
PRESIDENT'S MALARIA INITIATIVE


# Rwanda Vector Control Needs Assessment (VCNA)

Integrated Vector Management (IVM) Task Order 2

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# REPUBLIC OF RWANDA


**MINISTRY OF HEALTH**
**P.O. Box 81, KIGALI, RWANDA**

# VECTOR CONTROL NEEDS ASSESSMENT (VCNA)

# REPORT

May, 2011

**ABBREVIATIONS**

| | |
|---|---|
| CHWs | Community Health Workers |
| EIA | Environmental Impact Assessment |
| EID | Emerging infectious diseases |
| FAO | Food and Agricultural Organization |
| GFATM | Global Fund to fight Aids, Tuberculosis and Malaria |
| HMIS | Health Management Information Systems |
| IEC/BCC | Information, Education and Communication/Behaviour for Communication Change |
| IRS | Indoor residual spraying |
| IVM | Integrated vector management |
| LLINs | Long lasting insecticide treated bed nets |
| MOH | Ministry of Health |
| NGOs | Non-governmental organizations |
| NISC | National Interim Steering Committee |
| NTDs | Neglected tropical diseases |
| PMI | President's Malaria Initiative |
| RBC | Rwanda Biomedical Center |
| RTI | Research Triangle Institute |
| TRACPlus: | Centre for Treatment and Research on AIDS, Malaria, Tuberculosis and other Epidemics |
| USAID | United States Agency for International Development |
| VBDS | Vector borne diseases |
| VCNA | Vector control needs assessment |
| WHO | World Health Organisation |
| WHOPES | WHO Pesticides Evaluation Scheme |

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## Foreword

Data from the Health Management Information System indicate that malaria transmission has decreased significantly in the past few years. For example, malaria cases dropped from 15.6% in 2009 to 7.8% in 2010. . This trend has been attributed to several interventions including, vector control, which have recently been scaled up. Ownership and usage of nets have increased rapidly in both rural and urban areas of Rwanda due to increased availability of free nets through mass campaigns and routine delivery channels. Rwanda achieved the set target of universal coverage of long lasting insecticide nets (one net per 2 persons) at the end of February 2011. Indoor residual spraying (IRS) which commenced in 2007 in three districts in Kigali has expanded to seven other districts and other target sectors.

As Rwanda progresses towards a national goal of malaria elimination, robust measures need to be put in place to prevent potential future epidemic rebounds of the disease and the continued protection of an increasing vulnerable population as the overall immunity decreases. Such measures should also include regional cooperation to prevent cross-border transmission. It is therefore important that capacity for evidence-based decision-making is quickly established to adequately address potential future challenges in malaria transmission. Due consideration must be given to relevant orientation of the health systems and the removal of constraints to inter-sectoral action, to ensure adequate national preparedness and rapid response.

The Ministry of Health is committed to strengthening the control and surveillance of malaria and vector borne diseases and is hereby pleased to endorse the vector control needs assessment, as the first step towards the implementation of an integrated vector management strategy.

**Permanent Secretary**

**Ministry of Health**

## Preface

Malaria and other vector borne diseases are major impediments to the economic and social development of Rwanda. Vector control plays a key role in the prevention and reduction of disease transmission by reducing vector abundance, longevity, and preventing human-vector contact. The potential of vector control can also be exploited to reduce the spread of resistance to anti-malaria drugs, prevent and manage epidemics, and lower the risks of re-emergence or the introduction of vector borne diseases. When carefully implemented, vector control interventions can have multi-disease impacts. For instance, long lasting insecticidal nets (LLINs), indoor residual spraying (IRS) and larval source management (LSM), even when deployed with the primary focus on malaria, could help control other insects of public health importance such as houseflies, cockroaches, rodents, fleas, and bedbugs, which are responsible for transmitting other diseases. It is therefore important that measures are put in place to ensure that such multi-disease impacts are maximized. This can be achieved through joint planning and coordinated action between the various departments/units that are mandated to control vector borne diseases.

It is recognized that the technical, managerial and operational capacities for vector control at district-level are inadequate. It is also recognized that non-health sectors are usually not aware of the importance of their roles in vector management, and thus leave all issues on vector control to the Ministry of Health. Even within the Ministry of Health, coordination between relevant departments/units is less than desirable. There is a need for strong policy and institutional frameworks to address these constraints and guide an enhanced mobilization of national assets for cost-effective and sustainable control of vector borne disease in Rwanda. These are some core attributes that an integrated vector management (IVM) approach will foster.

