Diagnosis and Treatment, Global Malaria Programme WHO HQ  
   (Team leader)
2. Mr James Hopkins, Senior Programme Manager, Regional Public Health Programme, Kenan Institute  
   Asia, Chiang Mai Province, Thailand
3. Dr Nathorn Chaiyakunapruk, Associate Professor, Department of Pharmacy Practice, Director of  
   Centre of Pharmaceutical Outcomes Research, Faculty of Pharmaceutical Sciences, Naresuan University,  
   Phitsanulok Province, Thailand
4. Dr Anton Fric, Independent Consultant, Epidemiologist, Phuket, Thailand  
   Retired WHO SEARO Staff, Former Regional Adviser, Health Information
5. Dr Rita Kusriastuti, Director of Vector-Borne Disease Control, Directorate-General Disease Control and  
   Environmental Health, Ministry of Health, Jakarta, Indonesia
6. Dr Wichai Satimai, Director, Bureau of Vector-Borne Disease, Department of Disease Control, Ministry  
   of Public Health, Nonthaburi Province, Thailand
7. Mr Terry Clayton, Managing Director, Red Plough International Co. Ltd., Udon Thani Province, Thailand
8. Dr Phone Saing, Independent consultant, Yangon, Myanmar
9. Dr William Hawley, Health Specialist (Malaria), Child Development Section, UNICEF, Jakarta, Indonesia

Observer

1. Dr Jinkou Zhao, GFATM

WHO Secretariat

1. Dr Leonard Ortega, Regional Adviser, Malaria, WHO SEARO, New Delhi, India
2. Dr Krongthong Thimasarn, Medical Officer, Malaria, WHO Myanmar
3. Dr Mya Sapai Ngon, National Professional Officer, Malaria, WHO Myanmar
4. Dr Myo Myint Naing, National Technical Officer, Malaria, WHO Myanmar
5. Dr Sai Naw Ngin, GFATM Central Project Coordinator, Central VBDC Office, DOH/MOH, Nay Pyi Taw
6. Dr Khin Than Win, GFATM Training Coordinator, Central VBDC Office, DOH/MOH, Nay Pyi Taw
### Programme of the Myanmar Malaria Control Programme evaluation

**29 July - 9 August 2012**

<table>
<thead>
<tr>
<th>Time</th>
<th>Day 0</th>
<th>Day 1</th>
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<tr>
<td>0800–0900 hr</td>
<td>Meeting with the Technical Secretariat.</td>
<td>Presentation by JICA Briefing on field visit Coffee break (1000-1015 hr) Visit MMA, DMR</td>
<td>Depart YGN at 730 hr Travel to NPT by car Lunch on the way at 11.5th mile Visit Central VBDC 2.30pm Visit FDA 4 pm</td>
<td>Public Holiday Group meeting 10.00 am 2 teams (Tanintharyi and SSS return to YGN) 2 teams (Magway and Sagaing) continue to work in NPT (work at hotel) Remark: 2 August is a public holiday - Full moon Day Waso</td>
<td>2 Teams depart by air to Kawthuang and Taunggyi 2 Teams depart by car to Magway and Sagaing</td>
<td>Field visit</td>
<td>Field visit</td>
<td>Return from field visit to YGN</td>
<td>Preparation for presentation and report writing</td>
<td>Report writing</td>
<td>Departure of reviewers</td>
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<td>0930-1000 hr</td>
<td>Opening ceremony and introduction and group photo</td>
<td>Lunch</td>
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<tr>
<td>1000 – 1200 hr</td>
<td>Presentation by Programme Manager NMCP, UNOPS and discussion Presentation by Save the Children</td>
<td>Depart YGN at 730 hr Travel to NPT by car Lunch on the way at 11.5th mile Visit Central VBDC 2.30pm Visit FDA 4 pm</td>
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<tr>
<td>1200 – 1330 hr</td>
<td>Lunch</td>
<td>Break into 2 teams Visit 3DF PSI DFID AusAID</td>
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<tr>
<td>1330 – 1400 hr</td>
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<tr>
<td>1400 – 1500 hr</td>
<td>Break into 2 teams Visit 3DF PSI DFID AusAID</td>
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<td>1500 - 1515</td>
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<tr>
<td>1515 - 1700</td>
<td>Presentation by UNICEF and WHO</td>
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<tr>
<td>1700 - 1730</td>
<td>Meeting with Technical Secretariat</td>
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</table>
## Itineraries of the external review team
### (3 – 6 August 2012)

