# Republic of Rwanda


# Ministry of Health



# Rwanda Malaria Program Performance Review

**March 2011**

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# Executive Summary

## I. Key findings and conclusions

### *1. Surveillance and monitoring and evaluation systems*

Rwanda has an excellent information system in support of malaria control. The routine information system provide timely and complete monthly and weekly data for action: health and management information system (HMIS), Community Health Worker Information System (SYS.COM), epidemiological surveillance system with 11 sentinel sites, integrated disease surveillance (IDSR), and logistical information systems (LMIS) for various disease entities including malaria. Plans exist to convert the HMIS and IDSR into a phone-based, web-based platform for real time data collection. There is also a plan to develop a harmonized Logistics management information system. Regular data from health and malaria surveys: ddemographic and health surveys (DHS) that collect relevant malaria information (interim DHS 2007/2008 and ongoing 2010-2011 DHS); malaria indicator surveys (2005 MIS; 2010 integrated into the 2010/2011 DHS); health facility surveys for monitoring quality of care (2004/2005, and December 2010); and 2010 rapid evaluation of the community case management of malaria (CCM).

### *2. Malaria situation*

There has been extraordinary progress in the fight against malaria in the country. This is characterised by the following: 70% ddecline in malaria incidence between 2005 and 2010; 60% decline in outpatient malaria cases between 2005 and 2010; 54% decline in inpatient malaria deaths between 2005 and 2010; and 66% decline in malaria test positivity rate (TPR) between 2001 and 2010.There are however provincial and district variations in the gains in malaria control. For example, in 2010, the average TPR in East province was 29% and ranged between 19% and 40% among the districts. The same patterns of wide inter-district ranges were noted in average TPR in all provinces and Kigali city. Infact within each district, variations were noted in malaria incidence when looked at by health centre catchment area. Inspite of the inter-district and intra-district variations in malaria burden in the country, the malaria stratification map was last updated in 1982. Given that the stratification lends itself to targeting of interventions based on surveillance evidence, the absence of updated stratification map is a critical gap in program management. Also, although appropriate policies and guidance exist in various thematic documents, the absence of a consolidated malaria policy document was noted as a gap.

The gain in malaria control in Rwanda is very fragile. For instance in 2009, there was a spike in malaria incidence, proportional morbidity and mortality and test positivity rate at national level and in 28 of the 38 districts. This blip was said to be due to substantial decline in LLIN coverage from 51% in 2007 to 24% in 2009 due

to failure to conduct the planned LLIN distribution in 2008. Reduction in LLIN usage may also have contributed to this decline.

## *3. Achievements in various interventions*

### 3.1 Vector control

Vector control interventions used in the country include LLIN and IRS. Universal coverage with LLINs, defined as 1 LLIN for 2 people at risk of malaria, was achieved by February 2011. A focalised approach for IRS in high burden areas is used to supplement LLIN. More than 90% coverage of targeted structures was achieved with IRS, protecting about 1.2 million people.

### 3.2 Diagnosis and treatment

The country achieved one of the highest rates of parasitological diagnosis in Africa in 2010, with an estimated 94% of suspected malaria cases being parasitological diagnosed through microscopy or rapid diagnostic tests. There is a quality assurance system that documented satisfactory quality of diagnosis and anti-malaria medicines. Appropriate policies and guidelines in support of malaria diagnosis and treatment are available. Proportion of children under 5 years of age who received treatment within 24 hours rose from 62% in 2008 to 84% in 2009 and 89% in 2010. There is uuniversal coverage of ACT treatment through the public health system including faith-based facilities and through integrated community case management of children under five.

### 3.3 Health systems and support interventions

The scale up of interventions and impact on malaria were made possible by an exemplary organization and management of the health system as exemplified by integration and decentralization of malaria control at all levels, community involvement and participation performance-based pay for health workers who deliver key high quality interventions and meet targets. Access to health services is very high. There is also a good referral system supported by ambulances at hospitals and cell phones held by CHWs. There is a sustainable financing of health services through enhanced enrolment of people in fee-for-service community health insurance from 7% in 2003 to 92% in 2009.

The Supply Chain Management system had streamlined and clear operational centres at Central, District, Health centre and Community levels. Appropriate guidelines for management of commodities and pharmacovigilance alongside a pre-service learning module are available. Annual quantification for medicines and community needs assessment has ensured well supplied pipeline. Some challenges exist: absence of SOPs for PSM at all levels; absence of formal document with specifications of all anti-malarial commodities; lengthy procurement procedures; and absence of feedback on the LMIS.

There is strong political commitment to malaria control as shown by the presidential funding of training of CHW and issue of phones to all 60,000 CHWs. A comparison of data from 2007 DHS and 2010 rapid assessment showed evidence of behavior change resulting from previous BCC investments. For example, children under 5 who slept under LLIN the previous night increased from 60% in 2007 to 69,6 % in 2010.

Majority of partners' activities are aligned with the national malaria strategic plan. Outstanding is the need for increased information on financial expenditures from all partners. Gaps in funding the malaria control program were greatly reduced with substantial external funding from GFATM and PMI. The funding gaps declined to 10% in 2011. However there is danger of reversal in this area beginning 2012. Based on current commitments, a 55% funding gap exists for 2012 (amounting to USD 74,207,283.00) and 70% for 2013 (USD 44,157,360.00).

## II. Key recommendations

1. Maintain universal coverage with ITNs and malaria diagnosis and treatment and adopt malaria burden reduction strategies in targeted sectors, cells or villages within selected districts using IRS and vector source reduction strategies where applicable. This should be supported with sustained BCC/ICC campaign in support of interventions uptake with special focus on use of ITNs and need to maintain vigilance on malaria as the burden declines.

2. Adopt surveillance-based targeting of interventions. This will entail continued investments in the generation of strategic information and updating of malaria stratification maps to enable the targeting of interventions based on evidence. The following mechanisms for generating strategic information for action should continue: malaria parasite prevalence data through DHS and MIS; malaria vector bionomics through the sentinel surveillance sites; and studies on malaria medicines therapeutic efficacy, insecticide resistance and residual effects of insecticides.

   Regularly update the following maps and trends graphs: parasite prevalence map using data from DHS and MIS every 3-5 years; annual TPR map and monthly TPR trends graph; annual malaria Incidence map and trends graph; annual malaria vector map in order to monitor changes in vector populations and proportions. The ongoing work with the Malaria Atlas Project (MAP) to produce a composite model map of malaria risk in the country should be completed.

   In the context of the planned real-time data reporting systems, the following actions are imperative:

i. set new thresholds for malaria epidemics in all villages, cells, health centres and district hospitals as well as taking local action to management upsurges. Given declining malaria burden and transmission intensity, the WHO formulae for calculating thresholds may not be applicable - use of the average test positivity rate (TPR) of the previous year at that level (district, health centre, or cell) as the threshold for every New Year is suggested; and
ii. strengthen weekly analysis and use of routine data for action at national, district and health centre levels based on a set of core indicators for each level.

3. Adopt sustainable funding for malaria control especially funds to sustain universal coverage with LLINs and malaria diagnosis and treatment, and BCC/IEC campaigns. Specifically, there is need to undertake resource mobilization and increase domestic funding. There is also need to undertake advocacy for public-private partnership for malaria control and mobilize more funds from GFATM and other multi-lateral and bilateral organizations.

4. Implement cross-border collaboration in malaria control in malaria epidemic management between Rwanda and neighbouring countries through advocacy and planning at ministerial level, and review and information sharing meetings between Rwanda's border districts and their counterparts in neighbouring countries.

5. Update or produce strategic documents as follows: malaria policy document; MSP; M&E plan; EPR guidelines and tools; malaria commodities management guideline; mmalaria commodities specifications document; SOPs for commodities distribution; SOPs placing orders of malaria commodities at all level; and SOPs for storage of malaria commodities at community level.

6. Strengthen implementation capacity including equipment and training in vector surveillance and EPR, training on data for decision making and training on identification of vector breeding sites and management and developing and installing software for forecasting malaria commodities.

7. Conduct performance monitoring through semi-annual review and planning meetings focused on reviewing the following: malaria epidemiology including malaria epidemiological stratification, trends of TPR, incidence, and proportional morbidity and mortality; and progress of implementation of the MSP and annual operational plan including technical and financial reporting by all partners

# 1 Introduction

## 1.1 Background on Rwanda

Rwanda is situated in East Africa immediately south of the equator between 1°4' and 2°51' south latitude and 28°63' and 30°54' east longitude with a total surface area of 26,338 square kilometres. It is bordered by Uganda to the north, Tanzania to the east, the Democratic Republic of the Congo to the west, and Burundi to the south.

Rwanda forms part of the highlands of eastern and central Africa, with mountainous relief and an average elevation of 1,700 meters. However, there are three distinct geographical regions. Western and north-central Rwanda is made up of the mountains and foothills of the Congo-Nile Divide, the Virunga volcano range, and the northern highlands. In Rwanda's centre, mountainous terrain gives way to the rolling hills that give the country its nickname, "Land of a Thousand Hills." Here the average elevation varies between 1,500 and 2,000 meters.

Rwanda enjoys a temperate, sub-equatorial climate with average yearly temperatures of around 18.5°C. The average annual rainfall is 1,250 millimetres and occurs in two rainy seasons of differing lengths, alternating with one long and one short dry season. Rwanda has a dense network of rivers and streams, and several lakes surrounded by wetlands.

All the above environmental and climate factors are part of the factors influencing malaria in the country: climate variability (especially in the northern part of the country); differences in altitude; places of high human concentration (e.g. boarding schools in proximity of marsh); population movement (especially in the areas of low transmission to high transmission area); irrigation schemes (especially in the eastern and southern parts of the country); and cross-border movement of people (especially in the eastern and south-east parts of the country).

The population of Rwanda is estimated to be 10.2 million (mid-2010 estimate - National Institute of Statistics of Rwanda) with a high population density across the country of 368 inhabitants per square kilometre (2007 estimate). The population is essentially young, with 67 percent of all Rwandans under the age of 20; and 52 percent of the population is female. Nearly all Rwandans speak the same language, Kinyarwanda (spoken by over 99 percent of the population), which is the country's first official language, followed by French and English.

To improve the health of the population the Ministry of Health has developed a community health policy to create health care services at the community level. All socio-demographic aspects of the population were taken into account in the context

of guaranteeing equal access to health services and delivery of quality health services for all.

Economic access to health services was a challenge in the country. For instance, according to the 2006 Rwanda National Health accounts, expenditure on malaria accounted for 14% of the total health care expenditure. To improve financial access and equal access to the health care system plus mobilization of internal resources to increase financial viability of the health care services, the country instituted a system of mutual health insurance to respond to three specific objectives: to improve financial access to health care; to improve the financial situation of health establishments, and to improve the overall health of the population.

### 1.2 History of malaria in Rwanda

Malaria control in this country has had a long history dating as far back as 1920's. According to Ivorra Cano[i] Malaria was introduced in Rwanda in 19th Century and the first cases of malaria were seen after troops passed through Rwaza during the World War I. In 1930, malaria was known under the name of KAPfura in patients from Butare, Kabgayi, Ruhengeri, Nyanza and near lake Burera where the plasmodic index was 95%.[ii] Clinical malaria cases were seen in Rwandese who were working in Panda and Kilo cooper mines in Congo between 1937-38. Out of 2281 admitted patients, the plasmodic index was 88.3% and the gametocyte index was 2.7% showing low immunity in this population. Sixteen percent of the patients who were treated with 1 to 2 gms of quinine developed Hemoglobinuria which was suggestive of G6PD deficiency.[iii] In 1946, Schwetz conducted parasitological and entomological surveys in many areas of the country which showed occurrence of malaria epidemics due to expansion of cultivation activities into the marshes.[iv] In 1949 Jadin and Fain found 51.13% prevalence in 11,894 blood smears read in the Medical laboratory of Butare.[v] Epidemiological surveys conducted by Chardone & Coll in Mutara in 1954-55 showed a malaria prevalence of 43.3% with 56% being Plasmodium malariae.[vi]

### *1.3 Report outline*

The sections that follow consist of the following: Rwanda MPR; epidemiology of malaria; program management and guidance; Achievements by thematic areas – malaria vector control, malaria diagnosis and treatment, epidemic preparedness and response, supply chain management, advocacy, communication and social mobilization, and surveillance, monitoring and evaluation; conclusions; and recommendations.

# 2 The Rwanda malaria program performance review

## *2.1 Purpose*

The MPR is an exercise that allows a country to undertake a detailed review of the achievements of the malaria control program, the enabling factors in terms of strategies and activities and define the gaps between what was planned and what was implemented. The result of the MPR should include recommendations on current strategies and activities to be retained and what adaptations and new strategies to be to adopt in the context of new or recommended strategic directions. The MPR should involve all stakeholders in order to have the same understanding and plan together as a team so as to deliver high quality malaria interventions.

## *2.2 Justification*

The MPR was launched in Rwanda as a mid-term review of the MSP (2008-2012). Moreover, the malaria burden in the country had been declining. Before 2005, malaria was the leading cause of morbidity and mortality in Rwanda with periodic epidemic outbreaks in the high altitude areas. It accounted for over 50% of the outpatient attendance in the health centres and had high case fatality rates that were as high as 6% in district hospitals. Following a rapid increase of scaled-up malaria interventions, dramatic reduction in malaria cases and deaths has been achieved. At this time, health facility utilization rates increased dramatically as well, due in part to nationwide government community health insurance and improvements in quality of care and availability of services. Even with such significant progress, the battle against malaria is far from over. Decreased malaria burden brings a new set of challenges including possible drops in LLIN usage as malaria prevalence declines, reductions in natural immunity to the malaria parasite rendering large areas to become unstable hence prone to epidemics, and the need to implement a regional strategy for continued gains against the disease.

This expanding scope of new challenges underscores the need for sustained resources, political commitment and strong management at all level to fully control malaria. Rwanda is at a critical turning point in the fight against malaria and therefore, there was a strong justification to review the program in order to re-strategize and re-align efforts so as to sustain the achievements and progressively move towards malaria pre-elimination.

## 2.3 Objectives of the MPR

The general objective of the review was to assess the current strategies and activities with a view of strengthening the malaria control programme for sustaining the gains made and achieving further reductions in the malaria burden.

The specific objectives were:

1. to review the epidemiology of malaria in Rwanda;
2. to assess progress toward achievement of national, regional and global targets;
3. to conduct a mid-term evaluation of the current strategic plan 2008 – 2012;
4. to review the current program performance by intervention thematic areas and service delivery levels;
5. to review the structure, organization, and management framework for malaria control within the health system and the national development agenda;
6. to pave way for development of the new Rwanda malaria control programme (RMCP) Strategic Plan, new RMCP M&E plan both of which are an important precondition for resource mobilization and
7. to define the next steps for sustaining and improving program performance;

### 2.4 Methodology of the MPR

The MPR was conducted in 4 phases namely; planning and preparation (Phase 1), thematic desk reviews (Phase 2); field visits to validate thematic reports (Phase 3) and report writing and other follow up actions (Phase 4).

#### 2.4.1 Phase One: Planning and Preparation

The first phase of planning started in October 2010 when a cost plan/proposal was sent to WHO/AFRO requesting for funds. During this phase, there were consultation meetings with stakeholders to define the need for the review and to develop terms of references (TORs). Thematic review groups were formed in order to review Rwanda malaria program strategies. These groups were comprised of partners, district officials, the police, the army, GoR institutions and Units working in collaboration with the Malaria Unit. All thematic groups were chaired by partners involved in specific malaria control strategies and the Malaria Unit served as a secretariat. ToRs were developed and validated in a stakeholders meeting. The plan and budget were submitted to the RBM, the Malaria Unit and other partners for funding.

#### 2.4.2 Phase Two: Thematic Desk Reviews

The second phase started in December 2010 and ended March 2011. This phase involved selecting tools for the field review and conducting thematic desk reviews. Thematic review groups were meeting every week and all existing documents were found and filed at the Malaria Unit and shared with all partners. Two retreats were organized to finalize thematic review reports. A checklist was developed to track activities and updated gradually as need arose. This desk review consisted of a summary of recent progress in achieving set targets for access, coverage, quality, use and impact. It allowed the program to identify best practices, recognize problems, determine the priority of those problems, decide on how to investigate

those of highest priority and propose appropriate solutions. This phase revealed information weaknesses and gaps and therefore where the external review process would focus.

### 2.4.3 Phase Three: Field Review

The third phase was done according to the guidelines and it involved briefing of external review team. This ensued team-building between internal and external review teams, consensus-building on findings of thematic internal desk review, familiarization with data collection tools for field visits, briefing and formation of field teams for field review. The field visits started with central level visits to national institutions and organizations. This was followed by district and community field visits to malaria service delivery points. Later, teams re-converged and shared field reports through plenary presentations on key findings. Thereafter, thematic review reports were updated with this information to ensure completeness, and then preparation of drafts of the final report, executive summary, aide-memoire and slide presentation of key findings and recommendations. The aide-memoire and a summary of the key findings and recommendations were presented to the Honourable Minister of Health by the external review team. The aide memoire was circulated to stakeholders for study and internalization two days before the signature data. Then the same presentations were presented to the RBM stakeholders meeting that culminated into a ceremony for signing the aide-memoire.

Presentation of the findings was made to the Minister by the team followed by a presentation to all stakeholders in malaria control and the signing of the aide memoire on 18 March 2011. The aide memoire (Annex 1) was signed by Permanent Secretary of the Ministry of Health, the World Health Representative representing the United Nations agencies in Rwanda, the USAID Mission Director representing bilateral organizations in Rwanda, a representative of civil society organisations (Rwanda Development Organizations), the Director of the School of Public Health of the University of Rwanda representing research and academia and the Director of Malaria Unit and acting Director General of RBC/TRAC Plus.

### 2.4.4 Phase 4: Follow-Up

Phase 4 will start with finalizing, publishing and dissemination of the report. There will be followed with implementation of recommendations as part of updating policies, guidelines and plans as well as systematic monitor of the implementation of the recommendations. As part of the recommendations the NMCP and its partners will also update malaria policies and strategic and annual operational plans, and redesign programme as planned during the MPR.

# 3 Epidemiology of Malaria

## 3.1 Population at Risk of Malaria

The entire population of Rwanda is at risk of malaria. The high risk groups are as follows: children under five years of age; pregnant women; and people living with HIV/AIDS.

## 3.2 The Burden of Malaria

Malaria had been the leading cause of morbidity and mortality in Rwanda since the early 1960s with periodic epidemic outbreaks in the high altitude areas. This has however changed due to expansion of malaria prevention and control interventions. Year 2008 HMIS data showed that malaria had become the second highest cause of morbidity in Rwanda (12% of outpatient consultations and 16% of deaths). Among children under five years of age in 2008, malaria was the third highest cause of deaths (17.3% of proportional mortality).

The burden of malaria in Rwanda is declining as shown by 3 indicators reviewed: malaria incidence; malaria proportional morbidity; and malaria positivity rate. Malaria incidence declined from 186 cases per 1000 in 2005 to 84 per 1000 in 2008 (55% decline).

Overall, malaria incidence declined by 70% between 2005 and 2010 (See figure 1). The reduction in 2010 – 48.5% testing in 2009 and 93.7% testing in 2010; is the drop in 2010 real or due to increased use of microscopy/RDTs which excludes the non-malaria presumed malaria cases in previous years, thus narrowing the denominator.

Figure 1: Malaria Incidence

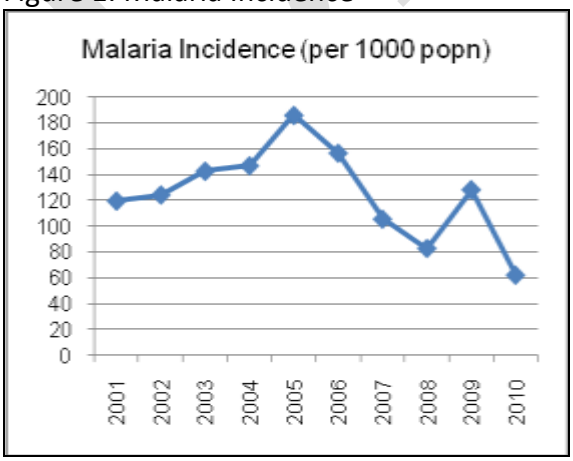
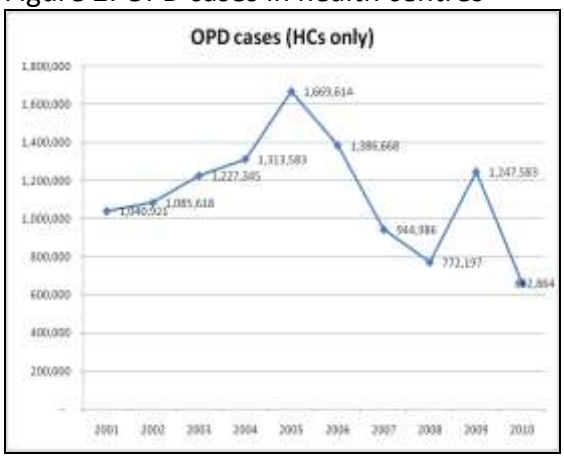



Figure 2: OPD cases in health centres



The trend of decline in malaria incidence is also reflected in the number of cases of malaria. Between 2005 and 2008, there was a 54% reduction in the number of malaria cases reported in health centres from 1,700,000 in 2005 to 700,000 in 2008, 60% reduction between 2005 and 2010 (see figure 2).

When the malaria HMIS data of 2007 is compared with that of 2005, there was a 64% reduction of malaria hospitalized cases and a 66% reduction in malaria hospitalized deaths. On the other hand, a comparison of the 2007 data with the average data for the 2001-2005 period showed a 54% reduction in hospitalized malaria cases and 62% reduction in hospitalized malaria deaths (See figure 3).

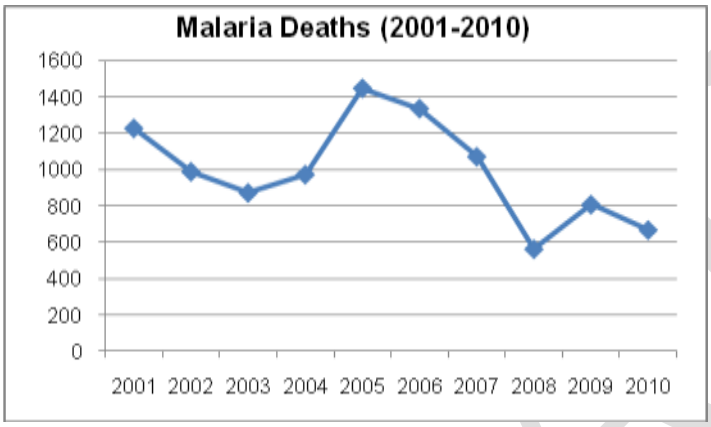


Figure 3: Trends of malaria deaths in district hospitals, 2001-2010

Malaria case fatality rate is also declining; the decline was over tenfold between 2005 and 2008 among people above the age of five years. In 2003, the malaria case fatality rate was 5.7% in children under five and 5.8% for those over five. In 2007, this had fallen to 0.3% in the under five and 0.6% in the five and above. Reported malaria deaths from district hospitals decreased from 1445 to 670 between 2005 and 2010.