As a first step towards transitioning to IVM, a detailed review of the current status of vector control and the opportunities for increasing efficiencies and maximizing sustainable reductions in local disease burdens was undertaken in 2010. Such a review has been termed, Vector Control Needs Assessment (VCNA), and forms part of the WHO Strategic Framework on integrated vector management.

The Specific Objectives of the VCNA were:

1. To review the policy framework and institutional arrangements for vector control;

2. To review the burden of vector-borne diseases and the status of their control, including the planning, implementation and management of operations and existing constraints;
3. To identify opportunities for addressing the constraints and facilitating national transitioning to IVM, including processes to utilize the findings of this report for the development of a national IVM strategy and work plans.

A meeting of all stakeholders directly and indirectly involved in vector control, was convened by the Malaria Unit of TRACPlus in February 2011 to validate the VCNA findings. The report was not intended to be prescriptive, but rather to provide guidance to develop and implement an IVM approach in the control of vector borne diseases in Rwanda It is designed for use by decision makers in the MoH and other relevant stakeholders to develop an IVM strategy and mobilize resources for its adoption and implementation. The RBC-TRACPlus is pleased to be engaged in this process and will provide all the necessary support to realize the important goal of eliminating malaria and other vector borne diseases in Rwanda.

*Acting* **Director General**

**RBC-TRACPlus**

## Acknowledgements

The VCNA was conducted as a collaborative effort between the Malaria Unit/RBC-TRAC-Plus/Rwanda and the USAID-funded IVM2 Project being implemented by the Research Triangle Institute, USA. Funding for this activity was provided by the US President's Malaria Initiative.

The authors would like to thank the staff of the following Organizations/Agencies that were consulted and contributed to the VCNA process, either as individuals or through informal stakeholder meetings.

- Ministry of Health, Rwanda
- TRAC Plus: Centre for Treatment and Research on AIDS, Malaria, Tuberculosis and other Epidemics.
- Rwanda Environmental Management Authority (REMA)
- Rwanda Agricultural Development Authority (RADA)
- Rwanda Animal Resource Development Authority (RARDA)
- Rwanda Wildlife Authority (RDB-RWA)
- Rwanda Environmental Agency (REA)
- USAID/Rwanda
- PMI/Rwanda and USA
- Access Project
- Tulane University, Rwanda HS20/20 Project
- Kigali Health Institute

It is hoped that these and other stakeholders will join hands in collaboration in the planning and implementation of integrated vector management in Rwanda.

**Director**
**Malaria Unit/RBC-TRACPLus**

## EXECUTIVE SUMMARY

The World Health Organization (WHO) recommends an Integrated Vector Management (IVM) approach to the control of vectors of human diseases. The strategy promotes maximal and rational use of available resources and remains the best option to scale up cost-effective and sustainable interventions to meet national objectives for vector borne diseases (VBDs). A vector control needs assessment (VCNA) was conducted in Rwanda in December 2010, as a first step in the development of a national IVM strategy and work plans. The VCNA reviewed the current status of vector control and indentified needs and opportunities in policy and strategy, institutional arrangements, program implementation, and monitoring and evaluation for national transition to IVM.

The review of the health policies and practices shows a broad structure for the prevention of infectious diseases, including a wide range of strategic objectives for the control and prevention of malaria and epidemic infectious diseases. While vector control is indicated as a key strategic approach in the control and prevention of VBDs, there is an absence of a well articulated overarching policy on vector control. Relevant policies are fragmented and embedded across different program and agency mandates; consequently, there is very little cross-sector efforts and accountability among the major stakeholders whose actions or inactions contribute to local disease burdens. Furthermore, the impact of environmental and agricultural policies on VBDs are not adequately recognized within the health sector, thus opportunities to link vector control with environmental and agricultural policies and practices are being missed.