<table>
<thead>
<tr>
<th>Date</th>
<th>Itinerary</th>
<th>Mode of travel</th>
<th>Night stop</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Southern Shan State</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.8.12</td>
<td>Travel from Yangon to Taunggyi via Heho</td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visit to State Health Director, Shan State Health Department, Taunggyi</td>
<td>Vehicle</td>
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<tr>
<td></td>
<td>Visit to State VBDC office, Shan State Health Department, Taunggyi</td>
<td>Vehicle</td>
<td>Taunggyi</td>
</tr>
<tr>
<td>4.8.12</td>
<td>Travel from Taunggyi to visit Taung Ni RHC, Pin Phyt Sub-center and</td>
<td>Vehicle</td>
<td>Taunggyi</td>
</tr>
<tr>
<td></td>
<td>Yat Sauk Township Health Department</td>
<td></td>
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</tr>
<tr>
<td>5.8.12</td>
<td>Travel from Taunggyi to visit Nyaung Shwe Township Health Department,</td>
<td>Vehicle/Boat</td>
<td>Taunggyi</td>
</tr>
<tr>
<td></td>
<td>Nam Pan Station Hospital and Khaung Taing RHC</td>
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<tr>
<td>6.8.12</td>
<td>Travel from Taunggyi to Yangon via Heho</td>
<td>Air</td>
<td>Yangon</td>
</tr>
<tr>
<td></td>
<td><strong>Taninthary Region</strong></td>
<td></td>
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</tr>
<tr>
<td>3.8.12</td>
<td>Travel from Yangon to Dawei</td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visit to Regional Health Director, Thaninthary Regional Health Department,</td>
<td>Vehicle</td>
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<tr>
<td></td>
<td>Dawei</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visit to Regional VBDC office, Thaninthary Regional Health Department,</td>
<td>Vehicle</td>
<td>Dawei</td>
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<tr>
<td></td>
<td>Dawei</td>
<td></td>
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</tr>
<tr>
<td>4.8.12</td>
<td>Travel from Dawei to visit Dawei Township Health Department, Kanaing Dar</td>
<td>Vehicle</td>
<td>Dawei</td>
</tr>
<tr>
<td></td>
<td>RHC, Nyaung Zin RHC and Thayetchaung Township Health Department</td>
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<td></td>
</tr>
<tr>
<td>5.8.12</td>
<td>Travel from Dawei to visit Inn Zauk RHC, Laung Lone Township Health</td>
<td>Vehicle</td>
<td>Dawei</td>
</tr>
<tr>
<td></td>
<td>Department and Maungmagan RHC</td>
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</tr>
<tr>
<td>6.8.12</td>
<td>Travel from Dawei to Yangon</td>
<td>Air</td>
<td>Yangon</td>
</tr>
<tr>
<td>Date</td>
<td>Itinerary</td>
<td>Mode of travel</td>
<td>Night stop</td>
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<tr>
<td>3.8.12</td>
<td>Travel from Nay Pyi Taw to Monywa</td>
<td>Vehicle</td>
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<tr>
<td></td>
<td>Visit to Regional Health Director, Sagaing Regional Health Department, Monywa</td>
<td>Vehicle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visit to Regional VBDC office, Sagaing Regional Health Department, Monywa</td>
<td>Vehicle</td>
<td>Monywa</td>
</tr>
<tr>
<td>4.8.12</td>
<td>Travel from Monywa to visit Ta-ze Township Health Department and Khabaung Kyaing RHC</td>
<td>Vehicle</td>
<td>Monywa</td>
</tr>
<tr>
<td>5.8.12</td>
<td>Travel from Monywa to visit Kan Htoo Ma Station Health Unit and Kha Yan Chan Sub-center</td>
<td>Vehicle</td>
<td>Monywa</td>
</tr>
<tr>
<td>6.8.12</td>
<td>Travel from Monywa to Yangon</td>
<td>Vehicle</td>
<td>Yangon</td>
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**Sagaing Region**

**Magway Region**

<table>
<thead>
<tr>
<th>Date</th>
<th>Itinerary</th>
<th>Mode of travel</th>
<th>Night stop</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.8.12</td>
<td>Travel from Nay Pyi Taw to Magway</td>
<td>Vehicle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visit to Regional Health Director, Magway Regional Health Department, Magway</td>
<td>Vehicle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visit to Regional VBDC office, Magway Regional Health Department, Magway</td>
<td>Vehicle</td>
<td>Magway</td>
</tr>
<tr>
<td>4.8.12</td>
<td>Travel from Magway to visit Pa Dan RHC, Pan Tein Sub-center and Nga-phe Township Health</td>
<td>Vehicle</td>
<td>Magway</td>
</tr>
<tr>
<td></td>
<td>Department</td>
<td>Vehicle</td>
<td>Magway</td>
</tr>
<tr>
<td>5.8.12</td>
<td>Travel from Magway to visit Salin Township Health Department, Kan Pyar Sub-center, Thayet Taw RHC and Lin Zin Station Hospital</td>
<td>Vehicle</td>
<td>Magway</td>
</tr>
<tr>
<td>6.8.12</td>
<td>Travel from Magway to Yangon</td>
<td>Vehicle</td>
<td>Yangon</td>
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</table>
## Group formation for field visit during 3 – 6 August 2012

