The findings were discussed with senior officials of the Ministers of Health in each country and incorporated into Clover phase 1. Phase II of Clover then aimed to identify feasible solutions to tackle some of the identified health systems bottlenecks in five countries, viz. Ethiopia, Mozambique, Tanzania, Uganda and Zambia, as part of a health systems strengthening regional programme that focused on malaria as an entry point.

In Ethiopia, between 2005 - 2007, Malaria Consortium implemented Clover phase II in two zones of Southern Nations Nationalities People’s Region (SNNPR); Kembata Tembaro and Halaba Special woreda, with a combined population of 1 million people. The interventions were focused mainly at regional, zonal and woreda levels and included, training and purchase of commodities, medicines and other equipment. The successes registered in phase II included; efficient micro-planning at district level with subsequent successful mass ITNs distribution, a study on ITN utilisation whose findings informed the scaling up of ITNs and the development and implementation of a malaria communication strategy that aimed to improve utilisation of distributed ITNs as well as correct use of other malaria control interventions. The Federal Ministry of Health was involved in all stages of these processes and lessons learnt from the project informed policy.

Phase III of the Clover project was designed based on the successes achieved in phase II and geographically covers a wider area of SNNPR; three zones; Kembata Tembaro, Wolayta, Siltie and Halaba Special woreda, with an estimated population of 3.5 million. The SNNP-regional health bureau (RHB) identified these areas for the Clover project as they are frequently affected by malaria epidemics.

At national level Clover III provides technical support to the Federal Ministry of Health (FMOH) and plays a lead role in coordinating the efforts of civil society organization (CSOs) and non-governmental organisations (NGOs) and other agencies fighting malaria in Ethiopia collectively known as Coalition against Malaria in Ethiopia (CAME). At regional level Clover III supports HSS efforts for equitable access to malaria prevention and control in South Nations, Nationalities and People’s Regional State (SNNPRS) (Figure 1).

**Background**

The total population of Ethiopia is estimated to be 79,835,354 with an annual growth rate is 2.6%. The average household size is 4.7 persons. SNNPR is one of the most populated regions of Ethiopia and has an estimated total population of 16,104,521. The major health problems in Ethiopia are preventable communicable diseases and nutritional disorders. About 82% of the years of life lost are due to communicable diseases. Despite the progress that been made over the past decade to improve the health status of the population, Ethiopia still has a high rate of morbidity and mortality and the health status remains relatively poor.

Life expectancy at birth is 54 years (Male 53.4, Female 55.4). Infant mortality rate is 109 per 1,000 live births and maternal mortality ratio 590/100,000 live births. The proportion of births attended by skilled health personnel is 25%. Prevalence of HIV in the population aged 15 – 49 years is 2.3%. The proportion of one year olds immunized with three doses of diphtheria, tetanus toxoid and pertussis (DPT3) is 82%. The contraceptive prevalence for women aged 15 – 49 years is 56.2%. The health work force is still constrained with a ratio of doctor to population of 1:68,635 and nurse ratio of 1:3,928.

Ethiopia has gone through three series of Health Sector Development Program (HSDP), and is currently implementing the fourth series, HSDP IV. The Planning and Programming Directorate, is responsible for overseeing HSS issues and focuses mainly on health management information systems (HMIS), monitoring and evaluation (M&E), planning and programming and resource mobilization. Some of the HSS indicators tracked include the following: The Total health expenditure (THE) per capita which is 1.2 billion US Dollars (USD), Per Capita expenditure on health is USD 16.1.

The general government health expenditure as a proportion of total government expenditure is 21% and the total donor spending on health as percentage of THE is 40%. While physical access to health services is good, 98.1% of the population live within a radius of 5 kilometres of a health facility, the health system is characterized by limited and inequitably distributed poor quality health services, and critically low human resource capacity.

Ethiopia has recently introduced a three-tier health care delivery system which is characterized by a first level of a District health system comprising of a primary hospital (with population coverage of 60,000-100,000 people), health centers (15,000-25,000 population) and their satellite Health Posts (3,000-5,000 population). A Primary Hospital, health center and health posts form a primary health care unit (PHCU) with each health center having five satellite health posts. The second level in the tier is a General Hospital with population coverage of 1-1.5 million people; and the third a Specialized Hospital that covers population of 3.5-5 million. The major programmatic issues of malaria prevention and control are dealt with by the Health Promotion and Disease Prevention Directorate which has directorates for Rural, Urban and Pastoral Health Promotion and Disease Prevention.