The lack of a comprehensive policy on vector control prevents appropriate placement and cross-cutting mobilization for vector control within the Ministry of Health (MoH). With the exception of malaria, there is currently no vector control effort linked to other vector-borne diseases. Although the last few years recorded significant investments in malaria control, national capacity for entomological and eco-epidemiological evaluations is embryonic. There remains a paucity of local data on the distribution of vector species and the burden of VBDs. Although there have been significant success at mobilizing external (donor) funding for malaria vector control, these are however mandated for single interventions and does not provide flexibility for the national program to mix appropriate major and supplementary interventions that will maximize impact. For malaria, there is still the challenge of achieving and maintaining universal coverage with the currently recommended primary tools (LLINs or IRS). This will require additional resources and the development of an IVM strategy that will enable effective packaging and matching of portions of the

action plans to potential donor profiles and enhance mobilization efforts. Overall, there is a need to reprioritize vector control as a substantial and critical component of VBD control, consistent with recommendations of WHO and Roll Back Malaria.

RBC-TRACPlus, which is the lead department responsible for the control of malaria and epidemic infections, may provide the most feasible opportunity to house a substantive vector control department/unit. This unit would need appropriate mandate to not only coordinate actions within the MoH, but also inter-sectoral vector control efforts. While there is an urgent need to strengthen human, technical, financial and infrastructural capacities, actions should be informed by a clear understanding of the functional roles and responsibilities of the various levels of operations linked with the politico-administrative levels within a highly decentralized environment. There should be deliberate efforts at building critical competencies and national capacities to, among others (i) clarify, on an ongoing basis, the eco-epidemiology and transmission of local vector borne diseases (VBDs), particularly malaria, (ii) continually enhance the targeting of a mix of interventions that delivers and sustain maximal reductions of local disease burdens, and (iii) mainstream regulatory frameworks that safeguard human and environmental health from potential negative impacts of the use of public health insecticides. To rise to this challenge, advocacy for political commitment, resource mobilization, intra- and inter-sectoral coordination and community mobilization will be essential. The initial commitment of partners and collaboration shown between agencies during the VCNA exercise is a positive first step. Rwanda is globally noted for its empowered communities, which would provide enormous advantage to the management of human disease vectors, if well harnessed.

Recognizing the financial implication of recruiting additional staff, staff re-deployment should be reviewed in line with the functions of the various levels of IVM implementation and targeted skills development provided, in the short term, to begin cost-sensitive reorientation of capacities to match needs for a scaled up IVM implementation.

An appropriately mandated National Inter-sectoral Steering Committee (NISC) for IVM is proposed to coordinate joint action, enable informed review of relevant policies and strategies, orient national vector control goals/targets and oversee implementation and stakeholders accountability. The formation of an NISC is consistent with WHO recommendation and critical to efficient national transition to IVM. NISC will oversee the follow up steps to ultimately translate the conclusions and recommendations of the VCNA into a national IVM strategy. These steps include:

- Facilitate national review and adoption of the VCNA
- Oversee the develop of a national IVM strategy and work plans, including transparent modalities for broad national consensus and official adoption of the proposed strategy
- Oversee the implementation of IVM and efficiently capture and report lessons to continually improve performance

## 1.0 INTRODUCTION

The Ministry of Health of Rwanda strongly believes in the best utilization of available resources, interventions, and services at all levels of health care delivery. Integrated vector management (IVM), defined as *"A rational decision making process to maximize the use of resources for vector control"* (WHO 2008) is recognized as a primary strategy for cost-effective and sustainable control and prevention of vector-borne diseases. The current WHO policy recommendation is for countries to transition to comprehensive IVM to ensure rational scale up in the control and prevention of vector borne diseases (VBDs) by implementation of the five key elements of IVM (Box 1).

While financial resources have increased dramatically in the last decade for the control of VBDs - particularly malaria - disease endemic countries still face significant challenges in scaling up and sustaining cost-effective interventions. The burden of VBDs remains high with unacceptable levels of morbidity and mortality. There are multivariate reasons for this situation - ranging from inadequate and frozen policies, inadequate competencies and skills for planning, implementing and managing vector control operations and weak institutional frameworks and systems. Many countries do not have mechanisms for reviewing the effectiveness and impacts of policies and there is also little capacity, if any, to generate the relevant data needed for such reviews. Vector control interventions in many countries are limited to reliance on a couple of interventions with little resort to ongoing evaluation of opportunities for maximizing the local efficiencies and impact.