In 2009, there was a spike in number of cases of malaria and deaths, malaria incidence, test positivity rate, and proportional morbidity and mortality rates. Malaria incidence rose from 84/1000 people at risk in 2008 to 128/1000 people at risk in 2009. Malaria proportional morbidity rose to 15.6% of outpatient consultations and 19% of deaths in 2009. The outbreak was also associated with increase in the total numbers of consultation and deaths due to other illnesses as well as increase in utilization of health services to the tune of 85%.This blip in 2009 was due to substantial decline in LLIN administrative coverage from 51% in 2007 to 24% in 2009 due to failure to conduct the planned LLIN distribution in 2008. Low use of available LLINs in the community could have contributed to this rise in malaria cases. In response to the outbreak, interventions were instituted including replacement of LLINS, robust communication strategy on LLIN's use &

maintenance, introduction of subsidized ACTs in private sector for children under five, policy of testing every suspected malaria case, introduction of HBM in 21 Districts and IRS in 7 districts. Thus between December 2009 and January 2010, a total of 6 million LLINs were distributed. This resulted in 50% reduction in malaria morbidity few months after; malaria morbidity decreased from 13% in 2009 to 7.8% in 2010 while deaths decreased from 20 to 13% in the same period.

### 3.3 Temporal Distribution of Malaria in Rwanda

In Rwanda, malaria transmission occurs throughout the year with peaks in May/June and November/December each year (figure 4).

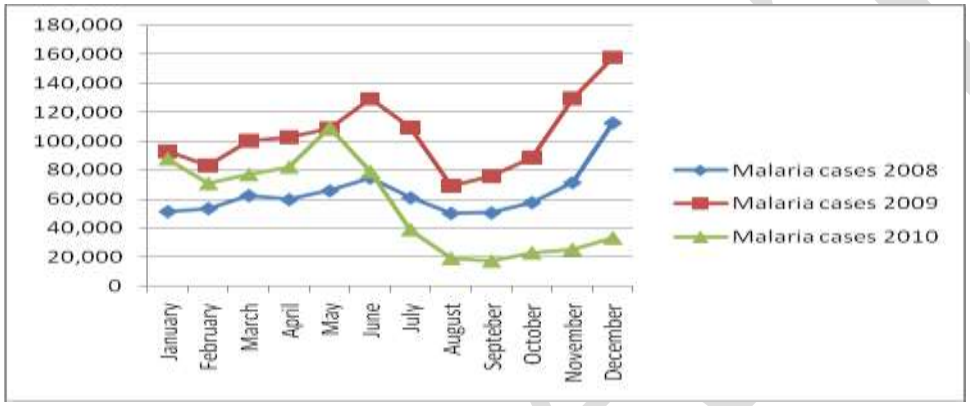



**Figure 4: Seasonal trends in malaria cases by year**

### 3.4 Geographical Distribution of Malaria

A 1982 stratification of malaria in Rwanda using altitude, climate, plasmodium index and disease vectors present divided Rwanda into 4 eco-epidemiological zones (see figure 5): Zone I extended from the Kivu Lake to the “Crête Congo–Nil” (1460-1800m). It is characterised by a parasite prevalence (plasmodium index) of 5-30%, malaria morbidity of 19% (Rusizi district); Zone II is a north-south stretch of land measuring about 160 km by 25-50 km east of zone I - this zone located at an altitude of 1800-3000m above sea level. The parasite prevalence (plasmodium index) in this zone is less than 2%; Zone III is located in the central plateau at an altitude of 1500-2000m above sea level) - the parasite prevalence in this zone ranges from 10% to 50%; Zone 1V is located in the lower floor of the eastern Central Plateau at an altitude of 1,000-1,500m above sea level - here malaria transmission is endemic and stable.

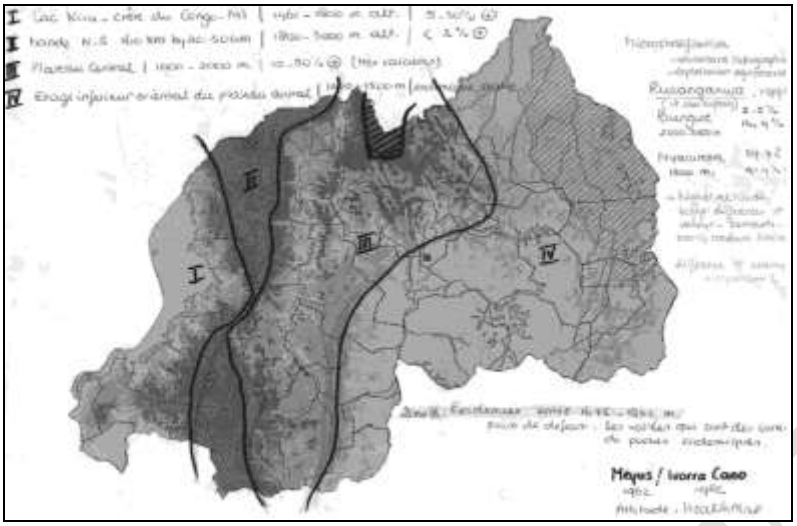


**Figure 5: Eco-epidemiological stratification of malaria in Rwanda, 1982**

### 3.4.1 Malaria Prevalence

The prevalence of malaria in Rwanda declined from between 12-32% in 2005 (malariometric survey) to 0.4-2.4% in 2008 (interim-DHS 2007-2008). The prevalence was 2.6% and 1.4% among under fives and women of reproductive age respectively (See figures 6 and 7 respectively). Prevalence data from 2011 DHS should be used to update these maps.

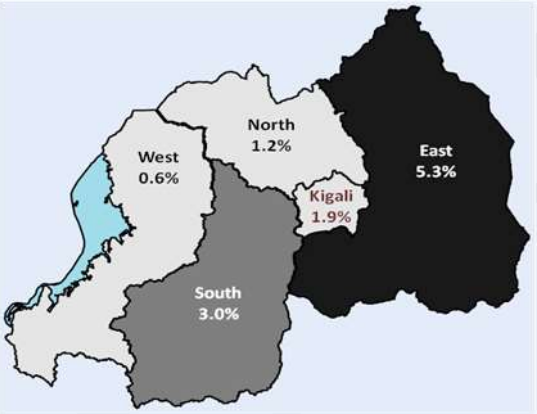



Figure 6: Malaria parasite prevalence among children under five years of age by region, 2008

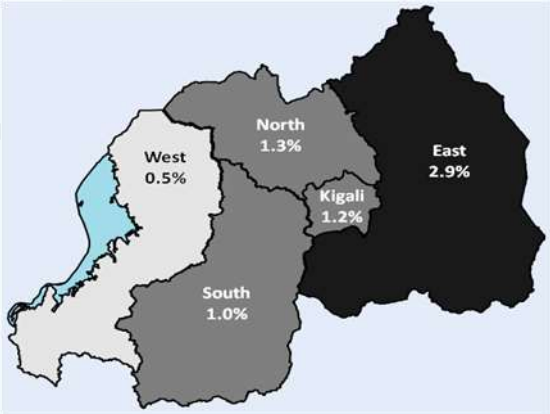



Figure 7: Malaria prevalence among women of child bearing age by region, 2008

### 3.4.2 Operational Stratification Using TPR and Incidence

Over the period 2001-2010 the test positivity rate (proportion of the number of positive tests over the number of tests using microscopy or rapid diagnostic tests taken) has declined from just over 55% to 22.9% (figure 8). This indicates that the stratification map done in 1982 is too old and may not reflect the current realities, more so given huge investments in malaria prevention, diagnosis and treatment since 2005.

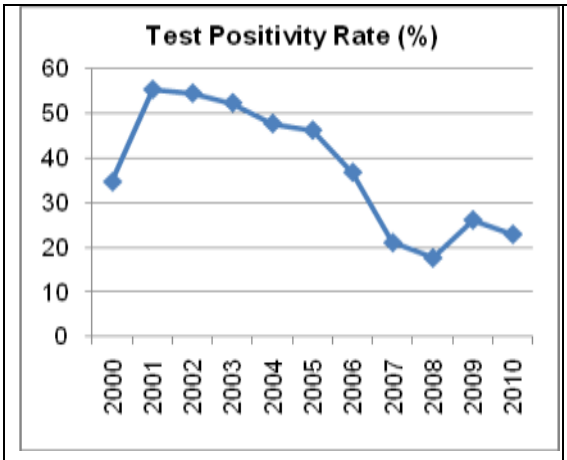



Figure 8: Trends in malaria test positivity rate (2000-2010)

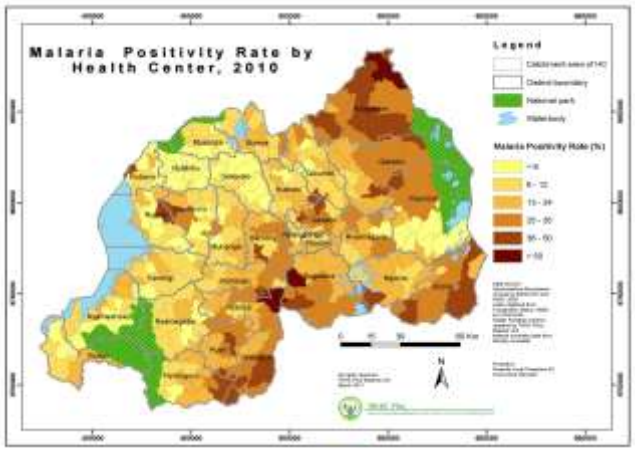



Figure 9: Map of malaria test positivity rate 2010

For operational purposes, test positivity rate could be used to stratify the districts, a proxy to declining parasite prevalence. A 2010 stratification by TPR is seen in Figure 9 and it shows inter-district and intra-district variations in malaria TPR.

There was a 66% decline in the average national TPR between 2001 and 2010 with provincial and district variations. The average national TPR in Rwanda was 22.9% in 2010. This is the culmination of the declining trends of TPR from 56% in 2001 to 14% in 2008 (75% decline).There was however a reversal in 2009 with TPR rising to 22.9%. Prompt interventions led to a resumption of the declining trends in 2010. It should be noted however that the 2009 reversal in declining trends of TPR occurred 28 of the 30 districts, even starting earlier (2008) in 4 districts (3 districts in eastern province and 1 district in southern province). For 14 (47%) of the 30 districts, the rising trends of TPR continued in 2010.

Eastern province had the highest TPR in 2010 (average, 29%; range, 19-40%). Average TPR in eastern province declined steadily from 62% in 2001 to 23% in 2008 (63% decline). The TPR however started rising in 2009 and continued in 2010, rising from a low of 23% in 2008 to 29% in 2010. The TPR in 3 of the 7 districts started rising in 2007 and continued till 2010. TPR in the other 4 districts started rising in 2008 and continued till 2010.

Southern province had the second highest TPR in 2010 (average, 24%; range, 10-32%). There was however a 71% decline in TPR over the years, declining from 56% in 2002 to 16% in 2008. The decline was reversed in 2009, rising to 25% and declining slightly in 2010 to 24%. It is noted that all districts suffered the 2009 reversal in TPR with the rise in TPR in 6 of the 8 districts continuing into 2010.

The trend of TPR in Kigali area declined from 43% in 2005 to 11% in 2008. This trend was however reversed in 2009 in all the 3 districts when the average TPR rose to 14% and continued to 16% in 2010 (range 9-23%). When the declining trends resumed in 2010 for 2 districts, the rise in TPR continued in Nyarugenge district in 2010 although at low level of 8.5%.

Northern Province had one of the lowest average TPR in 2010 (average, 11%; range, 5-19%; second only to Western province). The TPR had been declining over the years, from a high of 54% in 2001 to 9% in 2008. This decline was however reversed in 2009 (12%) with a slight decline in 2010 (11%). The rise in TPR in 2009 affected 4 of the 5 districts and continued in 2010 in 3 of the 5 districts.

Western province had the lowest TPR in 2010 (average, 10%; range, 7-14%). There has been a historical decline in TPR in this province, from 51% in 2001 to 8% in 2009 (a decline of 84%). A reversal in the declining trends of TPR started in 2009, rising to 12% but the decline started again in 2010. Six of the 7 districts however suffered a reversal in the declining trends. While 2 of the 6 reverted to declining trends in 2010, 4 continued the rising trend of TPR in 2010.

### 3.5 Malaria Parasites and Vectors

The main plasmodium species occurring in Rwanda is plasmodium falciparum (98.5%), with some ovale and malariae. There is practically no vivax detected in Rwanda[vii].

According to entomological studies from 1982 all three major malaria vectors of Sub-Saharan Africa, namely Anopheles arabiensis, Anopheles gambiae and Anopheles funestus were found in Rwanda. However, recent studies have shown predominantly Anopheles gambiae and a few anopheles funestus and Anopheles arabiensis as the malaria vectors in the country (Annual malaria reports, 2009). Information on bionomics can be seen in the section 5.1.7.4.

### 3.6 Key Issues

There is no updated map malaria stratification by prevalence since 1982 using an integrated set of indicators. In addition, for operational purposes routine data collected by HMIS and other sources can be used to annually stratify malaria to allow decision making on interventions.

### 3.7 Action Points

1. Update the epidemiological stratification map for the country; and
2. Use the routine data to provide epidemiological evidence for improved targeting to strengthen the implementation of cost effective interventions, given sub-district variations in malaria epidemiology.

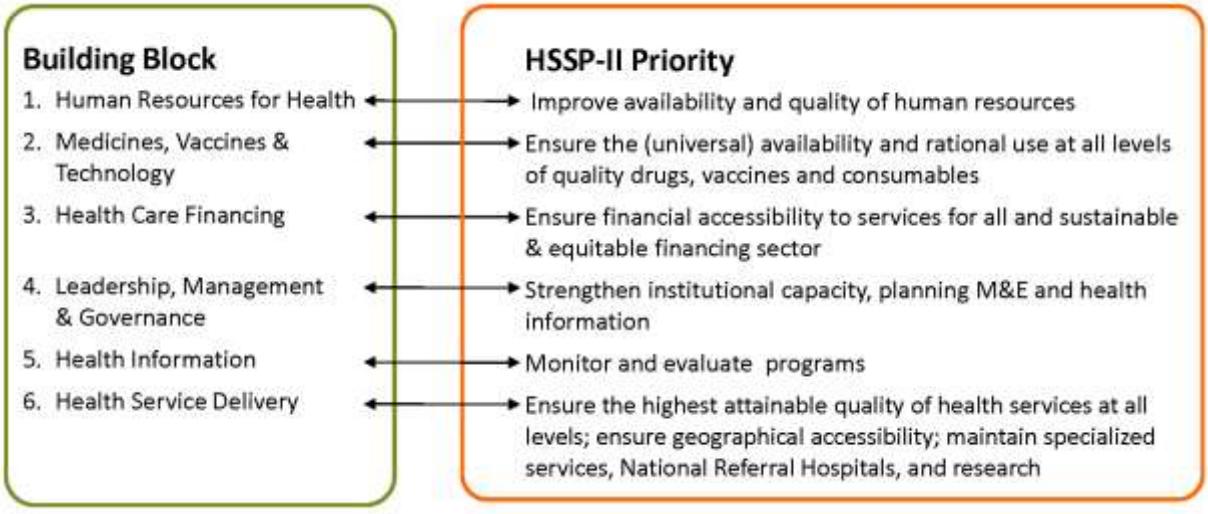
# 4 Program Management and Guidance

## 4.1 Place of Malaria Control in the National Health and Development Agenda

In September 2007, the GoR finalised the Economic Development and Poverty Reduction Strategy (EDPRS) 2008-2012. In order to align the Health Sector Strategic Plan to the EDPRS, the MoH decided that the HSSP-I would be internally and externally evaluated in 2008, and the second Health Sector Strategic Plan (HSSP-II) would subsequently be developed one year earlier than originally envisioned.

The HSSP-II operationalizes the EDPRS and Health Sector Policy and will guide the entire sector in the medium term. It provides a framework to inform health sector reforms and interventions in support of the GoR mission to continually improve the health of the population and thereby help to reduce poverty. The HSSP-II is implemented through the Medium Term Expenditure Framework (MTEF), which is linked to the national budget. The objectives of the HSSP-II have been aligned to the MTEF to ensure consistency in sector planning, budgeting and monitoring for 2009-2012. All major stakeholders in the health sector were involved in the development of HSSP-II in order to produce a comprehensive, high-quality plan and to create ownership amongst those responsible for its implementation and evaluation. The main components of HSSP-II were identified and the strategic objectives and major outputs were formulated and agreed upon by the MoH and its stakeholders. The endorsement of the HSSP-II was formally agreed by all stakeholders at the Joint Health Sector Review.

The HSSP-II was built on the highly successful Health Sector Strategic Plan-I (HSSP-I) with greater prominence placed on some areas, and other new initiatives being introduced based on emerging needs in the health sector. Family planning,



maternal and child health and nutrition are given greater emphasis and more funds will be directed to these programs to ensure that MDGs and EDPRS targets are met. Efforts are be made to increase community health interventions to bring services closer to the people, quality emergency transportation will be enhanced and the accreditation of quality health services will be expanded.

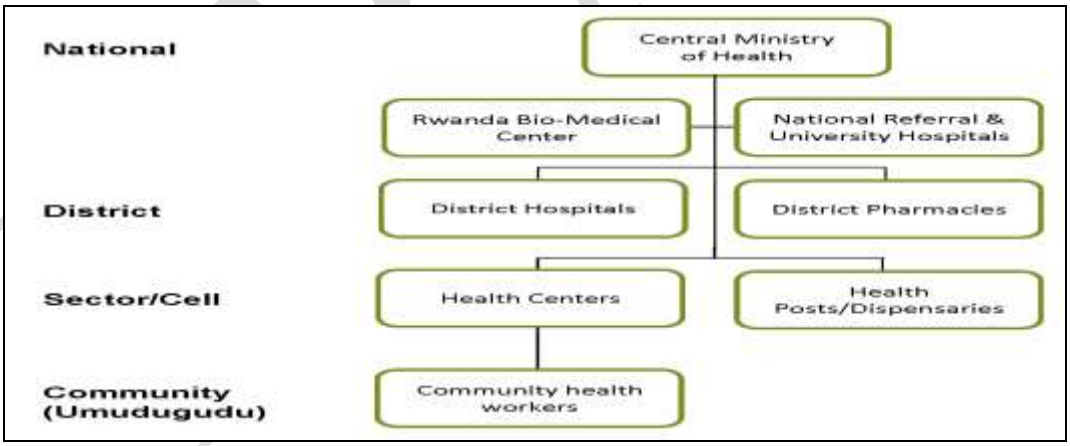
The continuing development of the SWAp at central and district levels and the finalisation of the decentralisation process were key areas for intervention. Within the objectives and program areas, key outcomes to be achieved were: a reduction in the maternal, child and infant mortality ratios; a decrease in the fertility rate; a reduced incidence of HIV; an operational Sector Wide Approach (SWAp) to be in place at central and district levels; an increase in the number of health facilities meeting WHO staffing norms; universal health insurance coverage; an increase in non-earmarked financial resources; increased geographical access; improved rational drug use; and strengthened research capacity.

## 4.2 The National Health System

### 4.2.1 Structure of the National Health System

The health system of Rwanda is organized according to the six building blocks and decentralized to five levels, as illustrated in Figure 11.

**Figure 11: Structure of the Rwanda Health System**




#### 4.2.1.1 National level

The central MOH undertook recent structural changes resulting in two main health entities: Core ministry of health; and the Rwanda Biomedical centre. The core Ministry of Health consists of four units: Clinical Services; Nursing and Maternal Child Health; Health Financing; and Finance and Administration. On the other hand, the Rwanda Bio-Medical Centre (RBC) will coordinate health services provided through the following agencies: King Faisal Hospital(tertiary reference); National

Reference Laboratory; Centre for Treatment and Research on AIDS, Malaria, Tuberculosis, and other epidemics (TRAC Plus); Health Communications Centre; National Centre for Blood Transfusion; National AIDS Control Commission (CNLS); Medical Maintenance Workshop; the Pharmaceutical Laboratory (LABOPHAR); drug procurement agency Centrale d'achats de Médicaments Essentiels du Rwanda (CAMERWA); and International Centre for Clinical Research. See figure 12. The RBC will also control training in all medical sciences in the country.

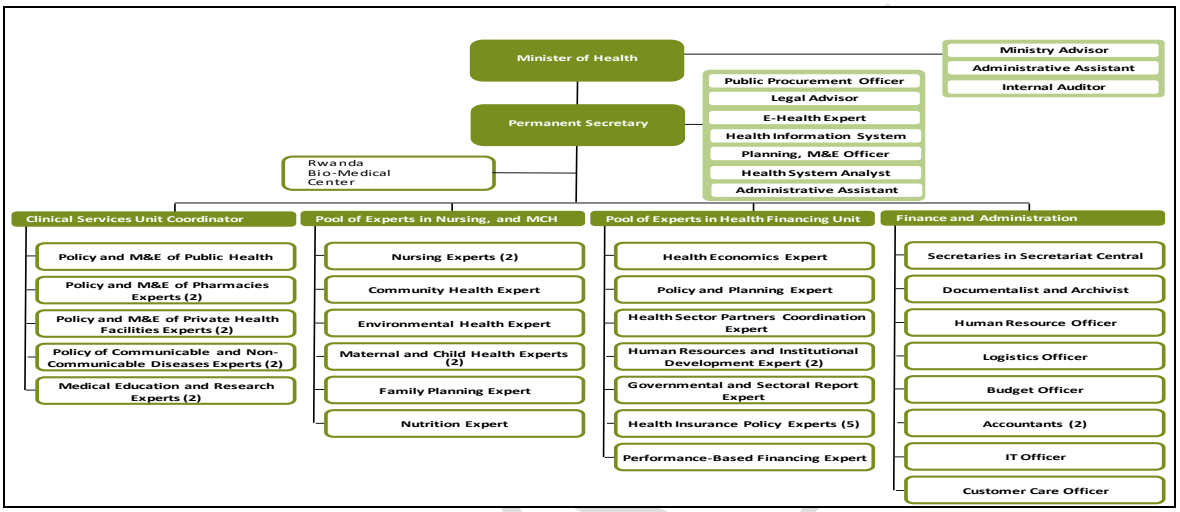



**Figure 12: MOH Organogram**

Within the decentralization strategic framework, the national level is responsible for determining policy, laws, decrees, regulations and medical basic equipment for basic health, to fight Malaria, Tuberculosis, HIV/AIDS and other epidemics, to promote basic hygiene, health, nutrition, or specialized medical care and health insurance. The national level also plays an important role in building and renovation of infrastructure and in in-service training of health workers.

Through its many agencies, the national level provides advice and guidance on issues such as quality of care, planning, management of health facilities, good governance in health, efficient deployment of human resources, and rational use of drugs.

#### 4.2.1.2 District level

The district is responsible for the provision of primary and secondary health care services (apart from the national hospitals, which fall under the remit of the central MOH). The main role of the district, according to the National Decentralization Strategic Framework, is to enhance the good functioning of hospitals, enhance general hygiene, assist sectors to promote better nutrition, and establish a health insurance scheme within its area.

Districts receive funds from the GOR through direct transfers from the Ministry of Finance, and some benefit from donor funding. The districts are responsible for administrative supervision of health facilities and collect essential indicators on health and services, which they share with the MOH.