Some of the critical health system bottlenecks that have impeded effective program scale-up and sustainability in Ethiopia include; critically low human resource (HR) numbers and capacity, with high attrition. Most staff have low technical and management skills and with low motivation. The lack of effective HMIS and M&E systems has hampered evidence-based programming. The lack of an effective procurement and logistics infrastructure and capital investment for health commodities has adversely affected drug procurement, causing stock-outs. While poorly harmonized drug procurement and distribution has led to over-supply and wastage of some drugs. Against the above background, malaria indicators in Ethiopia are poor (Table 1).
Malaria Consortium has offices at national and regional levels and works alongside FMOH and RHB executing the project through the government health system. The Clover project is managed through the Malaria Consortium office in Addis Ababa. There is a regional office, with two Clover project officers who work closely with the RHB and Woreda Health Office (WoHO) to implement activities at a zonal and woreda level, in line with the government priorities. Interventions have been supported at three levels of the health system; FMOH, SNNPRS HB, and zone/woreda, with particular focus given to woreda level.

The Clover project has implemented several interrelated interventions geared to wards strengthening different components of the health system for improved delivery and quality of services. Some of the key activities are outlined below according to type of HSS component targeted:

**Governance and Leadership**
Clover supported the FMOH to revise the national malaria diagnosis and treatment guidelines (2010), as well as adoption of the multi-species Rapid Diagnostic Test (RDT) kit to replace the Pfalciparum HRPII RDT at health post (community) level. The successful Round 8 proposal Global Fund for Aids Tuberculosis and Malaria (GFATM) was spearheaded by Clover. Additionally technical support was provided for the development of the regional (SNNPR) and national malaria Communication Strategies. Malaria Consortium – Clover has acted as the Secretariat of the national malaria control support team (MCST) and the Coalition against Malaria in Ethiopia (CAME). These functions contribute to governance and leadership components of the health system.

**Health financing**
Throughout its 6 years existence in Ethiopia Clover has supported and participated in district-based national health sector planning to enhance development of evidence based plans with appropriate representation of information from the HMIS.

**Human Resource**
Through the interrelated Clover components, capacity of health workers has been enhanced through on job training and supervision activities in case management, external quality assurance of malaria microscopy, HMIS and pharmaceutical and commodity management (Table 2). They are better able to perform their functions in the respective interventions, which has led to improved service delivery. For example average number of days with stock outs reduced by about 5 and 2 fold for woreda health office (WoHO) and HP respectively (Figure 2).

**Service delivery**
Clover interventions have focused on improving the quality of care and prevention for malaria. This has been achieved through interventions such as; external quality assurance (EQA) system for malaria microscopic diagnosis which included development of EQA implementation guidelines, training and supervision of laboratory technicians, procurement and distribution of reagents and supplies and technical support provided to establish a malaria case management audit system. Implementing community based behavior change communication (BCC) initiatives; including social mobilization through road shows has led to improved knowledge and practices for malaria prevention and treatment seeking. Technical and financial support rendered towards control of reported focal malaria case build up, including developing outbreak investigation guidelines and training of health professionals are other avenues that have boosted service delivery. Procurement and distribution of motor cycles to selected districts was aimed at strengthening supportive supervision structures, thereby improving service delivery (Table 4).

**Health Information System**
Support provided for strengthening HMIS included procurement of 74 computers with printers and software (55 for health facilities and 19 for woreda and Zonal health offices in Clover project Zones), and training of 273 HWs on computer use and the new HMIS reform, with special emphasis on data collection, analysis and subsequent use for decision making. Operational research on ITNs utilization was conducted in SNNPR in 2007 and 2009, the information generated guided the design and implementation of appropriate BCC interventions to address the low utilization of ITNs prevailing at the time despite increased coverage. These studies also informed the design of the SNNPR communication strategy.

**Pharmaceutical and commodity management**
Drug supply management (DSM) activities, including developing, printing and distribution of logistic management information system (LMIS) tools and training of pharmacy technicians, were supported within the framework of the national pharmaceutical logistics master plan (PLMP). Technical support was provided to conduct District micro-planning activities for improved delivery and management of RDTs, ACTs and ITNs were supported.