**Box 1: KEY ELEMENTS OF IVM**

1. **Advocacy, social mobilization**: IVM principles are embedded in the development policies of all relevant agencies, organizations and civil society.
2. **Legislation:** Regulatory and legislative controls for public health and pesticide management well established, reviewed and kept relevant.
3. **Collaboration within the health sector and with other sectors**: Functional collaboration within and between public and private sectors. Effective channels of communication among policymakers, VBD control programs and partners.
4. **Integrated approach**: Rational utilization of available resources, including appropriate integration of non-chemical and chemical vector tools and methods and multi-disease control approaches.
5. **Evidence-based decision-making**: Strategies and interventions are adapted to local ecology, epidemiology and resources, guided by operational research and routine monitoring and evaluation.
6. **Capacity-building:** Essential physical infrastructure, financial resources and adequate

A first step for national transitioning to IVM is to undertake a detailed review of the current framework and status of vector control; to identify and understand the root causes of existing constraints to the achievement of set goals, identify opportunities and requirements for addressing those constraints and recalibrating operations to increase efficiencies and maximize sustainable reductions in disease burdens. Such undertaking has been termed as a Vector Control Needs Assessment (VCNA) and forms a part of the WHO Strategic Framework on IVM.

As part of ongoing support by the US President's Malaria Initiative (PMI), the Malaria Control Unit/RBC-TRAC-PLUS of the Ministry of Health, Rwanda collaborated with the USAID-funded IVM Project implemented by RTI to undertake the VCNA. Support is anticipated to continue through the review and adoption of the VCNA report to translating the broad findings to orient a national IVM strategy and work plans (action plans).

### 1.1 Objectives of the Vector Control Needs Assessment

The objectives of the VCNA were to:

1. Review policy framework and institutional arrangements for vector control;
2. Review the burdens of vector-borne diseases and the status of their control, including the planning, implementation and management of operations and existing constraints;
3. Identify opportunities for addressing identified constraints and facilitating national transitioning to IVM, including processes to utilize the findings of this report for the development of a national IVM strategy and work plans.

### 1.2 What this report does not cover

The VCNA report does not cover issues related to the diagnosis, reporting, and management of vector borne disease cases. The report does not provide step-by-step instructions on how to control or eliminate a particular vector population, solve constraints or to dictate the roles and responsibilities of different sectors or stakeholders. The VCNA is a first step in a larger process aimed at providing a framework for informed and structured deliberation among national stakeholders sectors to, (i) recalibrate national goals and strategies on VBDs and (ii) evolve feasible and measurable work plans to address constraints to national vector control endeavours in a more comprehensive manner. The VCNA indicates where bridges between

different stakeholders can be built to strengthen the efficiency and effectiveness of partner and joint actions.

## 2.0 SITUATIONAL ANALYSIS

This section presents a status of the priority areas of assessment. Existing constraints are reviewed and opportunities for addressing the identified constraints or further improving vector management discussed in Section 3.

### 2.1 Policy and Institutional Framework for Vector Control

This section reviews the policy and institutional framework for vector control.

#### 2.1.1 Health Sector Policies and Plans

Rwanda currently does not have one overarching policy that addresses vector-borne disease control. In general, efforts to control vector populations have emerged from a number of different initiatives and Units primarily found within the Ministry of Health. The guiding strategic plans that have initiated these efforts contain some elements of IVM (Box 1), but do not collectively constitute a comprehensive and distinct IVM policy.

In 2008, a new unit for Planning, Policy and Capacity Development (UPDC) was established within the MoH. This unit was given the responsibility for monitoring and evaluation (M&E) of all health services to improve efficiency in the health sector. UPDC currently works closely with several units responsible for disease control and prevention and may have a role in developing a national IVM policy. Integration and supervision of vector control services among the various national control programmes at the national and district levels require coordination through policies that are currently missing in Rwanda.