#### 4.2.1.3 Sector Level

The objective of decentralization at the sector level is to enhance the functioning of health centres by establishing health centre executive committees, monitoring the functioning of health centres through these committees, mobilizing resources for health centres, building capacity of health centres, and designating areas for the disposal of waste products.

#### 4.2.1.4 Cell Level

The cell level has the role of integrating and harmonizing cell and Umudugudu activities by monitoring the functioning of health counsellors and other volunteers in the Umudugudu in the delivery of basic health care services, the fight against Malaria, Tuberculosis, AIDS and other epidemics, and hygiene activities. This level also monitors how health insurance schemes are working and the frequency with which the population joins these schemes.

#### 4.2.1.5 Village (Umudugudu) Level

The Umudugudu or community implements health policies by availing community health workers; creating awareness among the population of hygiene and primary health care (including distribution of condoms, mosquito nets, etc.); mobilizing the population to join the health insurance scheme; giving children basic emergency health care before taking them to health centres; sensitizing pregnant women to the need for antenatal care and facility-based deliveries; registering deaths; and submitting reports on the death rate.

### 4.2.2 Referral System

Rwanda has established a strong foundation in its fight against malaria. A developed network of public sector health facilities exists to meet the health needs of Rwanda's population. This network is structured as a pyramid with three referral hospitals at the apex followed by 40 district hospitals and 524 health centres. The health centres, in turn, use community health workers and other community based associations for community outreach activities.

Administratively, Rwanda consists of 4 provinces and Kigali City, and 30 districts 416 sectors, 2148 cells and 14837 villages (NISR 2008). The health system has a total of 458 health facilities consisting of 415 health centres, 40 District Hospitals, and 3 referral hospitals. There is a total of 11,170 staff including 571-Medical

Doctors, 6,543 Nurses, 35 Midwives, 746 Paramedical staffs, 39 Pharmacist, 804 Lab technicians, 945 supporting staff and 194 others. Additionally, there are 30,000 Community Health Workers who are indispensible in scaling up iCCM. Each of the CHWs is equipped with a cell phone. The estimate of health service coverage is 87% and community health insurance membership is 86% and 6% for private health insurance in Rwanda. Each district has at least one district hospital and an average of one health centre per 20,000 population. The district with the best health centre coverage is Karongi with 1.52 health facilities per 20,000 inhabitants and the least being Rubavu with 0.6 health facilities per 20,000 inhabitants. See figure 13 for the distribution of health facilities in Rwanda.

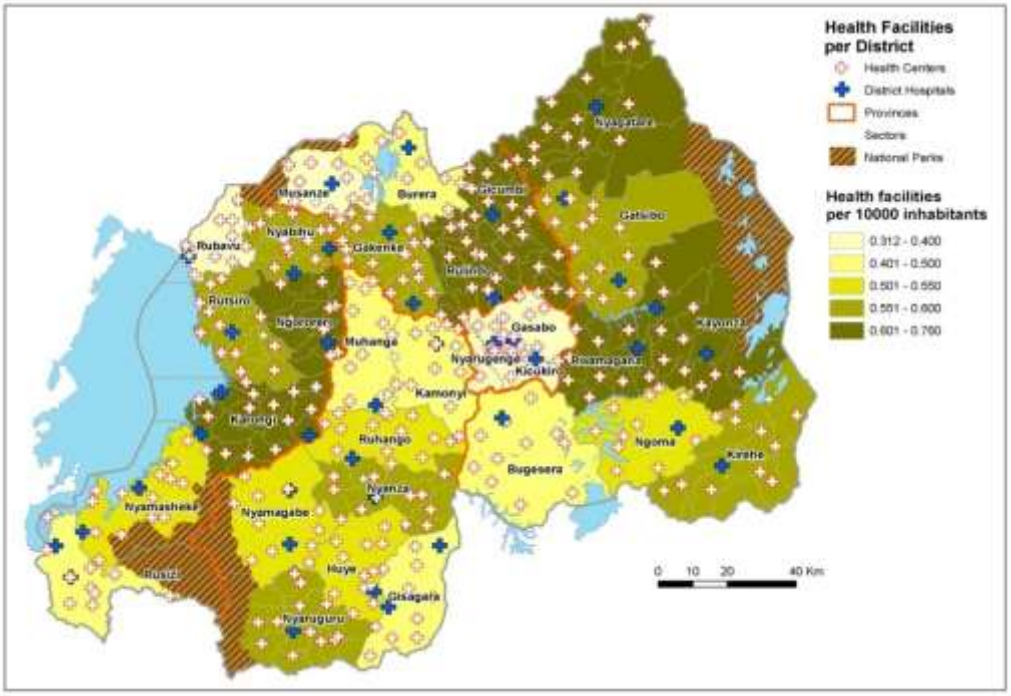


Figure 13: Geographical Distribution of Health Facilities per District

Each health facility has at least one functional microscope and reagents needed for the diagnosis of malaria. **T**he referral system is anchored on the provision of an average of 4 ambulances per district as well the CHWS' access to cell phones.

## 4.3 Organization and Management of the National Malaria Control Program

### 4.3.1 Evolution of the National Malaria Control Program

In 1975 the MoH Rwanda requested for Technical Assistance from WHO and a team led by Gueye was dispatched to develop a Proposal for the National Malaria Control of Rwanda based on chemotherapy using CQ in children and pregnant women. This proposal was however not found feasible by the MoH and USAID.

In 1982, Ivorra canon (24) suggested formation of a malaria control program mainly based on the creation of the central seed (noyau) in the Epidemiology Directorate, mentorship of health facilities in malaria treatment, reduction of vector density and contact vector-human as well as establishment of malaria operational research. The NMCP was thereafter created under the epidemiology Unit in the MoH(Emmanuel ref). In 1986(53), Ngabonziza and Sezibera suggested the development of a standardised treatment algorithm for chemotherapy in children and pregnant women, use of nets in towns, environmental sanitation in rural areas and health education. A year later, the MoH developed a strategy on malaria control in the context of primary health care (46). The Rwanda Malaria control program was formally established in 1995 with the support of the Belgian Cooperation.

Since 1998 Malaria has been controlled in the line and initiatives of RBM/WHO strategies. According to the DHS of 2003, only 7% of households had at least a mosquito net; availability being lower in the rural areas g as low as 1% in the former provinces of Kibuye and Gikongoro. Although the situation had improved a bit in 2005, still only 18% of households had at least a mosquito net and only 16% of under fives had slept under a mosquito net the night preceding the survey[viii]. Only 17.4% of children under five years received care from either a health centre or from a recognized private clinic when they had fever. The rest either received no care at all or were seen by traditional healers. At this time, infant mortality stood at 107 per 1000 live births, and malaria was responsible for most of them. Epidemics of malaria were rampant especially in the post late 90s. They were detected late and with a lot of difficulties because of unreliable data and low utilization of health facilities.

In 1998 an evaluation of the end of second year of accelerated Malaria Control Program was done with the view to assess the performance of malaria Programme with respect to the 1998 Plan of Action of the Programme as well as assess the implementation of program strategies. In 1999, the Ministry of Health through the National Malaria control program embraced the Roll Back Malaria global strategy as an initiative to scale up malaria control activities in Rwanda. The World Health Organization supported the inception process of the RBM initiative through a consultancy.

In the year 2000, the country re-affirmed her commitment to the RBM by appending her signature to the Abuja Heads of State Declaration on RBM. This was followed by a desk review and situational analysis with the focus of reviewing policies relevant to malaria control, trends, research, existing health care system, expenditure and required resources, the management systems at district level, health care system and household provision of care. The report of the both desk

and situational analysis guided the development of the 2002 – 2005 Roll Back Malaria Strategic Plan.

In 2005 the country did another program review which was done at the end of the 2002-2005 Malaria Strategic Plan. The purpose of the review was to determine the overall effectiveness and responsiveness of the control strategies and activities of the NCMP to the current global and Regional challenges in the control of malaria and make recommendations to strengthen the malaria control program. A second MSP 2005-2010 was developed to address issues raised and reorient the malaria control program.

Still suffering from the effects of the war and the decimation of the human resource base, Rwanda had a few qualified nurses in the public health facilities and even fewer doctors and the few available were mainly in the urban areas while 83% of the population lives in the rural areas[ix]. It is against this background that Rwanda embarked on a plan to make malaria control one of its top priorities. Through a campaign that received the blessings and support of the highest political authorities of the country, Rwanda adopted a multi-thronged approach that targeted prevention through the use of long lasting insecticide nets (LLINs) and behavior change communication, as well as early treatment with effective drugs, in 2005 a comprehensive national campaign was launched with support of Global Fund for HIV/AIDS, Tuberculosis and Malaria (96%), the Belgium Cooperation and UN agencies. The President's Malaria Initiative/USAID was started in 2008. Through the Government leadership and partners' efforts, a combination of effective tools and methods are now available and being used to combat malaria in Rwanda.

In 2007, the MSP review was carried out and SWOT analysis identified number of additional activities for implementation in the remaining life span of the strategy (2007-2010). This review has led the malaria control program to develop a new MSP 2008-2012 aligned to the 2020 Vision, EDPRS and the HSSPII in order to mobilise funds for new suggested activities and new targets set in regards to the mid-term review carried out in 2007.

The main strategies of the MSP were identified and the strategic objectives and major outputs were formulated and agreed upon by the NMCP and its stakeholders. The endorsement of the MSP was formally agreed by all stakeholders and approved by the SMM in the MoH and presented in the joint health sector review meeting.

Malaria control in Rwanda is guided by a malaria strategic plan covering the period of 2008 to 2012 where 9 key strategic axes are defined to ensure program

coherence and synergies. The goal of the strategic plan is to contribute to the improvement of the health status of the population and the fight against poverty by reducing the burden due to malaria. And the general objective is to scale up current interventions and consolidate achievements in order to reach the malaria pre-elimination phase in Rwanda by 2012. The strategic M&E plan was derived from the MSP. An integral component of the MSP is the development of a strong monitoring, review and evaluation framework.

In order to measure and analyse the success of MSP interventions in reaching outcomes and targets, a set of annual and periodic indicators have been developed through consultations with all stakeholders. The indicators are the most important for measuring malaria in the health sector's performance and have been informed by the country's long term vision and strategic direction (Vision 2020, MDGs and EDPRS). Malaria Performance Reviews is undertaken annually as part of the Joint Health Sector Review. The annual and periodic performance indicators as well as process indicators are on the basis for assessment. A Joint Annual Review report will be produced based on the review and will be disseminated to all stakeholders with any required actions monitored by the M & E unit of the MoH. Every year a malaria action plan is developed in collaboration with partners and an annual malaria report is disseminated. Malaria quarterly review meetings are conducted with partners to evaluate malaria implementation according to the malaria action plan.

The interim Demographic and health survey conducted in 2008, estimated that 57.2% of households own at least one insecticide treated net (ITN) while 25.1% of Household had more than one ITN. As far as the use of the ITNs is concerned, 58% of Children under five and 62.3% of pregnant women respectively slept under ITN the night preceding the survey. More than 95% of the ITNs were LLINs. ITN coverage is likely to be significantly higher in 2010 given the fact that more than 5 millions of LLINs have been distributed since 2005.

Use of ACTs medicines including the implementation of home based management of fever ("presumed malaria") by Community Health Workers since 2004 has increased the proportion of children under five with fever who received an antimalarials (correct and prompt) treatment within 24 hours of onset from 2.5% in 2005 to 62.6% All these interventions have decreased malaria morbidity and mortality countrywide.

### 4.3.2 Organization of the National Malaria Control Program

The national malaria control program (NMCP) is part of the Centre for Treatment and Research on HIV/AIDS, Malaria, Tuberculosis and other epidemics (TRAC Plus). Established in 2007 by LAW N° 28/2007 of 27 June 2007, TRAC Plus is a

public institution with a legal, administrative and financial autonomy, which encompasses, coordinates and harmonizes policies and strategies as regards to HIV/AIDS, Malaria and Tuberculosis. The Centre is particularly committed to providing an integrated and high quality services in combating HIV/AIDS, Malaria, Tuberculosis and other epidemics through prevention, cure, operational research, disease surveillance, control and an empowered workforce within available resources.

The mission of TRAC Plus is to provide evidence-based, technical leadership for the prevention and control of infectious diseases, through: independent applied research, multi-stakeholder participation, improved quality of services and strengthened health systems, thereby contributing to the improvement of the health status of the population. Before then, the NMCP existed as separate department of the Ministry of Health and was charged with the coordination of malaria control activities in Rwanda.

The organization structure of TRAC Plus is seen in figure 14. In collaboration with the Ministry of Health and Development and Research partners, the Centre strongly advocates for a participatory approach and strives for the communities' involvement in all aspects to ensure ownership and sustainability of the programs to be implemented.

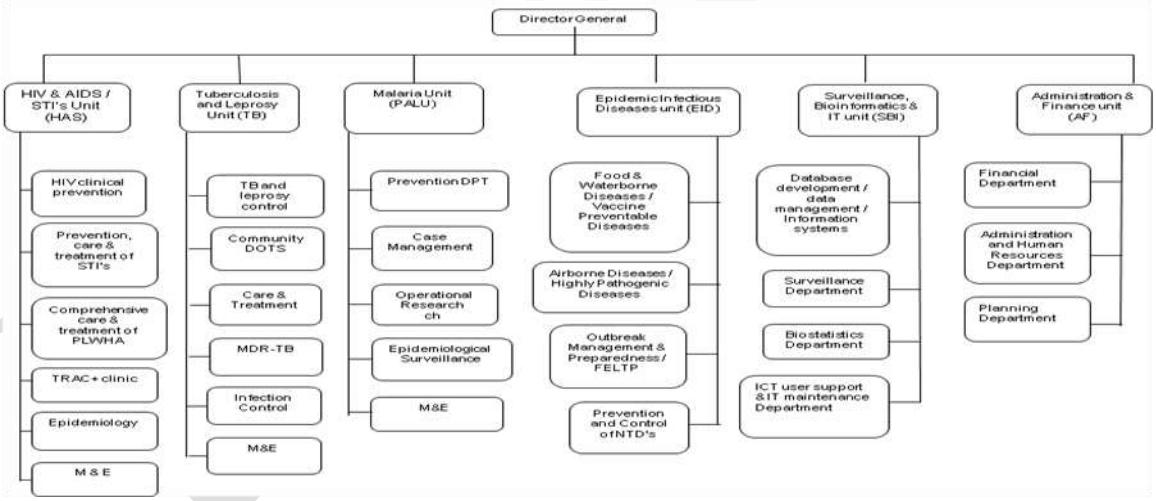


Figure 14: Organizational Structure of TRAC Plus

The specific terms of reference of TRAC Plus are as follows: establish and promote the fight against and research on HIV/AIDS, Malaria, Tuberculosis and other epidemics policy and strategic framework; establish coordination, monitoring and evaluation of activities conducted by institutions of care and research on HIV/AIDS, Malaria, Tuberculosis and other epidemics; ensure, conduct, coordinate and supervise operational and biomedical research on targeted diseases; ensure local

capacity building in the management and care of HIV/AIDS, Malaria, Tuberculosis and other epidemics; and establish collaboration with national, regional and international institutions involved in the fight against, training and research on HIV/AIDS, Malaria, Tuberculosis and other epidemics.

The malaria unit in TRAC Plus exists to provide policy and technical guidance to various implementing partners in malaria control. The core functions of the malaria unit are as follows: Policy development; adaptation of global norms and standards including development and updating of norms and standards; technical support to various implementing partners; monitoring and evaluation; partnership and coordination; and resource mobilization and management. The organizational structure of the malaria unit is seen in figure 15.

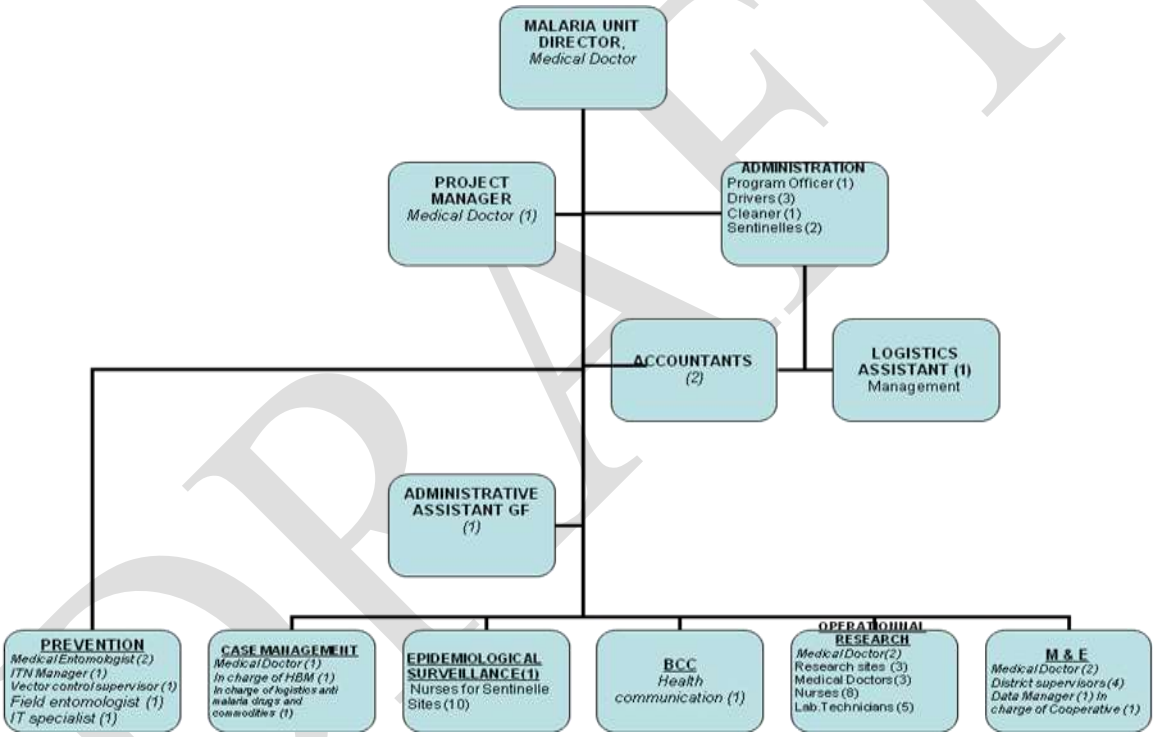



Figure 15: Organizational Structure of the Malaria Unit

The malaria unit provides technical and financial support to its implementing partners that contribute to malaria control. Some of the implementing partners are the MCH Unit; the HCC which designs health messages; the Health Information Systems department which compiles malaria-related data being reported by the health districts; the EID/TRACPlus program which will contributes to analysis of malaria-related data and detection of malaria epidemics; the national Reference and Public Health laboratory that ensures the quality of the biological analyses in the country. Other key partners in Rwanda's fight against malaria are CAMERWA and BUFMAR. These privately run non-profit organizations procure and stock

essential drugs and supplies for the country's health facilities. They ensure that the health centres have sufficient supplies of needed medications. The private health sector is relatively underdeveloped with clinics mostly located in the capital city of Kigali. With 90% of Rwanda's population living in rural areas, the role of the private sector is still limited. In addition to government resources, many malaria control interventions are funded through partners whose activities are aligned with the MSP. While some partners contribute directly to the MOH, others work through health districts or NGOs such as PMI which has all activities implemented by US NGOs.

In general, the organization and management of the national health system is exemplary as shown the by the following: integration and decentralization of health services at all levels; community involvement and participation; effective coordination and scale up of evidence based of malaria control interventions; evidence based policies and strategies; strong political support and country ownership; Zero tolerance of corruption and performance based implementation; and performance-based pay for health workers who deliver key high quality interventions and meet targets.

### 4.3.3 Malaria Control Policies and Guidance

National malaria control policies and guidance are scattered in various thematic area guidelines. There is no consolidated national malaria policy.

Rwanda has adopted three interventions for malaria vector control: use of LLINs; IRS targeting high risk areas; and larval source management. There are separate draft guidelines for IRS and LLINs and these should be finalised as a priority. WHO training manuals and guidelines for integrated vector management and entomological surveillance are available in-country. The development of an IVM strategic plan is underway following a vector control needs assessment (VCNA) that was conducted in 2010.

The malaria strategic plan promotes universal coverage of LLINs for all population groups (estimated at 1 net for every 2 people or 3 nets per household). To increase promotion of LLINs, tariffs and taxes on ITNs and insecticides were removed through a Ministerial instruction. Rwanda initially distributed nets through social marketing programmes but from 2005 introduced a policy for free distribution to pregnant women and children under 5 through ANC and EPI. In 2007 the government policy changed to universal coverage of the whole population, in line with global WHO recommendations.

Focal indoor residual spraying (IRS) for high risk areas was initiated in Rwanda in 2007, covering three districts, expanding to cover 54 Sectors in seven districts by 2010 with an estimated coverage of 99.4% of the target structures being sprayed

and a population of 1.2 million protected overall in 2009. With the development of the Integrated Vector Management strategy it is expected that additional districts will be targeted for IRS if additional resources can be secured. Clarity is required around the total number of spray rounds required, in the context of universal net coverage - and operational research is required to define the best strategy to achieve high impact whether this includes comprehensive district spraying or targeted spraying to higher burden areas? .

Policies on malaria treatment in Rwanda have been updated at various intervals. AQ+SP was introduced in 2001 as an interim drug before the introduction of Artemether-Lumefantrine in October 2006. Diagnosis and Treatment guidelines were developed in 2005 and updated in 2009 and states that Artemether-Lumefantrine is the recommended ACT for first-line treatment of uncomplicated *P. falciparum* malaria for all age groups, except for pregnant women in the first trimester where quinine is used. The second-line treatment remains quinine for all age groups and intramuscular artemether is used as a pre-referral treatment at the health centre level and for severe malaria.

In 2007 a Ministerial instruction defined the pricing policy for ACT in the context of cost recovery scheme in the health sector. Details are illustrated in Figure 16.

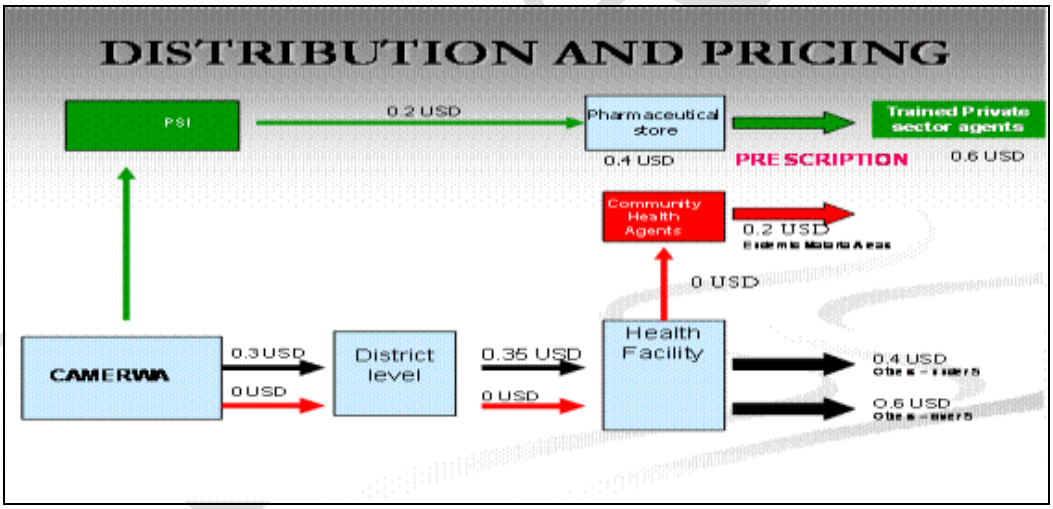


Figure 16: Ministerial Instruction defining the pricing policy

Rwanda also has finalized a national community health policy and Child Survival policy, both of which impact on the management and implementation of malaria case management at district and community levels. Guidelines on malaria diagnosis and treatment for both trainees and trainers have been developed and integrated in the lab technicians training manual at hospital and health centre levels. This included a change in policy to universal laboratory and RDT diagnosis of all suspected malaria infections.