### Table 1: Main malaria coverage indicators, Dhisio, DHS 2005 and MIS 2007

<table>
<thead>
<tr>
<th>Indicator</th>
<th>DHS 2005</th>
<th>MIS 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTF with at least one net (any net)</td>
<td>5.25%</td>
<td>4.8%</td>
</tr>
<tr>
<td>HTF with at least one ITN</td>
<td>4.91%</td>
<td>4.85%</td>
</tr>
<tr>
<td>Use of nets/night/nightly by children under five</td>
<td>5.25%</td>
<td>4.91%</td>
</tr>
<tr>
<td>Use of nets/night/nightly by pregnant women</td>
<td>4.85%</td>
<td>4.91%</td>
</tr>
<tr>
<td>Use of nets/night/nightly by lactating women</td>
<td>4.85%</td>
<td>4.91%</td>
</tr>
<tr>
<td>Use of RDTs by pregnant women</td>
<td>3.5%</td>
<td>2.85%</td>
</tr>
<tr>
<td>Use of RDTs by lactating women</td>
<td>3.5%</td>
<td>2.85%</td>
</tr>
<tr>
<td>Coverage of ACTs at 2-4 weeks prevalence</td>
<td>35%</td>
<td>25%</td>
</tr>
<tr>
<td>Coverage of ACTs at 2-4 weeks prevalence (within 48 hrs)</td>
<td>35%</td>
<td>25%</td>
</tr>
</tbody>
</table>

*Percentages in DHS and MIS are net and were rate for children or pregnant women aged 2-4 [3-5].
1. IEC/BCC strategy
Clover has supported the development of a malaria communication strategy (MCS) for SNNPR and implementation of Information Education and Communication (IEC) / BCC interventions in the SNNP Region, by disseminating key messages on malaria prevention and control through local radio stations, road shows, newspapers, leaflets, training and supervision of health workers. A total of 200 flip charts with malaria messages were distributed to health workers and health extension workers (HEWs) for use during IEC/BCC activities. These activities have contributed to some remarkable results in the uptake of malaria prevention and control interventions in the region. The proportion of young children using nets the night preceding the survey has increased from 28.40% to 70.02%. Insecticide Treated Nets (ITNs) utilization has increased from 34.7% to 60.47% in all ages. The behaviour of the households towards Indoor Residual Spraying (IRS) has changed, demonstrated by the cooperation of households during spraying and avoiding re-plastering within six months after spraying. There is a noticeable decrease in the number of severe and complicated malaria cases going to health facilities possibly due to increased community awareness of the malaria symptoms thereby seeking early treatment. Furthermore, the overall knowledge of malaria by the community increased dramatically, 83% of households reported that they knew about malaria, compared to 60.2% previously. Positive treatment seeking behaviour has also increased; the percentage of children with a fever who sought medical attention within 24 hours increased from 15.7% to 47.8%.

The IEC/BCC strategy has been adopted by SNNP-RHB and is being scaled up to the rest of the region. 10% discordance to 4% over one year (Figure 3). Because of this work, EQA has now been included in the SNNPR-RHB strategy and is being scaled up to the rest of the region.

2. Malaria case management - Capacity building
Innovations were developed to bridge the existing gaps in providing quality malaria case management services. Findings and recommendations from a malaria clinical case management audit that explored malaria case management practices in SNNPR were shared with FMOH, SNNP-RHB and partners. Based on the major gaps identified such as inadequate and inconsistent supply of drugs, insufficient reagents and supplies, and which are crucial to malaria diagnosis and treatment and inadequate adherence to standard procedures and guidelines, Clover supported the RHB to develop user friendly training manuals on management of uncomplicated malaria and severe and complicated malaria. This was then re-infused with on-the job training and supervision in all the health facilities in the Clover supported zones. Additionally, Clover has supported the RHB to develop other guidelines on drug supply chain management and external quality assurance for malaria microscopy.

3. External Quality Assurance System (EQA)
Quality assured diagnosis of malaria has become even more critical with the change of the first line treatment of malaria to Artemisinin based combination therapy (ACT). Definitive diagnosis using microscopy or rapid diagnostic tests (RDTs), improves targeting of treatment with better treatment outcomes and reduces unnecessary treatment. However often microscopy is handled by personnel with limited skills who need close supervision to uphold the quality of their work. An initial recheck of blood films done in February 2009, showed 10% discordance (disagreement) between slide results of the peripheral laboratory personnel and the experts at the central reference laboratories (Figure 3).