Several major policies/strategic plans initiated by the health sector, and reviewed during the VCNA, may provide further guidance in developing an IVM policy. These plans are listed below and subsequently discussed:

i. *TRAC Plus. Centre for Treatment and Research on AIDS, Malaria, Tuberculosis and other Epidemics. Strategic Plan. 2009 – 2012*
ii. *The National Strategic Plan for the Prevention and Control of Malaria in Rwanda, 2008-2012*

iii. *The Strategic Plan for Prevention and Control of Epidemic Infectious and Neglected Tropical Diseases in Rwanda, 2009 – 2012*

iv. *Environmental Health Policy, July 2008*

v. *The National Behavior Change Communication Policy for the Health Sector, December 2006*

i. **Centre for Treatment and Research on AIDS, Malaria, Tuberculosis and other Epidemics [TRAC *Plus].* STRATEGIC PLAN 2009 – 2012**: Coordination for infectious disease control activities including malaria, schistosomiasis, lymphatic filariasis, and onchcerciasis is the responsibility of TRAC *Plus* – a public health institution under the supervision of the Ministry of Health (MOH). The TRAC *Plus* 2009-2012 strategic plan provides a compelling platform from which policies, strategies and guidelines related to IVM can be harmonized. TRAC plus promotes, coordinates, and supervises operational and biomedical research targeting malaria and other emerging infectious disease (EID). This strategic plan attempts to coordinate activities conducted by entities responsible for monitoring & evaluation; prevention, care & treatment and/or research; and integration to obtain sustainable implementation of malaria and other epidemic infectious diseases programs at the national and district levels.

ii. **National Strategic Plan for the Prevention and Control of Malaria in Rwanda**: The national malaria control strategic plan for the years 2008 – 2012, initiated through the Malaria Unit of TRAC *Plus*, provides the overall goal of moving Rwanda towards the pre-elimination phase of local malaria transmission. The general objective of the Plan is to scale up current interventions, consolidate achievements and identify essential innovations in order to reach the malaria pre-elimination phase in Rwanda by 2012. Relevant to the development of a national IVM policy are several strategic goals including:

a. Development and implementation of Standard Operating Procedures for the collection, processing, analysis and use of malaria data in Rwanda.
b. Provision of a comprehensive list of malaria indicators that will guide all stakeholders involved in malaria control interventions that will be reported upon jointly.
c. Facilitation of periodic review meetings.

d. Consolidation of the epidemiological surveillance system, including: Sentinel sites; Integrated Disease Surveillance and Response (IDSR); Geographic Information Systems (GIS).
e. Reinforcement of strategic private-public, multi-sectoral, and community partnerships for the delivery of high-impact malaria prevention and control efforts at all levels of the health system.
f. Development of operational research through professional and targeted in-service trainings as well as collaboration with national and international research institutions and organisations.

These strategic goals provide opportunities to clarify roles and responsibilities, strengthen data management, and expand surveillance and reporting to other vector borne diseases, including the development of standard reporting indicators for vector borne diseases and a unified reporting structure. Additionally, the plan provides a mechanism to provide feedback, share information, and assess the status of programs and their progress in reducing morbidity and mortality of malaria. Presumably these opportunities would apply to other vector borne diseases, which could then strengthen national and district health system capacity to effectively and efficiently plan, implement, and manage malaria control efforts and other related vector borne diseases through evidence based programming.

iii. **The Strategic Plan for Prevention and Control of Epidemic Infectious and Neglected Tropical Diseases in Rwanda**: This plan was initiated through TRAC *Plus* and managed by the Epidemic Infectious Disease Unit. This unit is tasked to support Rwanda in the management and control of neglected tropical diseases (NTDs) including schistosomiasis, lymphatic filariasis, onchoerciasis, and trypanosomiasis, as well as emerging and re-emerging infectious diseases. The objective is to build national capacity for case management, prevention, behaviour change communication, and institutional support. Of particular interest would be the opportunity to improve knowledge, attitude, and best practices regarding specific vector borne diseases and to assess the magnitude of NTDs in the country by 2010. This strategic plan provides additional opportunities to improve the technical capacity of districts for surveillance and response to vector borne diseases by strengthening the IDSR system and by increasing capacity of labs and medical facilities to diagnosis and report on vector borne

diseases, and/or vector populations. Additionally this strategic plan provides opportunities to coordinate BCC/IEC efforts on vector borne disease prevention and support efforts to map the burden of vector borne diseases in Rwanda.