The integrated Community Case Management (iCCM) guidelines are also used to nationally scale-up universal diagnosis and treatment of malaria, pneumonia and diarrhoea for children under 5 by Community Health Workers (CHWs) and referral of severe and complicated cases to health centres and hospitals.

An epidemic preparedness and response (EPR) strategic plan (2005-2010) and EPR guidelines are in place although the plan expired last year. The overall objective of this plan was to contribute to the reduction of morbidity and mortality related to malaria through the establishment of a system of early warning system and epidemic management. Copies of these documents were distributed in 2005 to all districts but there is a need to update these plans and guidelines and distribute to all districts and health centres accompanied with capacity building at all levels.

Guidelines for the management of malaria commodities are integrated into the national integrated coordination procurement and distribution system (CPDS). CPS is a government mechanism for coordinating available resources in the supply chain for health commodities including specific areas like quantification and supply planning, procurement, storage, inventory control system and distribution. The CPDS is under the ministry of Health. Also guidelines for malaria pharmaco-vigilance are included in the integrated national guidelines for pharmacovigilance.

The Ministry of Health has a general training module on pharmaceutical management of all essential drugs. Trainings for inventory management were conducted but frequent training and on the job training are recommended due to the high staff turnover rate. Regular training on supply chain management is conducted by the MOH in collaboration with the partners. Pre-service training on the logistics module has started at National University of Rwanda for the 3rd year Student.

The following guidelines and policies are used in implementing behaviour change communication (BCC) activities BCC: the malaria BCC strategy and guidelines; and the national behaviour change communication policy for health sector developed in 2009.

The national behaviour change communication policy for health is based on the following principles: empowering people with the necessary skills and information for them to take informed health choices; enhancing systematic participatory planning in collaboration with stakeholders to develop, implement and monitor evidence based BCC interventions; encouraging the use of different strategic interventions (such as social mobilisation, IEC, BCC, advocacy), combined with a range of channels and tools to enhance health promotion activities among different

key audiences; and strengthening coordination, information sharing and building partnerships between different stakeholders to increase the impact of BCC interventions.

There is a national malarias strategic plan (MSP), 2008-2012) that guides malaria control in Rwanda. It is a second generation MSP developed after the first one was reviewed in 2007; the review guided the change of malaria orientations and subsequent development of the current MSP, 2008 to 2012. The main objective of the MSP (2008-2012) is to scale up current interventions, consolidate achievements and identify essential innovations in order to reach the malaria pre-elimination phase by 2012. The MSP (2008 -2012) is aligned with the HSSP II (2008 -2012) as well as the Rwanda EDPRS (2008-2012). Every year a Malaria action plan is developed and derived from the malaria strategic plan.

The Malaria Unit has a national monitoring and evaluation plan as a compliment of the national malaria strategic plan (MSP), 2008-2012. The M&E plan was developed after the first Malaria M&E System assessment conducted using the partner Monitoring and evaluation system strengthening tool (MESST). The M&E strategic plan ensures adequate monitoring and evaluation of strategic approaches to malaria prevention, control and pre-elimination. There are priority indicators with targets, the basis for monitoring outcome, impact and program performance towards local, national, regional and international goals and targets. The Malaria M&E plan also includes guidelines for regular generation and analysis of data and reporting on the progress of interventions. Every year M&E activities are included in the Malaria Unit action plan and are usually updated with findings from the M&E System assessment exercise.

### 4.4 Partnership in Malaria Control

There is an extensive malaria control partnerhsip in Rwanda consisting of the following: relevant MoH Units and desks; Districts, Health centres and CHWs; decentralised admin entities; GFATM; PMI& CDC through implementing partners; UN agencies; Rwanda civil society (NGOs); Rwanda institutions like CAMERWA and HCC; and Nursing schools and universities (SPH-UNR, KHI, etc);. A major pillar of the succesuful malaria controlpartnership in Rwanda is the alignment of the activities of most partners with the national malaria startegic plan in the spirit of the principle of three ones. This is supported with semestriel Joint Health sector meetings and reviews. There is need for increased information on financial expenditures from all partners

Coordination of malaria control is carried out through the maternal and child health tehmatic group. Through this group, review meetings and coordination among partners is achieved.

## 4.5 Financing Malaria Control

Table 1 shows the financial needs, availables by source and funding gaps in the national malaria control program.

**Table 1: Trends of the financing of malaria control in Rwanda (USD) (as at Oct 2010)**

| Financial gap analysis | Actual | | | Planned | | |
|---|---|---|---|---|---|---|
| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| Overall needs costing (A) | 246,617,472 | 332,731,302 | 65,719,930 | 56,476,648 | 136,012,159 | 63,028,498 |
| Current and planned sources of funding: | | | | | | |
| Domestic source: Loans and debt relief (provide donor name) | 3,083,332 | 3,083,332 | 3,083,332 | 3,083,332 | 3,083,332 | 3,083,332 |
| Domestic source: National funding resources | 500,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 |
| Total domestic sources of funding (B) | 3,583,332 | 4,083,332 | 4,083,332 | 4,083,332 | 4,083,332 | 4,083,332 |
| External source 1Global Fund Grants | 20,104,369 | 43,270,872 | 21,890,138 | 29,223,825 | 57,721,544 | 14,787,806 |
| External source 2:WHO | 375,000 | | | | | |
| External source 3:BTC | 1,007,003 | 839,811 | | | | |
| External source 3:PMI | 17,000,000 | 17,000,000 | 17,000,000 | 17,000,000 | | |
| External source 4:PSI | | | | | | |
| External source 5:UNICEF | | 22,500 | 3,900 | | | |
| Total external sources of funding (C) | 38,486,372 | 61,133,183 | 38,894,038 | 46,223,825 | 57,721,544 | 14,787,806 |
| Total resources available (B+C) | 42,069,704 | 65,216,515 | 42,977,370 | 50,307,157 | 61,804,876 | 18,871,138 |
| Unmet need (A) - (B + C) | 204,547,768 | 267,514,787 | 22,742,560 | 6,169,491 | 74,207,283 | 44,157,360 |
| % gap | 83% | 80% | 35% | 11% | 55% | 70% |

While the funding gaps declined from 83% in 2008 to 11% in 2011, pledged funds betwen 2012 and 2013 is not enough to maintain the trend. Indeed at the planned levels, the gap will rise to 70% in 2013 (see figure 17). This is a precarious situation for the program.

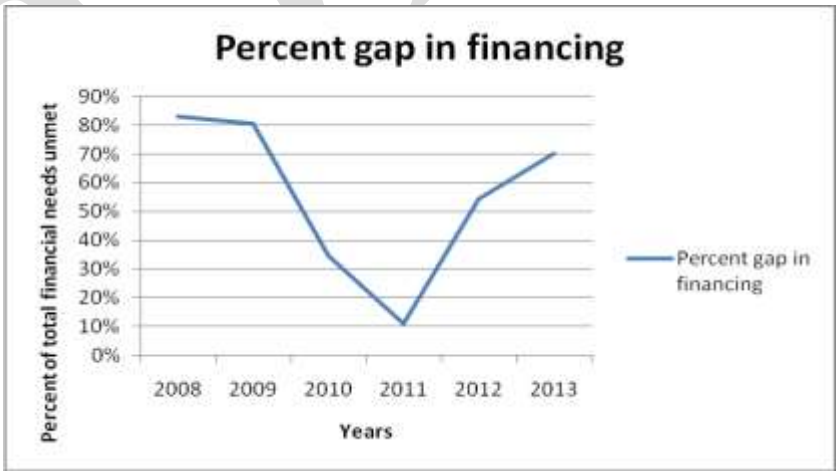



Figure 17: Gap Analsysis of the NMCP financing 2008-2013

## 4.6 Key Issues

The precaruious funding situation of the NMCP after 2011; pledged funds betwen 2012 and 2013, with funding gaps as high as 70% in 2013 is not enough to maintain the current gains. Absanece of mutual accountability on financial invesrtments by all malaria control stakeolders requires attention.

Given changes in malaria epidemiology in the country, there is need for revised MSP and M&E plan. Also the EPR guidelines need to be updated to reflect a new EPR system that is based on use of surveillance data to identify areas of high transmission within districts for targeted intervention as well new thresholds at all levels based on the average TPR in the previous year. The various malaria policy statements in various documents need to be pulled together into one document on malaria policy.

Other key outstanding issues affecting programme management were found as follows: absence of national level comprehensive database; absence of up to date country malariogenic stratification map; the threat of medicines and insecticide resistances; strategies for disposal of nets; and lack of framework for cross-border collaboration.

## *4.7 Action Points*

The program should undertake the following:

1. Establish comprehensive national level data base including referral and Private sector
2. Conduct Regular stratification of malaria using prevalence, TPR and/or incidence data
3. Intensify advocacy for increased domestic funding
4. Increase mobilization and advocacy for external funding
5. Organize semi-annual performance review meetings for all stakeholders
6. Re-orient national program to enhance evidence-based targeting of interventions for impact
7. Continue monitoring of medicines and insecticide resistance – medicines efficacy studies; insecticide resistance monitoring studies; and research in development of new interventions
8. Establish framework and mechanism for cross borders issues collaboration
9. Develop a new malaria policy document, strategic plan and M&E plan based on the recommendations of the MPR
10. Implementation of a strengthened EPR system based on the MPR recommendations.
11. Sensitization of the public; inter-sectoral collaboration

# 5 Achievements in Program Intervention Areas

## 5.1 Malaria Vector Control

### 5.1.1 History of Entomology

Data of anopheles in Rwanda were cited in 1938 and 1941. Between 1942-43, a study on vector biotypes per capture of larva and imagos was carried out in Butare, Kigali and Gisenyi.[x] This study showed malaria vectors in high altitude (more than 1700m) due to breeding sites created by expansion of cultivation in marshes. In 1948 and 49, Jadin and Fain collected mosquitoes in Butare and found 98% of them to be A.funestus[xi]. Out of the 207 A.funestus, 11% were infected by plasmodium. In 1949-50, 2669 *A.funestus* and 59 *A.gambiae* were collected from 6820 structures. 5.6% (of 36) of *A.funestus* and 4%(of 346) *A.gambiae* were infected with a max of 17% in Nyakabanda. Out of 90 blood fed A.funestus, 57 (63%) were fed with human blood, 38(42%) with cow blood and 11(12%) with pig blood.. Out of the 25 *A. gambiae*, 11(44%) were fed from human, 1(4%) from cow and 1 from pigs. Entomological surveys conducted in Rusumo and bugarama in 1975 showed a predominance of *A.funestus* in the plains in the north and *A. gambiae* in the south. *A. gambiae* density was 19 per structure with a 3% sporozoite index and night rate of agressivity of 11.6 bites per man per hour. Of all the *A. gambiae captured*, 89.9% were fed by human, 5.6% from goat, 2.7% from dog and 1.8% from cow blood. In Rusumo, both vectors were sensitive to DDT, malathione and propoxur[xii]. Jadin J et al showed that P. falciparum represented 72.4% P. malariae 14.2% and vivax 13.2%[xiii]. the existenc of vivax were etiquette as P. Vivax were P. Ovale according to Prof Vandepitte in 1988 (personal communication).

After a trial in Nyanza and Save in 1948, DDT was largely sprayed in July 1949 in Butare (625 km square)(26, 27, 30). Spraying was implemented every year and was expanded to 2/3 of the territory of Astrida (1800km square) protecting 260,000 people. Since November 1951, Butare marshes were treated with wetable powder 5-10% DDT. The medical laboratory of Astrida was in charge of spraying, implementation monitoring and its impact (26). DDT spraying was then expanded to Shangungu territory in 1954 and in the wholw Ruanda-Urundi in 1956(17, 44,45). This DDT campaign has reduced malaria cases from 341,000 in 1955 to 155,027 in 1960 while deaths decreased from 458 to 118 in the same period. The DDT was decentralised to chefferies in1959(45).

Rwanda promotes a policy of integrated vector management. The mainstay of vector control is universal coverage with LLINs targeting all population groups throughout the country. With approximately 6.1 million nets procured and distributed in the last year, enough nets have been distributed in Rwanda to protect 100% of

the population, based on an estimate of one net for every two people. At present, Indoor Residual Spraying is carried out in seven out of thirty districts, protecting approximately 1.3 million people in 2009. Additionally, larval control is being used in some urban areas. High coverage of vector control interventions is believed to have had significant impact on the malaria burden in country.

### 5.1.2 Organisational Structure

Vector control is integrated into the health system at central, peripheral and community levels. At central level, a department of vector control exists within the Malaria Unit, co-ordinating malaria vector control activities in the Ministry of Health. At the peripheral level (District level) vector control operations are integrated into the activities of district hospitals and health centres. At community level, vector control activities are implemented by the Community Health Worker (CHWs) network with the support of the heads of Sectors, Cells and Villages. The "*Umuganda*" (monthly environmental santitation days) initiative plays a key role in environmental management and community mobilization. Spray operators are recruited from local communities with the help of community leaders. Engagement of communities for IRS has resulted in high operational IRS coverage (87-98%) and LLIN usage. This success has also been attributed to strong collaboration between ministries in charge of local government, environment and infrastructures.

### 5.1.3 Vector Control Committee

The implementation of vector control activities requires the involvement of several departments and agencies. The VCNA report proposed the establishment of a national intersectoral steering committee involving the following partners: PMI, RTI, PSI, KHI, CAMERWA, EHD/MoH, WHO, UNICEF, MCH, RCLS, Ministry of Defense, Ministry of Environment, Ministry of Infrastructure, Ministry of Finance and Ministry of Local Government. The establishment of this committee will lead to interdisciplinary and inter-sectoral collaboration.

### 5.1.4 Vector Control Human Resources

The NMCP has the following human resource capacity at its disposal in terms of vector control: 1 Senior Entomologist as the Vector Control Focal Point at national level; 1Senior Entomologist for epidemic prevention at the national level; 3 Officers in Charge of supervision of entomology surveillance, LLINs promotion and distribution and supervision of IRS and other vector control activities; 1 Supervisor of malaria activities at each of the 40 district hospitals - This person serves as the focal point of malaria activities and duties are integrated in the activities of district hospital; and 11 Heads of sentinel sites based at Health Centres with 14 field technicians based at the same Health Centres.

### 5.1.5 Human Resource Training and Capacity Development

The two senior entomologists in the Malaria Unit train vector control technicians. IRS Spray operators (SOPs) are recruited by the Malaria Unit with support from local leadership under the guidance of district authorities. Candidates must be community health workers, less than 40 years old, in good health, and, among women, not pregnant or lactating. Training is conducted at district level, based on a five day module, split into theoretical and practical sessions. The Training of Trainers for IRS is carried out at national level to equip participants with the necessary skills for training IRS implementers at the district and sector levels. Instruction is done by a team of Master trainers supported by RTI and Malaria Unit.

The Malaria Unit has limited capacity to store equipment for vector control. For large-scale activities, the Unit uses the storage warehouse of CAMERWA, space at district hospitals or leased premises. IRS waste is disposed by incineration at the Kanombe Hospital, in Kigali in line with global recommendations.

### 5.1.6 Annual Planning

An operational annual plan is developed at central level. Each district has a 5 year strategic development plan implemented through annual operational plans. There is need for joint annual review of the operational plans by the central and district levels.

### 5.1.7 Vector Control Service Delivery

#### 5.1.7.1 Long Lasting Insecticidal Nets

i. Specifications and Distribution Methods

The distribution of conventional nets began in 2005 targeting pregnant women and children under 5 years of age through ANC and EPI. In 2005, Long Lasting Insecticidal Nets were introduced and the ministerial instruction of 2008 prohibited the importation and distribution of conventional mosquito nets. Recent IDHS findings show that 98% of nets are LLINs. In collaboration with partners, the NMCP developed standard technical specifications of LLINs. Packaging is designed to identify all LLINs as originating in Rwanda to avoid leakage. The Rwanda program uses only WHOPES approved LLINs. Rectangular nets are distributed through routine EPI and integrated vaccination campaigns for children under 5 years of age, while conical LLINs are distributed routinely through antenatal care for pregnant women and through household campaigns through CHWs networks. An assessment of the number of sleeping spaces per household is undertaken by CHWs to enable estimation of the number of LLINs required. This systems allows for the continuous replacement of nets based on need through the CHW network. This strategic approach needs to be incorporated into the draft guidelines for LLINs and integrated vector management.

### ii. Annual Trends in Coverage with LLINs

Figure 18 shows the number of nets distributed annually 2005-2010. Figure 19 (check data) shows the estimated coverage based on the number of nets distributed, divided by the population at risk, based on an estimate that one net protects two persons and last for up to three years.

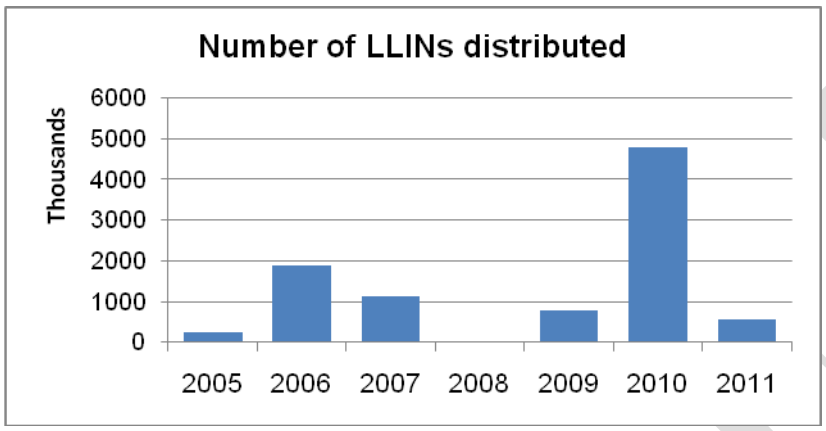



**Figure 18: Number of LLINs distributed from 2005 to February 2011.**

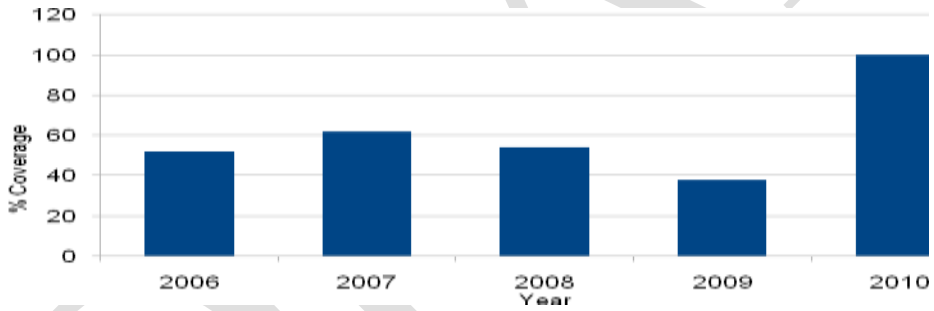



Figure 19: Estimated coverage based upon the number of nets distributed

In 2006, 1.6 million LLINs were distributed through a nationwide campaign targeting children under five years of age, followed by the distribution of an additional 1.16 million nets in 2007 and 800,000 in 2009. The 2007-2008 Interim Demographic and Health Survey revealed that 57% of households owned a treated mosquito net and 56% of children under five slept under a net. As a result of scaled up vector control coverage, including IRS, and scale-up of ACTs and parasitological diagnosis, Rwanda recorded sharp decreases in the number of confirmed malaria cases, the number of malaria admissions, and also deaths in both 2007 and 2008. However, as can be seen in the figure above, the percentage coverage of LLINs is estimated to have declined to less than 16% in 2009, and this was accompanied by the nationwide increase in the number of confirmed malaria cases, admissions and deaths. This was due to delays in the flow of expected funds. for LLIN procurement.

In response to the resurgence in cases and in order to meet the universal coverage target for mosquito nets, the National Malaria Control Programme and partners immediately responded with a universal coverage campaign in 2010. As a result, the resurgence in cases appears to have been reversed and the country is now estimated to have achieved universal coverage.

In terms of coverage, data are available from the DHS 2000, DHS 2005 and the IDHS 2007-08 and DHS 2010 (data under analysis). The IDHS (2007-2008) showed 57% of under fives and 62% of pregnant women slept under LLINs and 55% of HH ownership of at least 1 LLINs. The 2010 rapid assessment estimated coverage of 98.3%. According the data of NMCP, between January 2009 and February 2011, 6,142,758 LLINs were procured: 4,126,512 by Global Fund, 1,511,100 by PMI and 181,000 by UNICEF.

The 2010/2011 universal coverage campaign included distribution through health centres for newborns and pregnant women and through outreach for the rest of the population. Implementing partners included CAMERWA, National Police, PSI Rwanda, District hospitals, Health centres, and community authorities (Sectors, Cells and Villages) under the coordination of the NMCP. The program has achieved high coverage in both LLINs ownership and utilization. There is also strong partnership support in LLINs distribution in the country.

**Table 2: LLINs Distribution by target groups: January 2009–February 2011 (Source: NMCP data)**

| **Target groups** | **Number of LLINs distributed** | **Distribution channels** |
|---|---|---|
| New borns | 325.100 | Routine measles immunization distribution |
| Pregnant women | 353.080 | routine antenatal clinic |
| Children under five year old | 1.565.813 | MCH week campaign (April 2010) |
| Poorest of the poor | 251.250 | Campaign |
| Households | 3.076.941 | Campaigns |
| Catch up pregnant women consulted to health centres for January 2009 to June 2010 | 496.400 | MCH week campaign (November 2010) |
| Others groups | 14.674 | On specific requests |

A key lesson learned is the importance of sustaining universal coverage in order not to fall back on gains made in burden reduction. Rwanda responded effectively to the upsurge in cases in 2009 and has demonstrated great progress by achieving universal coverage in 2011. Plans to ensure sustained delivery of LLINs through

community systems to maintain this high level of coverage should be developed. Additionally a financial sustainability plan needs to be developed to ensure adequate resources are available to sustain the net distribution over the next five years.

The details for LLINs distributed from January 2009 to February 2011 and number of nets by households is shown in Table 2.