To address this gap, Clover introduced the EQA scheme which re-checks slides to confirm concordance (agreement) of blood film results through three levels to identify results that differ between the peripheral and experts at central level. In response to the findings, the scheme provides for remedial actions through on job support and assessment of the quality of reagents. Sixteen health facilities in SNNPR have piloted the EQA approach with 59 laboratory personnel receiving refresher training, on-the job supervision and coaching on malaria microscopy.

EQA has demonstrated improvement in the quality of malaria microscopic diagnosis (from 10% discordance to 4% over one year (Figure 3). Because of this work, EQA has now been included in the SNNPR-RHB strategy and is being scaled up to the rest of the region.

4. Drug supply management
Over the last three years the Clover project has focused on strengthening the medicines supply system, by improving the delivery of malaria medicines and commodities in the project sites in SNNPR. A baseline assessment done in February 2008 identified the major areas of strength and weaknesses in the Essential Medicines and Health Supply (EHMS) logistics system. A key strength was the practice of stock redistribution by some health facilities to avoid wastage. The major weaknesses were in the logistics management information system (LMIS), inventory control system (ICS) and monitoring and evaluation (M&E) systems. Inadequate institutional capacity was an underlying factor in all cases. As a result, there were frequent stock-outs of drugs and supplies, and a high rate of expiry. Seventy four (74%) of health facilities surveyed in February 2008, reported frequent shortages and stock out of antimalarial drugs (Figure 2).

Based on these findings, Malaria Consortium worked with the SNNP-RHB and developed tools for drug supply management which included guidelines and training manuals on LMIS, (ICS) and M&E. These tools were aimed at introducing a standard system within the government framework of the National Pharmaceutical Logistics Master Plan (PLMP). Seventy one (71) pharmacy technicians in the project areas were trained and provided with standard recording and reporting formats. A total of 101,000 bin cards and 1,000 stock cards were purchased and distributed to woreda health offices and health facilities to improve DSM activities. Joint supportive supervision visits with
the SNNPR-RHB were conducted to ensure effective delivery of malaria medicines and commodities. The main outcomes of these efforts have been:

- Reduction in the occurrence of expired EMHS. At the time of the evaluation in June 2010, none of the health posts (HPs) (0%), 16.4% of HCs & Hospitals and 14.3% of woreda health office (WoHO) had expired of EMHS items - compared to the baseline done in February 2008, where 14% of health posts, 67% of HCs and hospitals and 100% of WoHOs, ZHDs & RHB had expired EMHS. Major reasons for this improvement were reported to be increased practice of first in first out (FEFO) and redistribution based on physical inventory and timely reporting.

- Reduction in the average number of days with stock outs by about 5 and 2 fold reduction for WoHO and HP respectively (Figure 2).

- Timely submission of LMIS reports to the next higher level from 42% at baseline to 76.9% of health facilities.

- Increased ability to forecast EMHS needs from 26% at baseline to 86.2% of facilities able to forecast their drug requirement using either consumption or morbidity data method.

- There is improvement in the efficiency of the supply system depicted by a reduction in the average lead time for refilling EMHS needs at HFs, currently at 4.5 days, compared to 7 days at baseline (Figure 4).

- Supportive supervisions were conducted by next higher level for 79.5% of facilities. For those who were supervised by the next higher level, 96.8% received feedback and 86.3% were found to have the written feedback.

5. Health Management Information System (HMIS)

Through Clover, support was provided in the form of training on the reformed national HMIS, provision of computers and training on the application software to manage data. The effect was improved data management at Zones, Districts and health facility levels. Presently the Zonal and District offices are able to store up to five years worth of health data on malaria electronically. Displays of charts and line graphs are now evident in health facilities (HFs) and health posts. These analyses are used at different levels to gauge achievements against set targets. However because of the ongoing HMIS reforms and the changing guidelines and instructions, achievements were less than optimal in this area.
Competing priorities at all levels of the health system (FMOH, RHB, ZHB, WoHO) interferes with timely implementation of activities. Harmonisation of plans at sub-national level is critical to reduce competition and avoid duplication.