iv. **The National Behavior Change Communication Policy for the Health Sector:** While this policy does not specifically frame a strategy for vector borne disease control, the policy does recognize the Rwanda Health Communication Centre as the primary advisory unit to the MoH on strategic health communication - the main focal point for health promotion interventions across all health sectors. An inter-agency committee (the Multi-sectoral Technical Group) coordinates IEC/BCC (Information Education Communication/Behavior Change Communication) interventions for health communication. The policy provides a theoretical framework through which all health programs can implement social mobilization and IEC/BCC. In principle, this policy provides a good IVM platform to improve community acceptance of vector control activities and strengthen the effectiveness of vector borne disease control and prevention interventions through trained BCC health officers and well-designed BCC strategies. Through the Health Communication Centre's network, support can be garnered for IVM related activities at both the national and local levels.

v. **Environmental Health Policy:** Based on an *Assessment of the environmental health situation in Rwanda* conducted in 2006, the Ministry of Health's policy paper on environmental health provides a broad framework to address environmental health issues. The assessment recognized that some underlying causes of disease are related to a "lack of control of disease vectors" which are directly related the health of the environment. The policy emphasizes that the responsibility for environmental health services in Rwanda is currently shared between various ministries and government agencies, including the Environmental Health Desk. Several objectives of the Environmental Health Policy are relevant to the development of a national IVM policy including the active promotion of an institutional framework that enables efficient coordination and collaboration of various sectors and partners who have influence over environmental health issues. Such collaborative frameworks will help foster awareness about factors that undermine environmental health and contribute to changes in vector populations and disease risk.

### 2.1.2 Relevant/Related Policies, Plans and Practice in Other Sectors

#### *2.1.2a Environmental Policies*

Rwanda's Environmental Impact Assessment (EIA) policy covered under the **General Guidelines and Procedure for Environmental Impact Assessment, November 2006**, assesses development projects and provides the mechanism for monitoring and enforcing environmental policies. The guideline does not specify how vector control activities relate to environmental policy, in particular the use of public health approved pesticides used in Indoor Residual Spraying (IRS) and Long Lasting Insecticide Treated Nets (LLITN).

The Rwanda Development Board (RDB)[1] is responsible for carrying out regulatory measures. The EIA guidelines unify the legal requirements (Ministerial Order No 003/2008 of 15/08/2008) with the practical aspects of conducting an EIA. The EIA is therefore defined as a tool for prevention and control of environmental impacts caused by socio-economic development, which includes regulation on the disposal of pesticide waste used in vector control activities and the assessment of rice agricultural expansion on vector populations. REMA remains the primary organization responsible for the execution of environment-related policies and laws, including the Rwandan Organic Environmental Law. Article 67 of the Organic Environmental Law, states that programs and policies that may affect the environment shall be subjected to environmental impact assessment, before obtaining authorisation for their implementation. The environmental impact assessment shall be examined and approved by Rwanda Development Board, Department of Business Operation and Services or any other person given a written authorisation by the Authority (Article 69).

#### *2.1.2b Agricultural Policies*

The Ministry of Agriculture and Animal Resources (MINAGRI) has initiated a project for the rational use of pesticide and the development of an Integrated Pest Management (IPM) policy documented under the **Pest Management Plan (PMP) Arrangement for RSSP II [**Rural Sector Support Project II**] December 2007.** As part of this rural development initiative, agricultural extension workers support pest control training and education to reduce crop losses. Rational use of pesticides in agriculture could potentially have impact on public health as often the same pyrethroids are used. Hence opportunities for collaboration between

[1] RDB was previously under the Rwanda Environment Management Authority (REMA),

Rwanda Agricultural Development Authority (RADA) and the health sector, particularly malaria should be actively explored. In general, the introduction of pesticides in the country is subject to authorization by MINAGRI following the submission of a certificate of origin and a certificate of analysis of the active ingredient.

*2.1.2c Finance and trade policies related to vector control*

Additional documentation and coordination is needed to clarify how agricultural and public health pesticides, including LLINs, are managed and processed in terms of tariff, tax, and distribution and sale policies.

The Rwanda Bureau of Standards (RBS) plays a role in facilitating competitiveness, fair trade and consumer protection. It houses the reference laboratory which is responsible for testing various products, including pesticides, for compliance with national, regional and international standards.

The Rwanda Revenue Authority (RRA) is responsible for goods exempted from import duties and taxes. Tax exemptions are provided for some health and public health products including mosquito nets and materials for the manufacture of mosquito nets.