#### 5.1.7.2 Indoor Residual Spraying (IRS)

RTI International provides strategic technical management and operational support for IRS activities in seven high burden districts. Since 2007, the IRS project has completed six spray rounds in 3 districts of Kigali, four rounds in Nyarugenge, Kirehe and Nyanza and two rounds in the districts of Bugesera and Nyagatare. The sixth round was recently implemented from September to October 2010 in the sectors of targeted seven districts. Additional spraying operations were organized in 2010 to control malaria outbreaks in Gisagara district covering more than 18,886 structures. Approximately 1.3 million people were protected in the last spray round with high coverage >95% of targeted areas. From 2008, declining malaria burden led to a decision to move from district wide coverage to targeted focal spraying. With recent upsurges documented in 2009 and with universal coverage of LLINs now achieved, the requirement for full or targeted coverage and one or two spray rounds a year needs to be evaluated in collaboration with all partners leading to a policy decision by the MOH.

**Table 3: Summary of key information on IRS since 2007**

| **Description** | **August 2007** | **August 2008** | **March 2009** | **August 2009** |
|---|---|---|---|---|
| HH targeted | 165,932 | 196,108 | 196,126 | 299,888 |
| HH sprayed | 152,072 | 189,319 | 191,051 | 294,190 |
| Population protected | 705,035 | 835,487 | 866,002 | 1,323,442 |
| Rwanda total population | 9,556,667 | 9,831,501 | 10,117,029 | 10,117,029 |
| Proportion of population protected | 7.38 | 8.50 | 8.56 | 13.08 |
| Quantity of insecticide used (sachets) | 73,947 | 103,763 | 119,526 | 174,804 |
| Side effects cases/10000 inhabitants | 6.3 | 5.5 | 3.5 | 1.2 |
| HH/dd/sprayers | | 4.5 | 5.1 | 6.6 |
| Percentage of Refusals per HH | 8 | 6 | 3 | 2 |

| | | | | |
|---|---|---|---|---|
| found | | | | |
| Sprayers trained | 606 | 2053 | 2222 | 2276 |
| IEC implementers trained | 100 | 3365 | 3499 | 4454 |
| Police & Army, TOTs, Health providers | 293 | 351 | 351 | 439 |

Safety precautions and environmental mitigation measures have been managed by the Malaria Unit/Trac Plus. The insecticide used for IRS was originally Lambdacyahalothrin 10 WP for the first round but changed to Deltamethrin 250 WG through international competitive biddingAll insecticides and Gloria and Hudson Expert pumps comply with technical specifications of WHO. 1,672 functional and 46 non-functional spray pumps are available at RTI. At the Malaria Unit, 70 functional spray pumps and 30 requiring repair are available at the store for epidemic response. Insecticide safety guidelines are available and disseminated to districts and health centres. According to the storage space and equipment maintenance workshops, warehouses of CAMERWA have been rented and 8 temporary stores at district level were rented by RTI. Personal Protection Equipment and other spraying equipment are available and dispatched in the 7 targeted districts. All transportation vehicles for IRS operation are rented for each campaign. The disposal of all IRS waste was managed by incineration at Kanombe District Hospital. As malaria transmission declines, identification and targeting of foci using surveillance data will support the more effective targeting of IRS. This evidence based planning may result in further scale up of IRS activities.

#### 5.1.7.3 Integrated Vector Management

In 2009/2010, Rwanda conducted a vector control needs assessment and whose as a result of VCNA, it was possible to identify the constraints, opportunities, gaps and needs for the implementation of integrated vector management (IVM) in areas of policy, structural arrangements, operational, inter-sectoral collaboration and community mobilization (VCNA report, 2011). The process of developing an IVM strategic plan is ongoing and includes IRS, LLINs and larval control.

#### 5.1.7.4 Vector Surveillance and Operational Research

Rwanda has an impressive vector surveillance programme in place including sentinel sites for susceptibility testing and bioassays and quality control of interventions, and has an entomology reference laboratory.

**i. Sentinel sites**

Malaria vector monitoring was introduced by the NMCP in 2000. Since October 2009, entomological surveillance posts have been integrated with the activities of malaria sentinel sites. Surveillance is conducted on a monthly basis and involves community participation for mosquito sampling. Technicians based at sentinel sites

are involved in mosquito collection, identification and preservation of specimens for ELISA tests performed at Central level. The use of both CDC bottles and the WHO treated papers may cause problems of data interpretation and comparison and WHO recommends the use of WHO impregnated papers for insecticide susceptibility studies.

Entomology data collected from routine and monthly collections of mosquitoes show that Anopheles gambiae s.s (97%), An. Arabiensis (2.5%) and An. funestus (0.2%) are the main malaria vectors in Rwanda. The mean densities for the 15 month collection period covered were 4.8 house/night and ranged from 0.1 in Bungwe to 22.3 house/night in Mashesha. The average nuisance mosquito density was estimated at 24.5 house/night. The sporozoite index recorded was estimated to be 2.4% (n=5513). The average monthly entomology inoculation rate (EIR) was 3.4 infective bites per person per month, the highest recorded at Mashesha with 17.2 infective bites per person per month (This site is located at the south-west of the country where rice is grown).

### ii. Bioassays of IRS

Wall bioassays were conducted in 2010 to monitor effectiveness of IRS in 7 sectors. The mortality of control samples was <5% on average after 24 hours exposure. The average mortality obtained was more than 90% for the first 5 months with decreasing efficacy of insecticide recorded at 74% starting from the seventh month. These results showed that Deltamethrine 250WG, is effective (>80%) on the walls up for 5 months (Figure 21). Malaria transmission in Rwanda spans from November to July and spraying is conducted for about 40 days commencing in August/September each year. In light of these results it will be important to determine if the one spray round currently carried out is sufficient to adequately control malaria in the context of universal coverage of nets. Operational research should be carried out to determine whether one spray round is sufficient to reduce malaria transmission in high burden districts with universal LLIN coverage, or if one spray round with intensified surveillance to identify upsurges leading to a second spray round where necessary has higher impact, or two spay rounds are required.

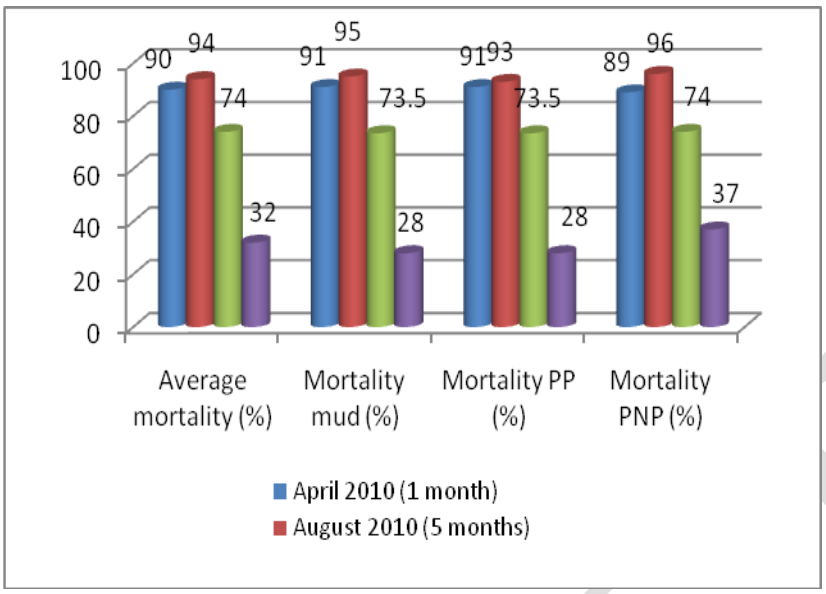



**Figure 21: Follow up of deltamethrine effectives after 5 months**

### iii. Insecticide resistance monitoring

The insecticides used for IRS are Lambdacyalothrin 10 WP in 2007-2008 and Deltamethrin 250 WG used starting from 2009 to date. LLINs are treated with Permethrin and Deltamethrin. All these insecticides are pyrethroids. Resistance monitoring was initiated in IRS districts in September 2009. The CDC bottle protocol has been used. The current resistance monitoring conducted in July to August 2010 in 8 different sites for 5 insecticides (Bendiocarb 0,1%, Malathion 5%, DDT 4%, Permethrin 0,75% and Deltamethrin 0,05%) showed that all mosquitoes tested were susceptible (100%) to these insecticides except for DDT where mortality (90%) was recorded at Mashesha (Rusizi district) and (86%) at Mimuri (Nyagatare District). Further studies are needed to confirm the possibility of resistance to DDT in these sites and also the resistance mechanisms. WHO recommends that insecticide resistance testing be conducted once annually using WHO insecticide impregnated papers that are obtainable from Malaysia.

## 5.1.8 Key Issues

The key issues are as follows:

1. Universal coverage with LLINs has resulted in a significant decrease in malaria burden in Rwanda. However, the 2009 experience has highlighted the importance of maintaining universal coverage. It is essential that the community based distribution mechanism is strengthened to ensure a continuous and sustained delivery of nets to maintain coverage. Additionally it is important that sufficient resources are secured to allow for sustained and timely financing of the programme so that gains are not lost.

2. Rwanda experiences two transmission seasons and the insecticide currently used for IRS has a residual efficacy of less than 5 months on sprayed surfaces this could potentially leave communities unprotected if one IRS spray round is conducted.
3. The requirement for full district level coverage of IRS and for one or two spray rounds needs to evaluated in the context of universal coverage of LLINs.
4. There are currently no comprehensive national IRS and LLINs guidelines to guide implementation. The existing guidelines for both interventions are in draft form.
5. There is a need to strengthen the capacity of the entomological laboratory services at national level including PCR, and storage facilities at Central and district levels.
6. Insecticide resistance is a global serious challenge to malaria vector control programs that use LLINs and IRS.
7. There is a high prevalence of malaria as indicated by EIR values of 17 and 4 infective bites/person/month in Mashesha and peri-urban Kigali associated with rice growing and population re-settlement

### 5.1.9 Action Points

1. A long term LLIN procurement and distribution plan is needed to ensure a continuous supply of replacement LLINs to maintain universal coverage;
2. A sustained financing plan is required to ensure that predictable and adequate resources are available to sustain universal coverage of vector control interventions.
3. NMCP to establish an integrated entomology laboratory and to build entomology capacity for effective monitoring and supervision of malaria vector control activities
4. The NMCP should continue with planned IRS in 2011 to cover the two malaria transmission seasons in the country. Additionally the NMCP should document whether there is a requirement to implement two IRS rounds to cover the two malaria transmission seasons in the context of universal net coverage.
5. The NMCP is implementing community-based integrated malaria vector control and should develop harmonized integrated vector management policy guidelines that combine guidelines for all interventions.
6. Whilst it is fortunate that insecticides remain effective, insecticide resistance should be monitored annually using WHO test kits.
7. The NMCP should carry out country mapping of malaria vectors to understand the country vector profile and to guide targeted vector control interventions.
8. There is need to conduct further detailed ecological investigations in Mashesha and peri-urban Kigali to identify risk factors and to strengthen collaboration with Agriculture and Infrastructure & Human Settlement Sectors

## 5.2 Malaria Diagnosis and Treatment

### 5.2.1 Introduction

Quinquina was first introduced in Rubona in 1929 which was used not only in the treatment of malaria, and also in tuberculosis, asthma, marasmus in 1970-71[xiv], cotrimoxazole was used to clear parasitaemia of the Blood smear in 37 subjects aged between 12 to 60 years old. In 1974-75 a study showed the efficacy of 15 mg of IM Chloroquine /Kg administered in 3 doses during 3 days was more efficacious in the treatment of malaria cases compared to 40 mg IM quinine/Kg administered the same way. The first strain of in vivo CQ resistance was seen in 1979[xv]. In 1986 a drug efficacy study conducted in Bugesera and Gakoma showed 57% and 14% of plasmodium strains resistant to in vivo CQ and AQ. Both were sensitive to SP. A similar in vitro study shown similar findings with high prevalence of resistant strains of 59% to CQ and 41% to pyrimethamine(8). All strains were sensitive to mefloquine and quinine. In 1986-87, a study conducted in Butare among 42 patients with positive blood smear who were treated with 25mg of CQ/kg. After 7 days of treatment, 9 out of 42 had positive blood smear. 2 cases of CQ resistant were not cured with SP (50). In 1987, a similar study in Gakoma shown resistance to CQ, AQ and SP(4).

Quinine was use in newborn malaria chemoprophylaxis in in the 1950s (26). In 1986-87, 43.6% of interviewed health facilities were using malaria chemoprophylaxia in pregnant women and in young children using CQ, Pyrimethamine, AQ and SP (46).

Rwanda introduced Artemisinin-Combination Therapy (ACTs) as the first line therapy of in 2006 and has been very successful at increasing access to malaria treatment through the public health system. All health facilities offer ACTs throughout the country, with the majority of population seeking treatment through the public sector. In 2009 the country also adopted a policy of universal parasitological diagnosis with microscopy in health facilities and RDTsat community level. In 2010 94% of all suspected malaria cases were tested before treatment, well above the average in Africa of 35%. Together with a well-functioning HMIS, high levels of confirmatory malaria cases, this has also provided accurate data on long term trends of confirmed malaria cases at district level. The data also provides the opportunity to evaluate the impact of malaria control interventions on the seasonal and geographical distribution of malaria in relation to LLIN and IRS interventions.

At the end of 2005, Rwanda adopted Intermittent Preventive Treatment in pregnancy (IPTp) as one of the strategies for preventing malaria during pregnancy.

However, with evidence of resistance to Sulfadoxine-pyrimethamine (SP), decreases in the transmission of malaria at the time, and the high prevalence of gene mutations for resistance to SP (Dhfr, Dhps), in 2008 Rwanda suspended IPTp during antenatal consultations.

### 5.2.2 Organization of Case Management Services

The anchor of malaria case management is the district hospital. Each district has 1 or 2 district hospitals. Each district hospital has 10-15 health centres. Each village has 4 community health workers. All these provide health services including the management of malaria in Rwanda.

CHWs provide community-based social communication and BCC and use RDTs to diagnose suspected malaria cases and treat confirmed malaria with Artemether-Lumefantrine. These malaria functions are part of a broader package of health interventions that CHWs provide, including diagnosis and treatment pneumonia with antibiotics and diarrhoea with Low osmolarity ORS and Zinc tablets. Based on HMIS data (excluding private sector), 46% of children under 5 access services through the CHWs, with the balance reaching health centres. CHWs are also trained to identify dangers signs of complicated malaria and pneumonia and refer patients to health centres and hospitals for further investigation and more sophisticated case management.

However, there is no policy of pre-referral treatment for severe malaria at the community level. Severe malaria patients are referred to health centres by CHWs. On reaching the health centres, such persons are then given pre-referal treatment and transferred district hospitals. This is supported with four ambulances per district hospital and each CHW is equipped with a cell phone to call for transportation of severely ill patients. These referral services are funded through the community health insurance scheme. For patients not covered under the community insurance scheme, the pooling risk fund ensures that no one is excluded.

Institutional collaboration on reproductive health, making pregnancy safer, child health and HIV prevention programmes is through the Joint Health Sector technical working group for Malaria, RH, Child Health and HIV.

### 5.2.3 Human Resources, Training and Capacity Development

The National Malaria Control Program has a focal point person for malaria case management who is supported by three supervisors who oversee the quality of case management in districts and at community level. There is a functioning national malaria case management committee for revising guidelines, updating information and convening meetings.

At the National level, focal points working on malaria case management are as follows: paediatrician – assigned in referral hospital, involved in updating guidelines, trainings, treating referred patients; obstetrician- assigned in referral hospital, involved in updating guidelines, trainings, treating referred patients; general physician- assigned in district hospital, responsible for treatment, training; and pharmacist – at national level only for malaria, at district for integrated management.

Most of the training on malaria diagnosis currently occurs as part of pre-service training done by national Universities and medical training institutions (Kigali Health Institute, Faculty of Medicine, School of Public Health). For in-service training, Malaria Unit-TRAC plus has developed a national training curriculum on malaria diagnosis and treatment.

Following the new revised malaria protocol, a number of trainings were carried in 2010: A total of 1,800 health providers trained on malaria case management ( at least 4/health centre); 3,430 lab technicians and nurses trained on RDT use (at least 8/health centre); and 33,928 community health workers trained on RDT use[xvi].

Different training tools had been developed according the level of management. The pre-service training is included in the curriculum. For the in-service training there are manuals both for facilitators and trainees that were updated in 2009, and for CHWs iCCM manuals were developed in 2010 and the IMCI guidelines are currently being finalized.

TOTs is conducted at national level by the technical committee, trained national level trainers, district level health workers, trained district trainers at hospitals and Health Centres. CHWs are trained by health centres supported by the district hospital staff.

### 5.2.4 Annual Planning

The MoH coordinates development of national malaria control plans, including malaria strategic plans, and annual operational plans. Districts and provinces do not have malaria-specific annual operational plans, but malaria components are included in general annual district operational plans and business plan

### 5.2.5 Malaria Diagnosis

The majority of health centres and hospitals in Rwanda have functional microscopy services to diagnose malaria, and since 2008, RDTs have been available for use by CHWs to diagnose malaria at community level. In 2009 Rwanda changed its policy

to universal laboratory and RDT diagnosis of all suspected malaria infections. As a result, the proportion of patients who received anti-malaria drugs that were confirmed before treatment increased from 48.5% in 2009 to 93.7% in 2010 (HMIS data, Figure 22).

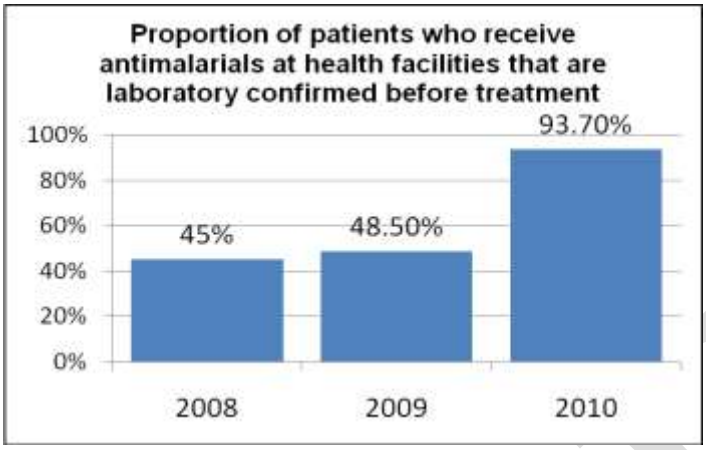


Figure 22: Proportion of patients with confirmed malaria

Currently 98% of Health facilities are equipped with functional microscopes and trained lab technicians. In 2009-2010 415 lab technicians received refresher training on microscopic malaria diagnostic and rapid diagnostic tests, organized by the National Reference Lab.

Use of RDTs is used as a potentially practical, long-term solution to malaria diagnosis in settings where high quality microscopy is not possible or feasible. RDTs were initially introduced in Rwanda in 2006. RDT-use has recently been expanded across the country and is now one of the main tools used by CHWs to diagnose malaria at community level, and identify non-malaria fever cases for further examination of other illnesses, including pneumonia. RDTs are also used at weekends and during emergencies at health centre level.

The total number of RDTs needed for 2011 is 1.7 million, of which 700,000 has been requested through GFATM Round 8, phase 2 and 500,000 RDTs from RCC annually up to 2014, and 200,000 in FY 2010 and 500,000 in FY 2011 from PMI. The priority is to ensure that enough RDTs are available to CHWs to test every suspected malaria case.

The National Reference Laboratory undertakes quality control of microscopy (see Table 3). The results showed a strong concordance and are evidence that the quality of microscopy in Rwanda is good.

**Table 3: Results of Blood smears slides quality control[xvii]**

| Year 2010 | Number of slides | Discordance | % of discordance |
|---|---|---|---|
| **Positive slides** | **1585** | **30** | **1,8 %** |
| **Negative slides** | **2772** | **51** | **1,8 %** |
| **Total slides** | **4357** | **81** | **1,8 %** |

In 2009, in order to understand what actually occurs when a child with fever or history of fever with a negative RDT is referred to the Health Centre a retrospective cross-sectional study examined the referral records of CHWs associated with 5 health centres in 3 districts Results showed that 2% of children tested positive, indicating a 0.1% error rate in the RDT done at community level. Follow up to the RDT negative children's residence indicated that only one child of the 551 children examined was deceased and this due to a non-malaria related cause. The results of this study and the previous HBM assessment support the policy of RDTs being provided at community level – with good reliability of RDT results, and good referral mechanisms. As HBM has already been integrated into iCCM, the addition of RDTs at community level has enhanced the ability to differentiate among the different causes of fever and thus provide more appropriate treatment.

### 5.2.6 Malaria Treatment

In October 2006, ACTs were rolled out countrywide at the health centre level. In 2007, the use of ACT was extended to the Community level using a network of 30,000 community health workers who provide treatment services (another 30,000 provide reproductive services and IEC/BCC) (four CHWs per village). Data collected at community level showed that for under-five children 62% with malaria/fever in 2008 received anti-malaria treatment within 24 hours. This increased to 84% in 2009 and 89% in 2010.

Table 4 shows the proportion of severe and uncomplicated malaria cases for 2009 and 2010. The results show that despite significant reductions in overall cases of malaria in 2010 compared to 2009, the proportion of severe malaria increased from 1.96% to 2.48%. This requires further investigation.

**Table 4- Clinical profile of malaria in Rwanda by severity, clinical type**

| Severity/clinical types | 2009, | 2010 |
|---|---|---|
| Uncomplicated | 1,247,583 | **624,253** |
| Complicated | 24,997 | 15,897 |

| | | |
|---|---|---|
| Total | 1,272,580 | 640,150 |
| Proportion of cases that are severe | 1.96% | 2.48% |

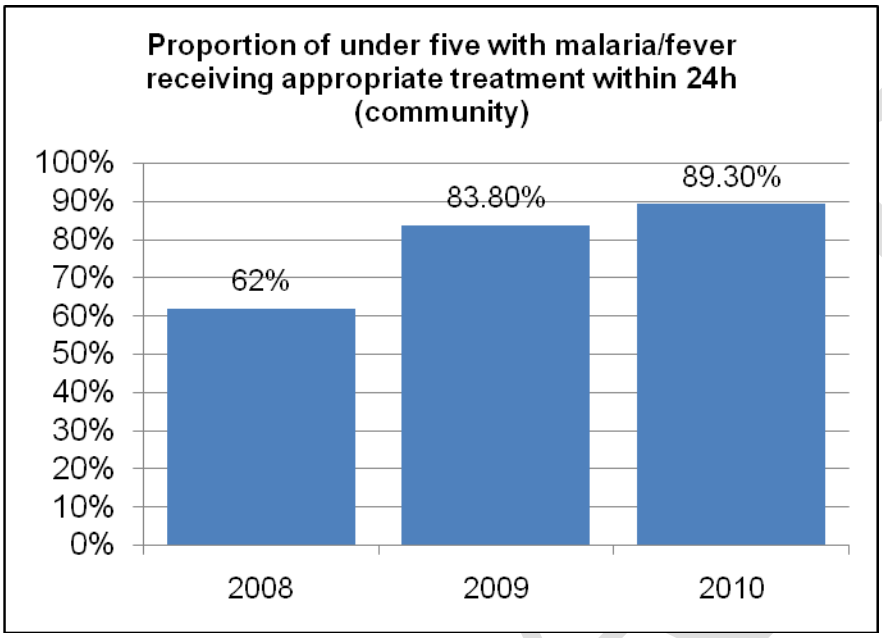


Figure 23: Proportion of U5s receiving treatment within 24 hours

### 5.2.7 Key Issues

The following issues were identified with regard to malaria case management:

1. Ensuring quality diagnostic capacity in health facilities and at community level in face of anticipated decreases in malaria transmission
2. Only children under 5 years diagnosed and treated by CHWs, thus excluding malaria positive adults.
3. Reinforcing adherence to treatment guidelines at health facilities and community level which includes ongoing supervision and continuing education;
4. Ensuring quality of antimalarials including building in country capacity to establish drug quality testing
5. Low compliance of the private sector for malaria interventions especially for reporting and respect of guidelines;
6. Low compliance of the private sector for malaria interventions especially for reporting and respect of guidelines;
7. No data from National Reference Hospital and private sector (Referee Hospital are not include in the HMIS);

### 5.2.8 Action Points

In order to sustain the gains of malaria control in Rwanda, the following are required:

1. Strengthen and sustain universal malaria diagnosis so that all suspected malaria cases are tested at all levels of the health system.
2. Ensure a predictable financing for a continuous supply of RDTs and ACTs for all health workers and CHWs that do not have access to microscopy by maintaining an ongoing procurement plan and supply chain logistics database
3. Include all RDT results into the HMIS and undertake analyses of data to evaluate changes in epidemiology of malaria, including impacts of malaria reduction interventions. Use results to amend implementation plans and programs.
4. Use HMIS/ISDR results to support a system of surveillance, detection of outbreaks and identification of parasite foci at district and community level for local level responses.
5. Maintain and ensure that all people are able to access diagnosis with the support of the community insurance scheme.
6. Ensure a continuous supply of ACTs so that all confirmed malaria cases are treated correctly and promptly
7. Introduce rectal artesunate for emergency pre-referral treatment of complicated malaria cases by CHWs to higher level health facilities for more sophisticated medical care.
8. Provide training and continuous supportive supervision so that treatment is confined to positively confirmed cases.
9. Advocacy for better compliance on malaria policy for private sector
10. Undertake an assessment of the longer term contribution of the community health insurance to the overall health system budget.