Although alignment and harmonisation of plans is very important, the lengthy process of health system reforms by the government (e.g. reformed HMIS and pharmaceutical and logistic master plan) can greatly influence the speed at which interventions are implemented and can compromise the efforts of partners; patience and good negotiation skills are necessary to avoid frustration with the system.

Competing priorities at all levels of the health system (FMOH, RHB, ZHB, WoHO) interferes with timely implementation of activities. Harmonisation of plans at sub-national level is critical to reduce competition and avoid duplication.

Health systems support without provision of some crucial commodities such as LLINs and drugs reduces the perceived value of the project compared to those projects able to deliver large amounts of commodities.

Rendering high technical support is not enough. Technical assistance needs to be matched with adequate financial support to implement government activities. Sometimes the resources expected from government to complement partner efforts are not forthcoming creating critical gaps that can jeopardise partners' good intentions. Advocacy is required to maintain high commitment from government to meet its financial obligations.

Due to recognition of the achievements of Clover and the visibility of Malaria Consortium, there is increasing demand for support from other zones in the region and even from other regions of the country. This recognition has been achieved with limited financial resources but with high technical support.

Identification of health system problems through consultative meetings with the government and other stakeholders was a critical process in adapting the generic plans of Clover project to fit the context in Ethiopia. This process promoted ownership of the project among stakeholders.

The implementation landscape changes frequently over time. Flexibility of the project to cope with changes and meet some of the expectations of health officials was an important aspect of the design of Clover.

Strong partnerships with government and stakeholders promotes trust and reliability which are necessary to carry out health system strengthening activities over a long period of time particularly since results can be small in magnitude.
The Clover project will come to an end later in 2010. Some interventions from the project that will continue either with government support or other partner support include:

External Quality Assurance: EQA has been appreciated by the SNNP-RHB, who have included it in their in the Strategy and is being scaled up to the rest of the region.

The communication Strategy: The communication strategy developed for the SN-NPR, has been incorporated into their strategies and plans and will continue to be used by SNNP-RHB. This strategy is being used to develop a national malaria communication strategy.

The HSS Tools Developed by Clover: The various tools; manuals, guidelines, checklists, developed by Clover and endorsed by the SNNP-RHB and FMOH will continue in use to build capacity through training and supervision for improved quality of services (Table 2).

There are some interventions that have been beneficial to the health system which can be scaled up but government at the moment lacks the resources to do so. These present opportunities for partners to step in and support the government and given the experiences gained through Clover can be implemented at large scale to achieve greater improvements in the health system. These interventions include:

Implementing the HMIS reforms: With experience gained by SNNP-RHB through Clover HSS project, if supported the RHB can roll out the out HMIS interventions to cover the entire region. Procurement of information communication technology (ICT) materials and training of professionals on the new HMIS reform would be key.

Scaling up Integrated EQA: SNNP-RHB has already included the EQA scheme in their strategy, however resources are needed to scale it up to the entire region and to add more innovations to improve EQA data management and quality at facility level by supporting the application of electronic data management for EQA and linking the malaria diagnostic quality assurance system with TB microscopic diagnostic system.

IEC/BCC: Further strengthening of IEC/BCC activities at the community level to enhance the uptake of health interventions, especially the designing and production of key malaria messages in as many local languages as possible and using other innovations such as community conversation, malaria school clubs and others deemed effective.

Capacity Building: Capacity building activities namely, the on job training/mentoring approaches used by Clover to train health professionals require substantial support for their scaling up.

Drug Supply Management: Mobilization of additional resources to roll out the best practices, such as use of bin cards/stock cards, availing guidelines and LMIS tools, of DSM to all zones of the region and other regional states of the country. Improvement of distribution mechanisms is required to ensure that health commodities reach the lowest levels of the health system (community-based services) in a timely manner.

HSS continuation at sub-national level
Consolidating Clover: Malaria Consortium has had a good track record in implementing HSS interventions in Ethiopia and has been invited by FMOH to scale up its operations to other zones of the region and other regions of the country. This will require extensive investment from partners.

Scaling up HSS: Scaling up and implementing HSS project in line with the government’s five year Health Sector Development Program (HSDP) in all malarious zones of the SNNP region.

Scaling up Clover best practices: Scaling-up innovative interventions (for example EQA) that were adopted by the regional health bureau to all malarious regions of the country. Such scaling-up could be achieved through close collaboration and working with the regional and federal governments as well as in country partners.