<table>
<thead>
<tr>
<th>Team</th>
<th>State/Region</th>
<th>District/Township</th>
<th>Reviewers</th>
<th>GFATM staff</th>
<th>WHO secretariat</th>
<th>VBDC Officer (liaison offer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tanintharyi</td>
<td>Kawthaung district</td>
<td>Dr Kamini Mendis Dr William Hawley</td>
<td>Dr Jinkou Zhao</td>
<td>Dr Leonard Ortega</td>
<td>Dr Malar Soe</td>
</tr>
<tr>
<td>2</td>
<td>Southern Shan</td>
<td>Thaungyi district/Yat Sauk township</td>
<td>Mr James Hopkins Dr Wichai Satimai</td>
<td>-</td>
<td>Dr Mya Sapai Ngon</td>
<td>Dr Thar Tun Kyaw</td>
</tr>
<tr>
<td>3</td>
<td>Magway</td>
<td>Nga-phe and Salin townships</td>
<td>Mr Terry Clayton Dr Rita Kusriastuti Dr Nathorn Chaiyakunapruk</td>
<td>-</td>
<td>Dr Myo Myint Naing</td>
<td>Dr Aung Thi</td>
</tr>
<tr>
<td>4</td>
<td>Sagaing</td>
<td>Monywa district/Ta-ze township</td>
<td>Dr Anton Fric Dr Phone Saing</td>
<td>-</td>
<td>Dr Krongthong Thimasarn</td>
<td>Dr Nay Yi Yi Lin</td>
</tr>
</tbody>
</table>
## Reviewers per Thematic Area

<table>
<thead>
<tr>
<th>Thematic area</th>
<th>External Reviewers: Thematic Group Members</th>
<th>Technical Secretariat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Malaria Control Programme Management, Policy and Strategy</td>
<td>Dr Kamini Mendis Dr Wichai Satimai Dr Rita Kusriastuti</td>
<td>1. Dr Leonard Ortega</td>
</tr>
<tr>
<td>2. Epidemiology, epidemic preparedness and response, surveillance, monitoring and evaluation</td>
<td>Dr Anton Fric Dr William Hawley Mr James Hopkins</td>
<td>Dr Krongthong Thimasarn</td>
</tr>
<tr>
<td>3. Entomology, vector control and other preventive measures</td>
<td>Dr William Hawley Dr Wichai Satimai</td>
<td>Dr. Mya Sapai Ngon</td>
</tr>
<tr>
<td>4. Diagnosis and treatment</td>
<td>Dr Kamini Mendis Dr Rita Kusriastuti</td>
<td>Dr Myo Myint Naing</td>
</tr>
<tr>
<td>5. Procurement and supply chain management, Finance and resource mobilization</td>
<td>Dr Nathorn Dr Phone Saing Mr Terry Clayton</td>
<td>Dr Sai Naw Ngin</td>
</tr>
<tr>
<td>6. IEC/BCC, Advocacy, Community Participation, coordination and partnership and capacity building</td>
<td>Mr James Hopkins Mr Terry Clayton Dr Phone Saing</td>
<td>Dr Khin Than Win</td>
</tr>
</tbody>
</table>

Thematic Group Leader – take the leading and coordinating roles in (a) reviewing the thematic area as per programme review framework and (b) writing the findings and recommendations on the thematic area.
The programme review is a mechanism to assess overall programme achievements and performance as well as to identify gaps. It provides an opportunity to propose strategic directions in order to improve the programme performance. The Ministry of Health, Republic of the Union of Myanmar, in collaboration with WHO, conducted the external evaluation of the malaria control programme during 30 July–9 August 2012. The review team noted a rapid increase in key intervention coverage spanning a large part of the country and improving timely service delivery at the village level over the past six years. The review team also observed a strong partnership as well as potential increase of funding for malaria control. Inadequate human resources for malaria control, overlapping of implementing areas of multiple partners, and emergence of artemisinin resistance are key challenges.