## 5.3 Epidemic Preparedness and response

### 5.3.1 Introduction

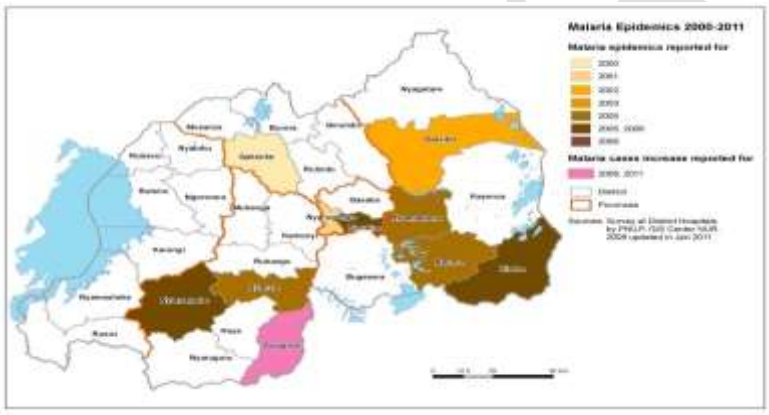
Knowledge of the local epidemiology, ecology and the biology of the malaria vectors and the environmental changes is essential for effective prediction, preparedness and response to epidemics. The Malaria Unit has been implementing the epidemic preparedness and response (EPR) system since 2005. Recently, there has been significant scale up of malaria interventions with corresponding decline in malaria morbidity and mortality signifying the urgent need to strengthen

the EPR system as the epidemiology of the disease will change from stable to unstable and the epidemic prone areas will expand.

### 5.3.2 History of Epidemics

In Rwanda, the epidemic-prone areas are those located on the plateau of the Congo-Nile ridge and 19 out of 30 districts are epidemic prone areas. However, recent outbreaks have occurred in areas previously considered as endemic. The following map (Figure 24) shows the malaria epidemics and malaria upsurges since 2000 based upon traditional thresholds defined by pooling data from the previous 5 years). Whilst effectively predicting outbreaks to 2006, we believe the epidemic thresholds is no longer detecting outbreaks and upsurges (e,g. upsurge in 28/30 districts was not picked up by the thresholds) due to countrywide reduction in disease burden**.** The factors that contribute to the occurrence of malaria epidemics include, climate variability (north of the country); differences in altitude; places of high human concentration (e.g. boarding schools in proximity to marshes); population movement (area of low transmission to high transmission area); irrigated agriculture (east and south of the country) and cross-border movement of people (east and south-east).

**Figure 24: A map of Rwanda showing districts that have had malaria epidemics 2000-2010**




### 5.3.3 Organization

The health system of Epidemic Preparedness and Response is organized in three levels of the health system: central, district (operational) and community. At the national level, the head of epidemiological surveillance in the Malaria Unit is the focal point of this activity. Together with the data manager, he checks the various warnings received from the districts and health centres as per the plan of epidemics investigation. He organizes visits to the field for investigation and meets with the technical teams of districts composed of case management, vector control, IEC, and epidemiological surveillance.

At the District and community levels, several committees are involved in the implementation of response activities. The political authorities at the community level give a support to aspects related to the security of personnel and logistic, the proper implementation of activities and to environmental health.

### 5.3.4 Human Resources, Training and Capacity Development

At the national level, there are 2 Senior Entomologists; 3 vector control technicians; 2 medical doctors; one data manager and one GIS technician. At District level, there is a data manager assigned roles of epidemiological surveillance. At each health centre level, there is a data manager in charge of collecting data and plotting/updating surveillance charts. This is an integrated support that takes place quarterly for data completeness, timeliness in reporting and plotting of graphs including on-spot feed-back.

### 5.3.5 Major Programme Activities and Achievements

The major activities are described below and they are grouped under broad areas of forecasting, preparedness, early detection and response.

#### 5.3.5.1 Forecasting

The prediction of epidemics is dependent mainly on the Climate Monitoring. Since 2004, the Malaria Unit collected meteorological data in 10 sentinel sites. The meteorology data base comprises information on climate variables including rainfall, temperature and humidity. The database is now about to be corrected and improved. With the collaboration of the meteorological department of the Ministry of Infrastructure, the NMCP was able to obtain data from previous decades that were used to calculate the normal values of reference for the monitoring of climate variability.

#### 5.3.5.2 Entomological Data

Epidemic Prevention is achieved through entomological surveillance and the implementation of vector control measures (IRS and LLINs). Entomological surveillance aims to identify the peak period for transmission, to conduct vector control activities in a timely manner and avoid the rise of the epidemic curve. Entomological surveillance can also allow a rational choice of vector control methods.

Of the 11 sentinel sites for epidemiological surveillance of malaria, 7 sites have integrated entomological surveillance in their activities since October 2009. These sites are: Mashesha, Karambi, Busoro, Kicukiro, Bungwe, Rukara and Bukora.

Need to continue with vector bionics to detect behaviour change and strategise control, insecticide resistance within the context of scale up of malaria interventions. The database includes entomological parameters of transmission (density of mosquitoes, the sporozoite index, parity, entomological inoculation rate, daily survival rate), the behavior of mosquitoes, and the level of resistance to insecticides.(See vector control thematic report).

Entomological strategies for epidemic management: Need to start entomological studies within the national malaria surveillance based targeting of malaria interventions. Identify transmission sites, vector breeding sites and managing the breeding sites.

The distribution and coverage of health facilities in Rwanda is adequate to report and respond to a malaria epidemic. The health system already collects routine and timely data on malaria cases across the country which would be used to identify any upsurge in malaria cases and respond appropriate at the local level. .

#### 5.3.5.3 Preparedness

For the preparedness and response to epidemics, Malaria Unit uses the following strategies:

i. Analysis of retrospective epidemiological data on malaria and meteorological data;
ii. Mapping of epidemic risk areas and monitoring of risk factors;
iii. Parasitological and entomological monitoring;
iv. Strengthening the health information system at all levels;
v. Control of epidemics detected

#### 5.3.5.4 Early Detection And Response

The evaluation of the epidemiological situation of malaria is mainly based on retrospective analysis of epidemiological data provided by the Health Management Information Systems (SIS). These data are aggregated according to the following variables: Location, Age, Clinical form, Period and Outcome (cured / Deceased).The information is collected from the various levels and passed on from the health post to the health centre then to district level and transferred electronically to the national level.

In the current context of the significant reduction in malaria cases in Rwanda, there is a need to strengthen surveillance and revise methodology of detecting outbreaks at the local level.

### 5.3.6 Program support

The main partners in the fight against epidemics are: Global Fund /RCC, PMI for logistics (Insecticide, Pumps and PPE). The RCC provides a budget line for the preparation and response to epidemics. The network of community health workers has also proved to be an important asset in the preparation and response to epidemics, especially in the tracking of cases, the implementation of interventions and IEC/BCC in which the Malaria Unit organizes a weekly radio program to inform and educate the public on the fight against malaria. This radio program runs every Saturday, which offers a chance to reach more people during the weekend day when most people are at home.

### 5.3.7 Malaria Early Warning System

To improve the control of the epidemic in the current context of climate change, Malaria Unit developed a malaria early warning system since 2005 based on vulnerability assessment, monitoring of climate parameters, the environmental monitoring, the monitoring of morbidity and entomological & parasitological surveillance.

The system of epidemiological surveillance at the health centre provides the possibility of a close monitoring on the origin of cases

### 5.3.8 Key Issues

The key issues are as follows

1. Expansion of areas of unstable malaria transmission: Scale up of malaria interventions to universal coverage (LLINs, Dx & Tx with ACT) has resulted in and will lead to further decline of malaria morbidity and mortality and expansion of areas of unstable malaria transmission, areas prone to malaria epidemics

2. Due to the declining malaria burden and transmission, the current methods of epidemic prediction that utilize EPR thresholds are no longer sufficient since malaria incidence has drastically reduced.

3. The current use of meteorological data for epidemic prediction is inadequate

4. Cross boarder movements of people is a facilitating factor in epidemic outbreaks

### 5.3.9 Action Points

Capacity for EPR needs strengthening nationwide as the whole of Rwanda may become a zone of unstable malaria transmission in 12-24 months if universal coverage with interventions is maintained;

1. There is need to update the EPR strategic plan and EPR guidelines including strengthening the capacity of health staff

2. There is a need to strengthen surveillance and data analysis so that EPR thresholds are based on test positivity rate (TPR). The observed TPR should be compared with the TPR of the same period the previous year.

3. Build capacity at the national, district and cell levels taking into account the new orientation or Epidemic prediction and response.

4. There is need to strengthen the existing collaboration with the meteorological department so that temperature and rainfall data are used for EPR

5. There is need to strengthen collaboration with the agriculture department in view of rice growing areas that may require larviciding and joint monitoring of insecticides

6. There is need for cross border collaboration through high level advocacy and joint planning of the bordering districts of the respective countries of Uganda, Tanzania and Burundi

## 5.4 Supply Chain Management

### 5.4.1 Introduction

Supply chain management in malaria control focuses on procurement, distribution, and stock monitoring of malaria commodities in collaboration with the central medical store (CAMERWA) and district pharmacies.

The Rwandan supply chain system has four levels: Central level, District level, Health facilities level and Community level as in the diagram below. The procurement of Malaria commodities is conducted at central level by CAMERWA. District hospitals in turn procure their malaria commodities from CAMERWA and BUFMAR (a faith based organization that is another central supplier but is not involved in Malaria commodities management).

### 5.4.2 Organization

Procurement supply management is domiciled in the national malaria control unit. A technical working group (TWG) exists with membership include representatives of the following partners: Malaria unit; Pharmacy Task Force of the ministry of health; MSH/SPS; Deliver project; District Hospitals; and District Pharmacies. The role of the TWG is to handle all issues related to malaria PSM. The PSM unit collaborates the Coordinated Procurement and Distribution System CPDS in the ministry of health which coordinates all PSM in different programs.

#### 5.4.2.1 PSM Management Capacity

There is a full time PSM officer in the malaria control program. Guidelines for the management of malaria commodities are integrated into the national integrated coordination procurement and distribution system (CPDS) which works with the TWG on malaria PSM. Pharmaco-vigilance (PV) guidelines are also included in the integrated national guidelines for PV. There is a general training module on pharmaceutical management of all essential drugs including a pre-service logistics module in 3rd yr medical school.

#### 5.4.2.2 PSM Performance Management

A review of PSM management practices and procurement, reporting and monitoring systems were evaluated. The PSM mmanagement practices were characterized by the following: conduct quarterly meetings with districts pharmacies to monitor pharmaceutical management of malaria commodities; carry out quantification exercise every year with revision every six months – manually done, no software for estimating commodities required; existing mechanism of tracing commodities .

In relation to procurement, reporting and monitoring, the findings were as follows: availability of annual procurement plan - all commodities are WHO prequalified; No formal document on technical specifications for all commodities; No SOPs for commodities distribution & orderings at all levels and for storage at community level; Strong monitoring through close collaboration with CAMERWA and use of delivery notes at all levels; Mechanisms available for monthly reporting on malaria commodities (LMIS) but no feedback mechanism

### 5.4.3 Supply Management Systems

#### 5.4.3.1 Specification of commodities

Specifications are available in the different departments of the program (PSM, vector control) but not a formal document.

#### 5.4.3.2 Estimates and quantification of requirements

Quantification of malaria commodities is still done yearly with a revision planned every six months to readjust the quantity to procure according to health facilities consumption data, quantities in pipeline and stock on hand. A quantification session has been carried out with district pharmacies in June 2010. The revision is planned for the beginning of year 2011.In September 2010, the quantification exercise was done for the next 3 years and the forecasting results have been used to elaborate the Procurement and Supply Management (PSM) plan for Rolling Continuation Channel (RCC) phase 2 for the Global Funds (GF).

#### 5.4.3.3 Financing

In 2006, Malaria commodities were funded by the Global fund, the government of Rwanda, and BTC. From 2006, PMI availed funds to procure mosquito nets, laboratory commodities, and ACTs. Also MSH procured some ACT and availed them to CAMERWA. In September 2006, the NMCP undertook active free of malaria commodities to District Pharmacies (DPs) with enough stock to last for 6 months. This was a seed stock to enable DPs generate seed funds for a revolving drug system as they sell the commodities to health facilities (HF) at regulated costs. The enabling factors for this revolving fund are as follows:

i. income generated from ACTs sales and then redeployed in ordering commodities from CAMERWA;
ii. strengthening of CAMERWA financial team through the recruitment of more staff;
iii. public sector decentralization policy of the MOH, thus institutionalizing the DPs; the latter having been strengthened through improved staffing and capacity building in collaboration with partners, contributing significantly to the improvement of the payment system; and
iv. Ministerial instruction on procurement policy limiting CAMERWA's customers to only DPs and referral hospitals, enhancing cost recovery.

#### 5.4.3.4 Procurement

Procurements are based on the PSM plans. There is a procurement plan for fiscal year 2010-2011. CAMERWA is responsible for all procurements except for commodities procured by PMI funds. Based on Global Fund recommendations, procurement of ACTs is conducted through WHO. Thus CAMERWA floats restricted tenders for ACTs, Arthemether and Quinine to WHO prequalified suppliers. Procurement of non ACTs drugs and commodities is based on the approval of GFATM.

Stock monitoring has been strengthened through strong collaboration between the Malaria Unit and CAMERWA aimed at avoiding stock-outs and expiry of malaria medicines. From August 2010, CAMERWA undertakes close follow up malaria medicines pipeline and reports back to the Malaria Unit every week. Also stocks on hand are monitored monthly by the Malaria Unit; the later informs CAMERWA when irregular situations occur.

#### 5.4.3.5 Storage, delivery and distribution

**i. Public sector distribution of malaria medicines and consumable:**

The storage capacity of CAMERWA is currently being improved with the support of the GFATM and PEPFAR via renting of commercial warehouses while expanding CAMERWA warehouses. Eight district pharmacies were rehabilitated in 2006 by MSH to improve the storage capacity. Community health workers use wooden Boxes for storage of the medicines. Stock control and reporting is functioning well. National stock control cards for commodities are available at storage and delivery points. There are malaria control program stock control cards for commodities at storage and delivery points. National and malaria control program quarterly reporting on malaria commodities are available. National procedures to address shortages or expired stocks of malaria commodities are not available.

*S*ince 2005, the country adopted a decentralization policy and the health system was decentralized as well. District pharmacies became agencies for procurement, storage, distribution and supervision of health commodities at District level and were allowed an autonomous management. The MOH in collaboration with partners further empowered the District by hiring qualified staff. Currently 27 out of 30 District pharmacies are managed by Pharmacists.

District pharmacies place orders at CAMERWA on a quarterly basis. They are responsible for collecting their quarterly orders from CAMERWA's warehouse (pull system). CAMERWA in collaboration with Pharmacy Task force and Partners has implemented an active distribution (a pull system where the transportation is provided by CAMERWA through the implementing partners for eleven District pharmacies with a phase out plan for the remaining Districts by July 2011. Prior to requisition, districts must review the quantities requested with the NMCP and receive their official approval. The Health facilities place their orders at District Pharmacies on a monthly basis and they are responsible for collecting their orders from the District warehouse. In turn, the Community Health Workers replenish their stocks on a monthly basis from health facilities. Distribution of commodities is well monitored through delivery notes at all levels.

**ii. Parallel distribution of nets:**

The long lasting insecticide treated nets are distributed through parallel system during campaign since CAMERWA can't handle those large stocks; the supplies are moved to health facilities for distribution.

**iii. Supervision and Integrated supervision tool:**

The NMCP in collaboration with the GFATM had facilitated the supervision of health facilities by district pharmacies. On a quarterly basis they received funds for the supervision of all the health facilities in their circumscription; they have to produce a supervision report before get funds for the next quarter.

**iv. Private sector distribution of malaria medicines:**

The PNILP strategy to introduce Artemether Lumefantrine (AL) into private sector pharmacies and over-the-counter outlets (comptoirs) includes officially registering these establishments, developing a system of accreditation to encourage recommended business practices, and developing a marketing and subsidized pricing scheme that would promote appropriate treatment of malaria for children under age five. In addition to increasing accessibility to AL, this strategy serves to discourage the sale and use of non-recommended antimalarials that are either no longer efficacious (e.g., Sulfadoxine Pyrimethamine) or that could undermine the efficaciousness of the newly introduced treatment by promoting drug resistance (e.g., artemisinine monotherapy).

The current private sector strategy will provide highly subsidized AL to a population most at risk for severe malaria and subsequent death; however, recent PNILP discussions have included extending in the future the strategy to cover malaria treatment for adults as well. Although adults are not at as great a risk of serious complications due to malaria and AL could be available at non-subsidized prices, the rationale for this is to prevent the misuse of the highly subsidized paediatric treatments.

With the New NMCP policy to treat confirmed cases, the distribution of ACTs in private sector through PSI is currently on hold, in order to put in place guidelines and train the private outlets

### 5.4.3.6 Inventory control

An inventory control system informed the storekeepers when to order or issue, how much to order or issue, and how to maintain an appropriate stock level of all commodities to avoid shortages or stock out (Logistics Handbook). There is currently a lack of those SOPs but they are being produce by partners. Minimum/maximum stock levels are in operation: At district level, a maximum stock levels of 4 months and minimum stock level of 1 month; and at service delivery points, a maximum stock level of 1 month and minimum stock level of 0.25 months. With the adoption of a harmonized LMIS, these stock levels will change as follows: District level, maximum stock level of 5 months and minimum stock level of 2 months; and at service delivery points, maximum stock level of 2 months and minimum stock level of 1 month.

### 5.4.3.7 Quality control

The norms for quality control system in the storage and distribution of malaria commodities exist but few districts fulfil them. Quality control assurance insured in

tendering characterised by the following: good manufacturing practice certificate; products certificate; marketing certificate (authorisation de Mise sur le Marche); and samplings of batch quality control are done but not systematically for all batches. Since 2010, an MOU was signed between the pharmacy department of the National University and the NMCP for regular control of Malaria commodities.

#### 5.4.3.8 Logistics information system

The Information system in place tracks the flow of medicines through each level of the system, while stock on hand and consumption are reported back up the system. The malaria report and requisition form are filled at Health Centres' on a monthly basis and sent to DPs. The DPs aggregate the report and send them to the central level in the logistics unit at the NMCP. The feedback mechanism is not yet in place. Supervisions are conducted regularly but these need to be reinforced in order to have accurate, reliable data for strategic decision making.

Although all commodities are managed through the same distribution channel, there were multiple logistics information systems for ARV, MCH/FP, and TB, malaria, Laboratory commodities and essential medicines. In August 2008, working groups were set up to lay the groundwork for a harmonized logistics management information system (LMIS) under the coordination of the Pharmacy Task Force (PTF), with support from SCMS and USAID | DELIVER PROJECT. The harmonized tool is now available. The SOP and training materials are being developed. Under the current fiscal year, the harmonized LMIS will be rolled out. The LMIS will provide stock status and consumption data to inform resupply and quantification, as well as data for strategic decision-making.

During this fiscal year July 2010-June 2011, CAMERWA has committed to hire data collectors at District pharmacy for a period of 6 months renewable for helping the district pharmacy in collecting, aggregation and validation of consumption report.

### 5.4.4 Status of attainment of national programme indicators

**Table 5: Summary of PSM indicators and achievements**

| PSM monitoring Indicators | NMS baseline | 2010 targets) | Status report | |
|---|---|---|---|---|
| | | | Status report (national targets) | Reference document and date |
| Number of doses of ACTs delivered | 869,580 | 1,004,083 | 1,694,082 | Quarterly reports of distribution from CAMERWA |

| | | | | |
|---|---|---|---|---|
| Number of doses of Artemether delivered | 110,856 | | 47,580 | Quarterly report of distribution from CAMERWA |
| Number of doses of Quinine tablets delivered | 1,700,133 | | 1,005,000 | Quarterly reports of distribution from CAMERWA |
| Number of ACTs repackaged for private sector | 150,000 | | 104,082 | Population SI reports |
| Number of ACTs repackaged for Public sector | 630,000 | | 434,264 | PSI |
| Number of doses of Quinine Ampoules delivered | 1,530,011 | | 108,884 | Quarterly reports of distribution from CAMERWA |

### 5.4.5 Key Issues

Rwanda has a well established Supply Chain Management system with streamlined and clear operational centres at Central, District, Health Facility and Community levels. Guidelines for the management of commodities and pharmacovigilance alongside a pre-service learning module established in training schools have ensured awareness on PSM issues. With quantification for medicines and community needs being done every year, the PSM system is well managed through quarterly meetings at central and district levels, provision of mechanisms for improved monthly reporting and maintenance of close working relations with the CPDS, CAMERWA, BUFMAR and District pharmacies for monitoring of supply chain management. While there is now a staff set aside to specifically handle procurement within the Programme, there are also efforts to improve on storage capacity at central and district levels. However, the programme was also found lacking as far as accuracy of data from health facilities, installing software for estimating commodity requirements, SOPs for PSM at all levels, having a formal document with specifications of all anti-malarial commodities, length of procurement procedures and provision of feedback on the LMIS. Specific issues are as follows: One staff in the supply chain department; Data from health facilities are not yet accurate; Malaria commodities management guideline; Lack of software for estimating commodities required; No formal document with technical specifications for all malaria commodities; Long procurement procedures for some partner funded commodities; SOPs for commodities distribution, placing orders at all levels,

storage at community level not available; and LMIS feedback mechanism is not yet in place.

### 5.4.6 Action points

The following actions are required

1. Reinforce the PSM department with staff;
2. Conduct a regular data quality audits and regular formative supervisions
3. Elaborate malaria commodities management guideline
4. Avail a software for forecasting malaria commodities
5. Elaborate formal document on specifications for all malaria commodities
6. Elaborate SOPs for commodities distribution ,for placing orders at all level, storage at community level
7. Provide for medicines for management of severe malaria in the Government Budget
8. Undertake tendering once for a long period for problematic products and plan for the delivery in instalments.
9. Establish feedback mechanisms for LMIS.

## 5.5 Advocacy, IEC/BCC and Social Mobilization

### 5.5.1 Introduction

There is commitment from political level which can be demonstrated by presidential budgets that is used to train CHWs and there is solid evidence of impact on better knowledge, information utilization, and community involvement in malaria control.

The campaign basis, evidence and outline are summarized in the Rwanda Malaria Communication Strategy for October 2010.

The population at risk for malaria are all people living in areas of risk for malaria earlier stated. However, children under 5 years of age, pregnant women, old age, PLWHA as well as people migrating from malaria non endemic to endemic areas. The behaviours that place them at risk have been identified through quantitative

research (KAP survey 2008, DHS 2008), focus-group discussions with target populations and a stakeholder's workshop organized in 2009. These behaviours include the following: Delay in treatment-seeking due to lack of transport and long distances from health facilities: Self medication; not taking drugs as prescribed; Sporadic use of LLIN's; Negative perceptions about LLIN's; No LLIN protection for all family members; LLIN's being used for non purposeful intentions such as fishing, poultry houses, and cattle houses; and displacement and hardship during floods.

### 5.5.2 Organization

The review found that there is a functional technical working group on advocacy, behaviour change communication and community mobilization and meets quarterly. There are also officers or focal points for advocacy, information, education and communication and community mobilization at community, district, provincial and national levels. In addition, the 60,000 CHWs are also providing malaria IEC/BBC with the community based programme.

### 5.5.3 Annual planning

The annual Malaria programme plan for BCC is based on the fiscal year from July to June and its preparation starts in April for each year. All partners are involved in annual planning. The Annual events organized include, the World Malaria Day, Mother and Child Heath week, Youth week and health policy week. During these campaigns, multiple channels of communications used are radio, TV, news papers, meetings, billboards, banners and songs. Funding for developing materials, media coverage, social mobilization and training has been given with the support of Global Fund Rounds and RCC with technical support from Development Partners.

### 5.5.4 Human resources, training and capacity development

In the Malaria Unit, there is a national focal point or officer for behaviour change communication who has helped in coordinating BCC activities and a communication working group chaired by the HCC which is responsible for coordinating all BCC activities at the MoH and also in charge of validating messages used in the health centres. These messages are aligned with global events such as the World Malaria Day. The malaria messages and themes are developed and implemented in partnership with Imbuto Foundation, World Vision; PSI, AVVAIS, Pro- Femmes Twese Hamwe, CARITAS; RDO, Urunana DC. IEC materials are produced and disseminated using local channels such as local leaders' sensitization meetings, monthly community voluntary environmental day, pamphlets, drama, poets, posters, etc.

### 5.5.5 Achievements - major programme activities and achievements

#### 5.5.5.1 Behaviours associated with malaria

The key individual behaviours associated with malaria include the following: acquiring and sleeping under a LLIN; Good care-seeking behaviour- early detection and treatment, at community or facility level; Reducing malaria in pregnancy; and Accepting IRS, when offered

#### 5.5.5.2 Development and channelling of BCC messages

Through the IEC/BCC working group, integrated messages for malaria control were developed and disseminated through a variety of channels. Messages focused on the modes of transmission of malaria, its cause, and how it could be prevented. Mass media messages and campaign were carried down to the community level. Rwanda has 60,000 community health workers and with an estimated population of 10 millions, there is a ratio of 1:166 CHW/persons which is one of the highest in Africa. These CHWs along with local political leaders and other volunteers were mobilised to support BCC activities. Radio remains the most preferred channel of message delivery since it is owned by 58% of the population (IDHS 2008). The TV is owned by only 3% in rural areas and 16% in urban area. The cell phone ownership has risen from 5% in 2005 to 13% nationwide, with 42% in urban areas; this is a potential channel for BCC.

#### 5.5.5.3 Evidence of behaviour change

The Interim DHS 2008 had indicated a huge increase in nets ownership and use at household level and even among the most at risk groups are pregnant women and children under five compared to the DHS 2005. We are expecting to see an increase again with the DHS 2010. Using the 2008 behavioural TraC survey, we have also a significant improvement of levels of knowledge of malaria transmission factors and also indicated improved behavioural determinants for LLIN use. Assessing knowledge of malaria transmission, symptoms, and prevention is important for informing prevention campaigns and improving case identification and treatment.

**Table 6: Observed indicators of behaviour change, according to the RIDHS 2007/8**

| **Desired Behaviour** | **Practice in 2007/8** | **Practice in 2005** |
|---|---|---|
| Household ownership of at least 1 net | 59% | 18% |
| Household ownership of at least 1 ITN | 57% | 18% |
| Household ownership of at least 1 LLIN | 56% | 15% |
| Children under five slept under the net the previous night | 60% | 16% |
| Children under five slept under the LLIN the previous night | 56% | 13% |
| Pregnant women slept under the net the previous | 65% | 20% |

| | | |
|---|---|---|
| night | | |
| Pregnant women slept under the ITN the previous night | 62% | 20% |
| Pregnant women slept under the LLIN the previous night | 60% | 17% |
| Child with fever in the past 2 weeks | 21% | 26% |
| Of those with fever, gave anti-malarial medication | <6% | 12% |
| Of those with fever, gave anti-malarial medication within 48 hours | 0.2% | 3% |
| Of those children under five tested for malaria during the survey, those that were positive | 2.6% | n/a |

### 5.5.6 Enablers and Best Practices

Achievements in BCC/IEC have been facilitated by the fact that Kinyarwanda language is spoken and understood by all citizens in the country. The other enablers are as follows: availability of MoH/BCC policy and Malaria BCC strategy provide guidelines for BCC/IEC implementation; availability of four CHWs in each village; high radio set ownership and listening culture by the community has augmented the dissemination of information in the community; use of the *Umuganda, a* monthly community based initiative on environmental management for IEC/BCC on malaria; use of temporary hands for IRS IEC/BCC further enhancing awareness in the spray areas; daily and weekly education sessions (OPD & ANC) at health centre level; inclusion of BCC/IEC activities in the District and Health Centre action plans; involvement of CHWs who are available in each village and communicate and collect health messages house to house in the community; friendly structures and systems that favour BCC activities countrywide; literacy level of is 75% www.mineduc.gov.rw/spip.php?article 27 summary report 2003-2010); existence of IEC promotional materials (Billboards, Posters, pamphlets, songs , films, booklets, Banners, flyers, umbrellas, T-shirt, etc) with Malaria control messages helps to facilitate social mobilization; integrated malaria messages in each campaign organized by the MOH; use of partnership with mass media such as radio stations, TV, news papers to transmit messages against Malaria; and involvement of partners ensuring national coverage in the fight against Malaria.

### 5.5.7 Key Issues

The following are the key issues: absence of long-term funding to support BCC activities; lack of harmonization of integrated regional BCC policies; and need for further evidence of which of all these communications strategies has the most impact of BCC.The priorities for research are as follows: Research gaps on various IEC issues, such as community perceptions on different interventions should be

investigated; Research on appropriateness of IEC materials produced for malaria control should be conducted; Research on the utilisation and perception of ILLNs; Behavioural research to explore the determinants of anti-malaria drugs use; and Media coverage, listening and level exposure for malaria messages.

### 5.5.8 Action Points

The following actions are required:

1. BCC needs to be given emphasis in future malaria related funding applications, and integrate budget line for BCC activities in each component of malaria program; and

2. The evidence base for adoption of BCC strategies needs to be strengthened in order to ensure that strategies with the most impact are used.

## 5.6 Surveillance, Monitoring and Evaluation

### 5.6.1 Introduction

Monitoring and evaluation (M&E) generates standardized data sets that provide results which measure the success of the malaria program against the national program, RBM and MDG targets at input, outcome to impact levels. It provides a measure of progress of the entire malaria program, and its results are used for re-orientation of interventions and for effective future implementation.

Operational research is also required to track changes in malaria epidemiology, vector bionomics, insecticide and parasite resistance and the effectiveness of malaria interventions. The results are often used by senior decision makers to make changes to evidence-based policies and strategies, and adjust future program directions.

Surveillance is important, especially given that Rwanda has embarked on moving towards pre-elimination phase. Surveillance is needed to identify the geographical and seasonal distribution of parasites at higher resolutions.

Rwanda has a malaria strategic plan and a subsequent monitoring and evaluation plan. This plan has a costed plan for implementing monitoring and evaluation activities including those related to the integrated approach promoted by the MOH.

### 5.6.2 Human Resources, Training and Capacity Development

The Malaria Unit has a designated M&E sub-unit staffed with two M&E officers, four District supervisors and one data manager. The M&E sub-unit has strong linkages with HMIS and IDSR as well as TRAC Plus, EPI and others from where it obtains relevant malaria data on a regular basis. It works in close collaboration with other stakeholders and is linked with other sectors' M&E programs such as The National Institute of Statistics of Rwanda (NISR), The School of Public Health, CAMERWA, MSH, PMI to harness relevant information on malaria prevention and control.

The NISR is responsible for conducting nationally representative surveys such as DHS. For instance, during the MIS 2007 they assisted the Malaria Unit and SPH in the methodology, determining the appropriate sample size, selection of enumeration areas, survey personnel, data management as well as analysis. All household surveys in Rwanda are conducted in partnership with NISR to ensure quality standards and that the data collected are comparable over time.

The School of Public Health SPH of the University of Rwanda has experience with conducting surveys and had been involved with the NISR in the MIS 2007. The SPH also contribute to capacity development especially in the areas of data management and epidemiology.

CAMERWA as the main procurement agency for essential drugs and health related commodities tracks the procurement and the distribution of reagents such as anti-malarias to district pharmacies. Data from their logistics management information system is useful for monitoring commodity availability at service delivery points

.

The identified gaps in M&E system both related to skills and infrastructure are addressed to promote the implementation of the M&E plan. The M&E system strengthening strategy includes institutional capacity building for both human skills through training and strengthening of existing structures and system e.g. equipping facilities with computers for improved data management. In addition, the unit builds linkages with other health program systems, and the development of procedures and guidelines for implementation. Measures to ensure the long-term sustainability of a functional malaria control M&E system include the provision of technical guidance and continued capacity building through periodic and close on-site mentoring and coaching.

The Malaria control interventions are funded by different partners. While some partners contribute directly to the MOH, others work through health facilities or NGOs. The major funding agencies for the program in general and M&E in particular are The Global Fund and PMI.

### 5.6.3 Achievements

#### 5.6.3.1 Routine information system

##### i. HMIS and SISCOM

Currently, the Gestion du systeme d'information sanitaire (GESIS) (HMIS) and SIScom (Community Health Worker Information System) are the main reporting systems for estimating impact in terms of malaria morbidity and mortality. The GESIS records monthly data at health facilities level (health post, health centre, dispensary and hospital) on malaria cases and deaths, blood smear tested, anti-malaria drugs and LLINs distributed to Children Under 5 and pregnant women.

The GESIS report contains information pertaining to the following indicators:

a) Malaria morbidity (outpatient and inpatient cases) among children < 5 years of age (by clinical/presumed and confirmed cases)
b) Malaria morbidity (outpatient and inpatient cases) among persons 5 years of age and older (by clinical and confirmed cases, and for the latter by species)
c) Malaria inpatient deaths in children < 5 years of age and in persons > 5 years of age
d) Numbers of inpatient cases of severe malaria in children <5years of age and in persons>5 years of age.
e) All inpatients and outpatients cases allowing the calculation of malaria morbidity
f) All cause of deaths allowing the calculation of malaria morbidity
g) Number of bed nets distributed through EPI and ANC
h) Number of anti-malarial drugs distributed in health centres and district hospitals
i) Number of blood smear done and results (positive/negative)

The SISCOM records monthly data on malaria case management at community level by community health workers. The monthly SISCOM report contains the following indicators:

a) Number of children with fever treated at community level within 24 h
b) Number of children with fever treated
c) Number of children in these two categories who were referred by CHWs and/or died in the community
d) quantity of Primo(ACT) distributed

Given the fact that RDTs are a new intervention included by the Malaria Unit, the number of RDTs used is being collected separately at the Malaria Unit through the same reporting channel but using a parallel quarterly reporting from Health centre to District and then to Malaria Unit. This is also the case of LLINs distributed through measles campaigns as distribution and documentation are done at distribution sites.

With the inclusion of RDTs for diagnosis of malaria by CHWs and quarterly visit of CHWs to monitor use of LLINs, there is a need for the SIScom to incorporate new malaria specific indicators related to these interventions in order to avoid parallel reporting. Currently all the GESIS and SISCOM tools are under revision to address these gaps.

The GESIS and SISCOM which integrate all data (not only malaria data) are computerized at the National level, all district hospitals and some health facilities. At all health facilities (health centres and Hospitals) there are data managers dedicated to the collection, entry and the overall management of data. ). An electronic web-based HMIS is under development. The aim of the web-based system is to provide data to programs - data that programs could analyze as they see fit. The tools and guidelines for this web-based system have been developed. This will also include a dashboard where key indicators can be viewed in graph and map form. Implementation is planned for the second half of 2011.

### ii. Epidemiological Surveillance

There is in place, an epidemiological surveillance system to carry out routine monitoring of malaria. There exists as well an early warning system for the early detection of malaria epidemics alert that are subject to weekly notification from sentinel sites. For the purpose of early detection of outbreaks and epidemic risks an additional parallel system collecting malaria data from the health facilities on a weekly basis is conducted at 11 malaria sentinel sites. Data from the 11 health centres are compiled, computerized and then analysed at the NMCP central level. There is no comprehensive analysis of weekly surveillance data on a regular basis. Since the 60% reduction of malaria in Rwanda, the malaria alert and epidemic threshold set are not sensitive to alert for a probable abnormal increase of malaria,. This is also confounded with the increase of health service utilisation due to community health insurance and strong communication for early diagnostic and treatment. Completeness and timeliness of reporting doesn't represent a serious challenge, because these data are collected by malaria sentinel site officers.

### iii. Integrated disease surveillance (IDSR)

TRACPlus has been using an electronic system to track distribution of ITNs (Track-Net) and access to other services like PMCTC among HIV/AIDS patients; it is phone and web-based real-time reporting system from the HFs. Currently, only sites which provides ARV treatment services are involved in Track-net. This will however be expanded countrywide by June 2011 and will involve all health centres and hospitals in the phone-based and web-based reporting of ITNs and services to HIV/AIDS clients. A module is being developed to enable community health workers

to send data on MCH to the electronic platform. This is different from CISCOM that reports routine activities of CHWs and it does not include ITNs distribution since the ITNs are distributed through campaigns. There are plans to expand this system for enhanced routine information system.

TRACPlus has already finalized the strategic plan, guidelines and tools for introducing integrated disease surveillance and response (IDSR) in Track-net. Training plan is being developed. It is noted that the system is not a parallel system but is managed by HMIS and domiciled in the HMIS server. Thus as TRACPlus adds the IDSR module, it will be an integral part of the web-based HMIS.

**iv. Data quality audits**

In order to deal with data quality issues raised during MoH supervisions and the LFA data audit conducted by the Global Fund, the Ministry of Health has adapted data quality assessment (DQA) tools and has trained staff from all districts to conduct quarterly DQAs in all health facilities. Data quality is also reviewed during quarterly PBF quality assessments. These assessments do not focus exclusively on malaria, but during the initial round of DQAs one of the indicators assessed was OPD cases of malaria in health centres and district hospitals. To further improve the quality of data collected, the Malaria Unit has initiated quarterly meetings at the district hospital level which are organized in order to review malaria data. The quarterly meetings provide an opportunity to conduct peer review of data by other health centres within the district hospital, correcting possible errors and addressing common programme challenges.

**v. Logistics information system**

This is described in detail under PSM. The NMCP in collaboration with the GFATM had facilitated the supervision of health facilities by district pharmacies. On a quarterly basis they received funds for the supervision of all the health facilities in their circumscription; they have to produce a supervision report before get funds for the next quarter.

### 5.6.3.2 Malaria Surveys

Surveys provide useful measures of population- and facility-based coverage indicators for gauging progress in scale up efforts at national or sub-national level.

Periodically, Rwanda conducts the Rwanda Demographic and Health Survey (RDHS) and the Malaria Indicator Surveys (MIS) whose methodologies are similar. In addition, the questionnaires are standardized and structured and change little between surveys hence, DHS and MIS results are comparable over time.

**i. Demographic and Health Survey (DHS).**

An RDHS was conducted in 1992, 2000, 2005 and interim DHS in 2007/2008. The DHS collected malaria data on under-five all-cause mortality, treatment of fever among children under five, possession and use of ITNs as well as anaemia prevalence. For the first time malaria prevalence using RDT and blood smear have been collected during interim DHS conducted in 2007-2008 and currently the RDHS 2010-2011 is under way and the preliminary results will be available by June 2011.

### ii. The Malaria Indicator Survey

Roll Back Malaria developed a standardized Malaria Indicator Survey (MIS) package and guidelines for assessing core global malaria coverage indicators at the household level[xviii]. The survey package contains standard methods and questions for measuring household level possession and usage of insecticide-treated mosquito nets, treatment of febrile children with anti-malarial drugs, and use of intermittent preventive treatment for the prevention of malaria during pregnancy, prevalence of anaemia and malaria parasitaemia. The 1st MIS in Rwanda was conducted in 2005 and the second mid-2007. The planned third MIS has not been conducted as Rwanda was carried out the DHS. Questionnaires of the MIS have been included in the ongoing DHS to ensure that data are available for t he year 2010 as planned.

### iii. Health Facility Surveys

The tools and approach of this survey are based mainly on that developed for evaluating the accelerated malaria control activities in the African Region and the integrated management of childhood illness (IMCI) instruments for a multi country evaluation. The survey instrument assesses the clinical skills of health care staff and the available supplies and equipment at the health facility. It also assesses the inpatient clinical practices, the dispensary and pharmacy services as well as the information system of the health facility. The advantage of the IMCI approach is that the assessment is not limited to skills for the management of malaria. It also addresses the management of the sick child, which includes children presenting with malaria. Elements of the health facility survey should also be undertaken as part of routine supervisory visits. The first malaria health facility survey was conducted at the end of 2004 and beginning of 2005 to assess the status of implementation of the new anti-malaria drug policy. It was recently repeated in December 2010. In May 2007, Rwanda conducted a service provision assessment (SPA) that included malaria indicators.

In 2006 and 2010, the Malaria Unit conducted the malaria health facility survey which show improvement of malaria case management at all levels. With the last survey, the results show that 85.7% of children under five years with uncomplicated

malaria were correctly managed at health facility level. There is an improvement according to 2006 result from 77.4 % to 85.7%.

### iv. Rapid Evaluation of CCM

In 2010, the Malaria Unit in collaboration with the Community health desk conducted a rapid evaluation of the CCM. Results showed that 70% of under five children are correctly treated at community level (the integrated CCM including management of fever, cough, diarrhoea and pneumonia) and more than 85% receive an adequate treatment of malaria. Table 7 below summarizes dates and malaria surveys.

**Table 7: Malaria surveys**

| | Years | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Surveys** | **2002** | **2003** | **2004** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** |
| **DHS** | √ | | | √ | | √ | √ | | √ |
| **MIS** | | | | | | √ | | | |
| **HFS** | | | | | √ | | | | √ |
| **KAP** | | | | | | | | | |

### v. Operational Research

Operational research priorities are well established in the strategic plan of the Malaria control program. The NMCP has had opportunities to participate in different multi-centre studies on the evaluation of different antimalarial drugs which contributed to the development of adequate policies on case management. NMCP has also built strong collaboration with regional and international institutions and universities and in a number of cases contributed to the development of study protocols.

Participation in multiple- type of studies has resulted in the generation of a huge database which is kept at NMCP offices (electronic or physical data source).The program has benefited a lot from the introduction of innovative technology such as PDAs and GPS and improved the quality of data entry, analysis and storage.

Opportunities have been created such capacity building at community, health centre and hospital level in research in collaboration with national and international research institutions. The leadership role of Rwanda in Malaria control provides opportunities to publish papers in international scientific journals.

The main challenges encountered in operational research are delays in releasing results of evaluations and reports (Multi-centre studies, data audit), limited

dissemination and feedback to the local level and the absence of an efficient archival system in place or document retention for research data.

### 5.6.4 Enablers and best practices

Monitoring and evaluation of malaria control activities has been greatly enhanced by the existence of an excellent health ad management information system (HMIS). This system provides data on malaria for all malaria routinely collected indicators; coverage is very high with nearly all the health facilities countrywide reporting (98% reporting rate). This is also supported by regular data from population-based surveys including DHS and MIS.

### 5.6.5 Constraints

The following constraints affect malaria monitoring and evaluation: limited data on socioeconomic impact of malaria; inadequate stock reporting of ACT and RDT at community level is inadequate; population projections are from 2002 - some programs use different population growth rates while family planning has increased in Rwanda and child mortality have decreased and there's no national system on birth and death registry; absence of routine surveillance and HMIS data on malaria from National Referral hospitals or private health facilities in the national HMIS; WHO Malaria bulletin template created in 2009, but has not been completed; absence of district profiles in place due to malaria epidemiology changes that have occurred in the recent years; delays in releasing results of evaluations and reports (Multi-centre studies, data audit); limited dissemination and feedback to the local level; absence of efficient archival system in place or document retention policies for evaluation data and reports; dashboard implementation is behind schedule; HMIS and other platforms reporting Malaria data are not web based; capacity in M&E is limited at district and health facility level; access to data from HMIS and SIScom is not timely; and absence of updated map of malaria stratification.

### 5.6.6 Key issues

The key issues arising from this review are as follows:

1. Malaria data collection is integrated into the national HMIS and provides comprehensive routine data, however, logistics MIS is not yet functional. No private sector and referral hospital data

2. Insufficient data analysis and use at the NMCP level given the amount of available data

3. Malaria control strategies are not harmonized with neighboring countries

4. Sense of low on job capacity building such as peer visits and specific training for NMCP personnel

### 5.6.7 Action Points

The following actions are required

1. Strengthen weekly analysis and use of routine data for action at national, district and health centre levels. At national level the following should be undertaken: Adopting and weekly analysis of the following core indicators - ITN coverage, IRS coverage and ACTs coverage; and identifying districts with excessive occurrence of cases and epidemic-prone districts and provide feedback to the district level for local action. At district level, undertake the following: Analyzing and monitoring the following - trend of test positivity rate (TPR), trend of cases and deaths (increasing or not), clustering of cases and death by health centre and cell, epidemic threshold; cases by health centres; and working with health centres with cluster of cases identify causes of high transmission and intervene appropriately. At health centre level, intervening in villages with clustering of cases to investigate coverage with preventions interventions and take local action to reduce malaria burden.

2. Build key malaria indicators into HMIS data warehouse and dashboard. Develop mechanism to automatically update malaria bulletin with HMIS data.

3. Strengthen capacity in data analysis for NMCP staff, M&E and data managers in districts and health facilities.

4. Collaborate with HMIS to incorporate referral hospitals and private sector into HMIS so that HMIS data could be as complete as possible; this can be achieved through advocacy meetings with referral and private sector hospitals and institution of performance contract mechanisms with their leadership.

# 6 Conclusions and Recommendations

## 6.1 Conclusions

The conclusions of the Rwanda malaria program performance review are as follows

1. The country has one of the best routine and survey-based systems for generation and use of strategic information for malaria control in Africa. Rwanda boasts of monthly data at all levels on malaria variables. This data is available and accessible at national level, district and health centre levels. It is also disaggregated in such a way that it that enables the monitoring of malaria burden and indicators. The SYS.COM (Community Health Worker Information System) is computerised system that records monthly data on malaria case management at community level by CHWs. The integrated disease surveillance (IDSR) is planned as a module in Track-net whose strategic plan, guidelines and tools are finalized and training planning is in process.

   With regard to epidemiological surveillance system there are 11 sentinel sites for collecting malaria data from the health facilities weekly. There is ongoing development of a harmonized Logistics management information system.

   Regular data from health and malaria surveys including the following: demographic and Health Survey (DHS) that collects relevant malaria information (Interim DHS 2007/2008 and ongoing 2010-2011 DHS); The Malaria Indicator Survey (2005; mid-2007; and 2010 integrated into the 2011 DHS); Health facility surveys for monitoring quality of care (2004/2005 to assess status of implementation of the new malaria treatment policy; and December 2010 with results showing appropriate malaria case management at 85.7%, rose from 77.4 % in 2006); and rapid evaluation of the CCM in 2010 with results that indicate that 70% of <5s were correctly treated at community level as part of CCM; > 85% of <5s received adequate treatment of malaria.

2. Extraordinary progress has been made in the fight against malaria as signified by the following: declining of malaria incidence by 70% decline between 2005 and 2010; decline of outpatient malaria cases by 60% between 2005 and 2010; declining of inpatient malaria deaths by 54% 2005 and 2010; and declining of malaria test Positivity rate by 66% between 2001 and 2010. There are however provincial and district variations in the gains in malaria control. For example the test Positivity Rate in 2010 showed the following variations among the provinces: the average TPR in East province was 29% with variations among the districts ranging from 19% to 40%; average of 24% in South province (district range, 10-32%); average of 16% in MVK (district range, 9-23%); average of 11% in North Province (district range, 5-19%); and average of 10% in West province (district range, 7-14%). It was noted however that inspite of the reality of variations in malaria burden

across the country, the last malaria epidemiological stratification map of Rwanda was in 1982, at a time well before current interventions and epidemiological changes.

3. There is expansive access to health services supported by a good referral system and ssustainable financing of health services. The organization and management of health services is exemplary and characterized by the following: integration and decentralization of malaria control at all levels; community involvement and participation; effective coordination and scale up of evidence based of malaria control interventions; evidence based policies and strategies; strong political support and country ownership; zero tolerance of corruption and performance based implementation; and performance-based pay for health workers who deliver key high quality interventions and meet targets. While majority of partners' activities with the national malaria strategic plan, there is need for increased information on financial expenditures from all partners. In the financing of malaria control activities, great gains were made in reducing the funding gaps to about 10% in 2011 thanks to substantial external funding from GFATM and PMI. Funding challenge abound as from 2012 as the funding gap swing upwards: 55% in 2012 (USD 74,207,283.00) and 70% (USD 44,157,360.00).

4. The decline in malaria burden is due to expanded access to prevention and control interventions. The NMCP implements community-based integrated malaria vector control combining LINs, IRS and larval source management using draft LLINs and IRS guidelines. Universal coverage with LLINs was achieved in February 2011 through the distribution of 6.1 million LLINs between December 2009 and February 2011. This was augmented with focalised IRS in high burden areas, achieving more than 90% coverage of targeted structures covered; and protecting a population of 1.2 million. Entomological infrastructural and technical capacities are however inadequate for effective monitoring and supervision of malaria vector control activities. Malaria diagnosis and treatment have been scaled up to universal coverage. As a consequence, Rwanda has one of the highest rates of testing suspected malaria cases with a 98% parasitological diagnosis. Additionally it also has near universal coverage of ACT treatment through the public system. This needs to be sustained to ensure that all malaria cases are diagnosed correctly and promptly. Data provided by RDT results considerably expands information available for surveillance and transmission containment. It also helps to further understand seasonal and geographical distribution of malaria, and analyze the effect of malaria reduction interventions on long term malaria trends at district and even lower levels.

5. Scale up of interventions was made possible by functional support systems. The Supply Chain Management system with streamlined and clear operational centres at Central, District, Health Facility and Community levels. Appropriate guidelines for management of commodities and pharmaco-vigilance alongside a pre-service learning module are available. Annual

quantification for medicines and community needs assessment has ensured well supplied pipeline. Some PSM challenges: No software for estimating commodity requirements; No SOPs for PSM at all levels; No formal document with specifications of all anti-malarial commodities; lengthy procurement procedures; and absence of feedback on the LMIS.

The capacity for malaria behaviour change communication is high. There is strong political commitment which demonstrated by the presidential funding of training of CHW and issuing of phones to all 60,000 CHWs. There is solid evidence of impact on better knowledge information utilisation and community involvement in malaria control. There is evidence of behaviour change from previous BCC investments. However, there is need for more evidence base for the BCC interventions being implemented

6. The declining malaria burden and transmission intensity has resulted in expanding areas of unstable malaria transmission; these areas are prone to malaria epidemics. Also the current EPR threshold is no longer sensitive enough to detect malaria epidemics and needs to be revised. Capacity for EPR needs strengthening nationwide in anticipation of the expected impact for universal coverage with LLINS supplemented with IRS and universal coverage with malaria diagnosis and treatment.

7. Rwanda's gains in malaria control are however fragile! For instance, the failure to replace discounted ITNs in 2008 led to decline in effective universal ITN coverage from 51% in 2007 to 24% in 2009 resulting in the 2009 nationwide upsurge in malaria cases in 38 of 30 districts. This calls for vigilance. The gains in malaria control will be sustainable only if available data is used to monitor malaria burden, identify transmission foci and guide local action. There is a continuing threat of resistance to malaria medicines and insecticides in the east African sub-region. In spite of the threat, currently the antimalarial medicine for uncomplicated malaria is very efficacious but vigilance is required.

## 6.2 Key Recommendations

1. Maintain universal coverage with ITNs and malaria diagnosis and treatment and adopt malaria burden reduction strategies in targeted sectors, cells or villages within selected districts using IRS and vector source reduction strategies where applicable. This should be supported with sustained BCC/ICC campaign in support of interventions uptake with special focus on use of ITNs and need to maintain vigilance on malaria as the burden declines.

2. Adopt surveillance-based targeting of interventions. This will entail continued investments in the generation of strategic information and updating of malaria stratification maps to enable the targeting of interventions based on evidence.

The following strategic information for action should continue to be generated:

i. Data on malaria parasite prevalence: Support should continue for malaria indicator surveys (MIS) every 3 years and demographic health surveys (DHS) every 5 years;

ii. Data on malaria vector bionomics: The feeding and resting behaviours of the vector should be monitored so as to review strategies as the vectors change their behaviours. Currently, the vectors feed inside/outside and rest inside/outside; this behaviour lends itself to the current strategy of indoor residual strategy but when changes are noted especially when the vector rest outdoors, IRS will no longer be useful; thus support should continue for vector bionomics including capacity strengthening and development of integrated entomology laboratory; and

iii. Data on malaria medicines therapeutic efficacy, insecticide resistance monitoring and residual effects of insecticides in order to ensure timely detection of resistance and take prompt remedial action.

The following maps and trends graphs should be regularly updated:

i. Parasite prevalence map - this should be updated using data from DHS and MIS every 3-5 years; the last MIS was in 2007 and the malaria prevalence map has been developed using the results, the results of the 2011 DHS should be used to update this map by the end of 2011;

ii. Annual TPR map and monthly TPR trends graph - given that more 90% of suspected malaria cases are being tested in all districts of Rwanda, TPR is good proxy for malaria prevalence. A 2010 malaria test positivity rate (TPR) map has been produced. A monthly TPR of less than 5% for 12 months is the milestone for program transition at national and district level from control to pre-elimination. Thus the Rwanda program is at the control stage and is not at ready to transit to pre-elimination. This map should therefore be updated annually and used to monitor progress of malaria prevention interventions and target program investments;

iii. Annual malaria Incidence map and trends graph - with a very god HMIS, Rwanda is in a very good position to produce malaria incidence maps annually. The 2010 incidence map has been produced. Malaria incidence of less than 1 case per 1000 people at risk is the transitional milestone for transiting from pre-elimination to elimination program at national and district levels. Although the Rwanda program is at the control stage, given availability of data, it is good capacity building and systems strengthening for Rwanda to update the incidence map

annually and use it to monitor impact of interventions and target program investments; and

iv. Annual malaria vector map in order to monitor changes in vector populations and proportions.

The ongoing work with the Malaria Atlas Project (MAP) to produce a composite model map of malaria risk in the country should be completed.

In the context of the planned real-time data reporting systems, the following actions are imperative:

i. Set new thresholds for malaria epidemics in all villages, cells, health centres and district hospitals as well as taking local action to management upsurges. Given declining malaria burden and transmission intensity, the WHO formulae for calculating thresholds may not be applicable. Use of the average test positivity rate (TPR) of the previous year at that level (district, health centre, or cell) as the threshold for every New Year is suggested. This way, any level in disease burden attained the previous year will be used as bar above which an epidemic is declared and response initiated.

ii. Strengthen weekly analysis and use of routine data for action at national, district and health centre levels based on a set of core indicators for each level. At national level, the following core indicators should be adopted and analyzed weekly: ITN coverage, IRS coverage and ACTs coverage; and identifying districts with excessive occurrence of cases and epidemic-prone districts and provide feedback to the district level for local action. At district level, analyzing and monitoring the following should be undertaken: trend of test positivity rate (TPR), trend of cases and deaths (increasing or not), clustering of cases and death by health centre and cell, epidemic threshold; cases by health centres; and working with health centres with cluster of cases identify causes of high transmission and intervene appropriately. At health centre level, intervening in villages with clustering of cases to investigate coverage with preventions interventions and take local action to reduce malaria burden.

3. Adopt sustainable funding for malaria control especially funds to sustain universal coverage with LLINs and malaria diagnosis and treatment, and BCC/IEC campaigns. Specifically, there is need to undertake resource mobilization and increase domestic funding. There is also need to undertake advocacy for public-private partnership for malaria control and mobilize more funds from GFATM and other multi-lateral and bilateral organizations.

4. Implement cross-border collaboration in malaria control in malaria epidemic management between Rwanda and neighbouring countries through

advocacy and planning at ministerial level, and review and information sharing meetings between Rwanda's border districts and their counterparts in neighbouring countries. The high level ministerial advocacy could be based on the existing sub-regional mechanisms: the health ministers and permanent secretaries (PSs) of the East African community meet twice every year (first the PSs meet and then the Ministers join them and are briefed by the PSs). Before the meeting of the PSs, the malaria control program managers should meet to strategize on malaria control and define issues to be tabled for discussing at the PSs' and ministers' meetings. These issues should focus on joint activities fir strengthening cross-border malaria control and elimination.

5. Update or produce strategic documents as follows: malaria policy document; MSP; M&E plan; EPR guidelines and tools; malaria commodities management guideline; mmalaria commodities specifications document; SOPs for commodities distribution; SOPs for placing orders of malaria commodities at all level; and SOPs for storage of malaria commodities at community level.

6. Strengthen implementation capacity including equipment and training in vector surveillance and EPR, training on data for decision making and training on identification of vector breeding sites and management and developing and installing software for forecasting malaria commodities.

7. Conduct performance monitoring through semi-annual review and planning meetings focused on reviewing the following: malaria epidemiology including malaria epidemiological stratification, trends of TPR, incidence, and proportional morbidity and mortality; and progress of implementation of the MSP and annual operational plan including technical and financial reporting by all partners.

## 7 Annexes

Annex 1: Agenda for all the phases of the MPR

Annex 2: People involved in MPR

- Thematic review teams
- Field teams
- People visited

## Annex 3: SWOT Analysis

| | Strengths | Weaknesses | Opportunities | Threats |
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| **Malaria Programme TRAC+** | ▪ National Malaria Unit established and functioning with effective leadership<br>▪ Strong stable health sector<br>▪ Short term financing (RCC/Round 5 GF 1 year/PIM until 2011)<br>▪ GF Round 8 and RCC until 2013<br>▪ Existing, effective, evidenced-based strategies<br>▪ Conducive work environment from National to District level<br>▪ Availability of drugs and commodities at National and District level<br>▪ Focused and closely collaborating partners<br>▪ Integration of malaria activities within the health system<br>▪ Pilot program for CHWs use of RDTs<br>▪ | ▪ Unpredictable funding in the long term after 2013<br>▪ Weak drug management in Health centre resulting in stock outs of drugs at health centre level<br>▪ HR capacity in malaria control and M&E/ supervison at District level and below<br>▪ Weak multi-sectoral coordination at decentralised levels<br>▪ Prescribing habits of physicians leading to over treatment<br>▪ Some support not accordly to Rwanda needs and priorities<br>▪ Epidemic preparedness policy and procedures in place<br>▪ Management of the private sector | ▪ Availability of Funds<br>▪ Strong health system: mutuelles and PBF<br>▪ Collaboration and support from local NGOs on malaria sensitization<br>▪ Strong commitment and involvement of health providers and community health workers<br>▪ Evidence based of malaria control interventions<br>▪ Strong monitoring system<br>▪ Government and partner support<br>▪ Close collaboration with EAC<br>▪ Effective communication<br>▪ HMIS in place to monitor progress in malaria control activities<br>▪ Support from community for malaria control<br>▪ Activities planned - Review of Community health policy; Private sector and community survey; Study in health seeking behaviour; Inclusion of malaria control indicators in DHS, Health Qual and PBF | ▪ Possible withdraw of partner funds(all important activities cover until 2013 with RCC and Round 8)<br>▪ Instability in Neighbouring countries as well as weak malaria control<br>▪ Possible influence of changes in agricultural practices<br>▪ Emerging drug resistance<br>▪ Resistance to insecticides<br>▪ Change in malaria epidemiology<br>▪ Sub standard drugs on the market |
| **VECTOR CONTROL** | **Strengths** | **Weaknesses** | **Opportunities** | **Threats** |
| Entomological | Existence of 7 sentinel sites where data | Shortage of skilled | Availability of funding through | Fluctuation of power at |

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| surveillance | is collected fortnightly to monitor entomological indicators | technicians and inadequate laboratory facilities | partners: GFATM, PMI, CDC and Government to eliminate malaria | insectary<br>Over reliance on external support<br>Cross-border malaria |
| Indoor residual spraying | Technical capacity available locally and support from local leadership and community with strong collaboration with development partners | Capacity to cover all target areas due to limited funds.<br>Inadequate public contribution to ensure sustainability | Global call for malaria elimination and institutional collaboration with KHI, Local government | Insecticide resistance<br>Unpredictable weather conditions<br>Species successions |
| Long-lasting insecticide treated nets | Strong acceptability by communities and effective distribution systems in place | Monitoring capacity of usage and no guide for disposal of old LLINs | Global call for malaria elimination and government commitment to eliminate malaria | Insecticide resistance |
| Integrated vector management | Strong commitment by NMCP to implement IVM | Lack of policies and guidelines for IVM | WHO recommendation to adopt IVM as an approach for vector control | Labour intensive |
| Policies and guidelines | Strong health sector policies framework | Lack of national policies for vector control | Strong commitment by the Government | Lack of inter-sectoral collaboration |
| Organization | Strong malaria program structure and leadership. | Lack of inter-sectoral collaboration | Strong goodwill from the Government and partners | Poor career path for entomologists |
| Malaria vector control research | Collaboration with research institutions and university | No institution involved in training of entomologists and Lab technicians | Collaboration with external Research institutions such as ICIPE & Tulane | Over-dependence on external influence for decision making on VC |
| **Case Management** | **Strengths** | **Weaknesses** | **Opportunities** | **Threats** |

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| | ▪ Defined roles for each level and synergy between the different and existing programs<br>▪ Decentralization of health services<br>▪ Integration of malaria activities within the health system<br>▪ Availability of policies and guidelines for case management<br>▪ Availability of policies and guidelines for case management<br>▪ Functioning community health based system for the home management of malaria<br>▪ Availability of drugs and commodities<br>▪ Financial accessibility for the communities through the Community Insurance scheme<br>▪ Well-functioning referral system for malaria cases | ▪ No adequate system in place to collect malaria data from referral hospitals and private sector<br>▪ Severe case management at district hospital in accordance with the guidelines (cases to be confirmed)<br>▪ No other lab examinations at hospital to exclude malaria<br>▪ No subsidized drugs in private sector<br>▪ No information of malaria cases in private sector and referral hospital<br>▪ no clear drug management system at community level<br>▪ Wastage of RDTs use ( safety injection) | ▪ Strong Government commitment and support<br>▪ Consistent Financial support from partners (Global Fund RCC malaria and Round 8, PMI,…)<br>▪ Presence of partner support<br>▪ Presence of at least one person trained in malariology in all district hospitals (6 weeks training WHO malaria course) | ▪ High staff turnover<br>▪ Cross border of the population in the neighbouring country |
| **EPR** | **Strengths** | **Weaknesses** | **Opportunities** | **Threats** |
| Advocacy, information, education, communication and community involvement | Existence of HCC department at MoH | Insufficient personnel | -Promotion of community radio<br>-Increased literacy through free primary education | Cross-border issues |
| National control systems for malaria epidemics and emergencies | - Strong linkages with partners for malaria epidemics and emergencies control | Inadequate operational capacities | -Promotion of communication technology<br>-Existence of a ministry responsible for disaster | disasters (climate change, earthquake land, ...) |
| Rapid response to malaria epidemics | Existence of logistic & financial means | Inadequate number of human capacities | Political will; Existence of funds for the control of malaria epidemics | High reliance on external funds |
| Early warning | -Existence of sentinel sites for malaria | Inadequate human capacities | Collaboration with other | climate change |

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| and surveillance of malaria epidemics | weekly reporting.<br>Close collaboration with meteorological department | | departments | |
| Preparedness and planning for malaria epidemics | Existence of an *adhoc* technical team | Insufficient well-trained personnel at decentralize level | Existence of committees for malaria epidemics control at District and health centre level | High reliance on external funds |
| Determinants of malaria epidemics and emergencies and risk factors | - Existence of sentinel sites.<br>Existence of thresholds for epidemics | All determinant and risk factors are not well documented.<br>Need to revise and update the threshold | Existence of communities health insurance | Resistance of vectors and parasites to insecticides and antimalarial drug |
| Forecasting malaria epidemics | -Existence of meteorological station at sentinel sites.<br>Weekly monitoring and reporting of malaria cases at sentinel sites | -Lack of timely reporting from meteorological department.<br>Lack of weekly reporting on morbidity data in most of health centres | -Collaboration with other departments.<br>- Promotion of communication means (internet, mobile phone) | climate change |

| PSM | Strengths | Weaknesses | Opportunities | Threats |
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| | ▪ Reporting system is in place to gather consumption data from the health facilities to be used for the quantification.<br>▪ Since December 2009, Logistics officer in Malaria Unit.<br>▪ Quantification done every year with review every 6 months.<br>▪ Funds are available up to 2011<br>▪ Partners support (GF,PMI, GoR…)<br>▪ Strong Procurement Unit in CAMERWA<br>▪ Closed collaboration with Malaria unit and CAMERWA<br>▪ Procurement through WHO with prequalified suppliers for ACTs for quality assurance<br>▪ PSM Plan available<br>▪ The existence of functional district | ▪ Data from health facilities are not yet accurate.<br>▪ Delay of harmonized LMIS system implementation which will allow the availability data for all malaria commodities<br>▪ Inappropriate estimation of impact of bed nets distribution, In door Residual spraying (IRS), Behaviour Changing Communication (BCC), outbreak seasons on decreasing of malaria cases and drug consumption. Some prescribers still give the ACT for presumed malaria | ▪ Another project request (RCC phase 2) is in process and will cover the needs till 2013.<br>▪ Willing of partners to cover any identified gap (PMI, UNICEF…)<br>▪ National and partners (GF, PMI) Policies and regulations on procurement available.<br>▪ The RCC phase 2 is in process<br>▪ willing of partners to strengthen the supply chain system<br>▪ Review of the inventory control system<br>▪ MoH and other | ▪ The season outbreak causes over consumption of drugs and stock out.<br>▪ Long procurement procedures for non ACTs drugs and other commodities<br>▪ Increase of cases in some areas due to neighboring countries which use different treatment policies |

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| | pharmacies | cases<br>▪ Staff turnover in district and health facility level, one staff in the supply chain department<br>▪ Insufficient Storage capacity as demand of bed nets is increasing.<br>▪ SOPs for commodities distribution ,for placing orders not available<br>▪ Guidelines for storage at Community level.<br>▪ Non accurate and reliable data<br>▪ No Reporting of the private sector<br>▪ The PTF is not well equipped, for now, to conduct lead alone the pharmacovigilance activities<br>▪ There is not quality control laboratories which can support pharmacovigilance activities/findings<br>▪ Some prescribers still give the ACT for presumed malaria cases<br>▪ Integration of the private sector into the national system by providing them with access to quality approved drugs in accordance with the national treatment policy<br>▪ A medicine regulatory authority may be effective | stakeholders highly committed to the issue of pharmacovigilance in Rwanda<br>▪ National Pharmacovigilance and medicines Information Centre (NPMIC) | |

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| | | only it have a legal basis. | | |
| **BCC** | **Strength** | **Weaknesses** | **Opportunities** | **Threats** |
| | • MOH BCC Policy and malaria BCC strategy available<br>• Friendly structures and systems ( Political administrative,…) that favour BCC<br>• Existence of BCC department in NMP<br>• Use of different information charnels<br>• Annual campaigns *(Malaria day, MCH Week and MOH other campaigns)*<br>• Funding available to support BCC activities *(Developing IEC materials ,media, social mobilization, trainings)*<br>• Informative Research on specific behaviors *(Beliefs on the utilization of LLINs 2007/2008)*<br>• Involvement of partners *(GF R8 sub recipients)* ensuring National coverage in the fight against Malaria<br>• M&E department in place to monitor the progress in malaria control activities;<br>• Engagement of religious leaders | • Less or no trained BCC facilitators at all levels | • Political commitment (Government and partners support)<br>• Diversified funding support for BCC activities such as GF, PMI<br>• Efficient CHW network ;<br>• Local leaders & Opinion Leaders support at all levels and all sectors;<br>• Same language used countrywide | • Lack of harmonization of integrated regional BCC policies |



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