**2.2 Structure, Resources and Functions (human and financial)**

2.2.1 Within the Health Sector

IVM requires a problem solving approach to vector control based on field observations, surveillance and situation analysis. Because almost every situation is distinct and complex, even across districts in the same country, the skills and capacity for surveillance, analysis and management need to be fostered at all appropriate levels of administration. Therefore, when correctly implemented, decentralized vector control should potentially increase efficiency and reduce wastage.

Health services in Rwanda are provided at different levels of the health care system (community health workers, health posts, health centers, district hospitals and reference hospitals) and by different types of providers (public, private-for-profit and NGOs). The

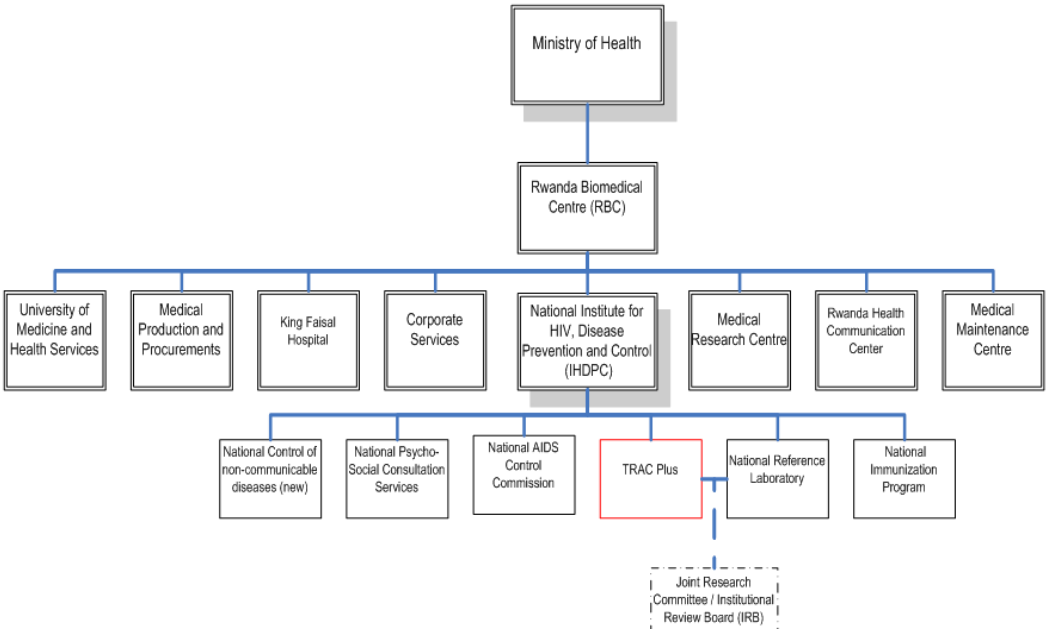
health sector is composed of administrative structures and implementing agencies at each level.

At the district level, agencies are under the supervision of the Mayor and Executive Secretary at the District level. The Districts have an administrative unit in charge of health, including public health administration services (planning, hygiene inspection, environment, supervision of management of agencies and intersectoral collaboration). At sector level, technical agencies include the health sector and community health insurance branches. These agencies are under technical supervision by those in charge of sector administration for social services and the Director of Health and child rights of the Districts. At village level, there are community health workers who are supervised administratively by those in charge of social services, and technically, also by those in charge of health services.

TRAC *Plus* is the leading public health institution in Rwanda responsible for health and research in the areas of HIV & AIDS, tuberculosis, malaria and other epidemics, including neglected tropical diseases (NTD). TRAC *Plus* also houses the Surveillance, Bioinformatics and IT unit (SBI) to support all information and data management to improve collaboration within the organization, as well as with other institutions such as the National Reference Laboratory (NRL), National AIDS Control Commission (CNLS), National Immunization Programme (EPI), National Psycho-Social Consultation Services (Mental Health), and other units responsible for the control of non-communicable diseases. Collectively, these institutions will make up the National Institute for HIV, Disease Prevention and Control (IHDPC). Future plans call for the IHDPC to become one of the institutions within the Rwanda Biomedical Centre (RBC), which will build and coordinate multi-sectoral and integrated activities to address the need for effective and efficient public health practices at all levels including communicable and non-communicable diseases (Fig. 1).

**Fig. 1: Institutional Framework for the Proposed Rwanda Biomedical Centre**

(Source: *TRAC Plus Strategic Plan. 2009 – 2012)*

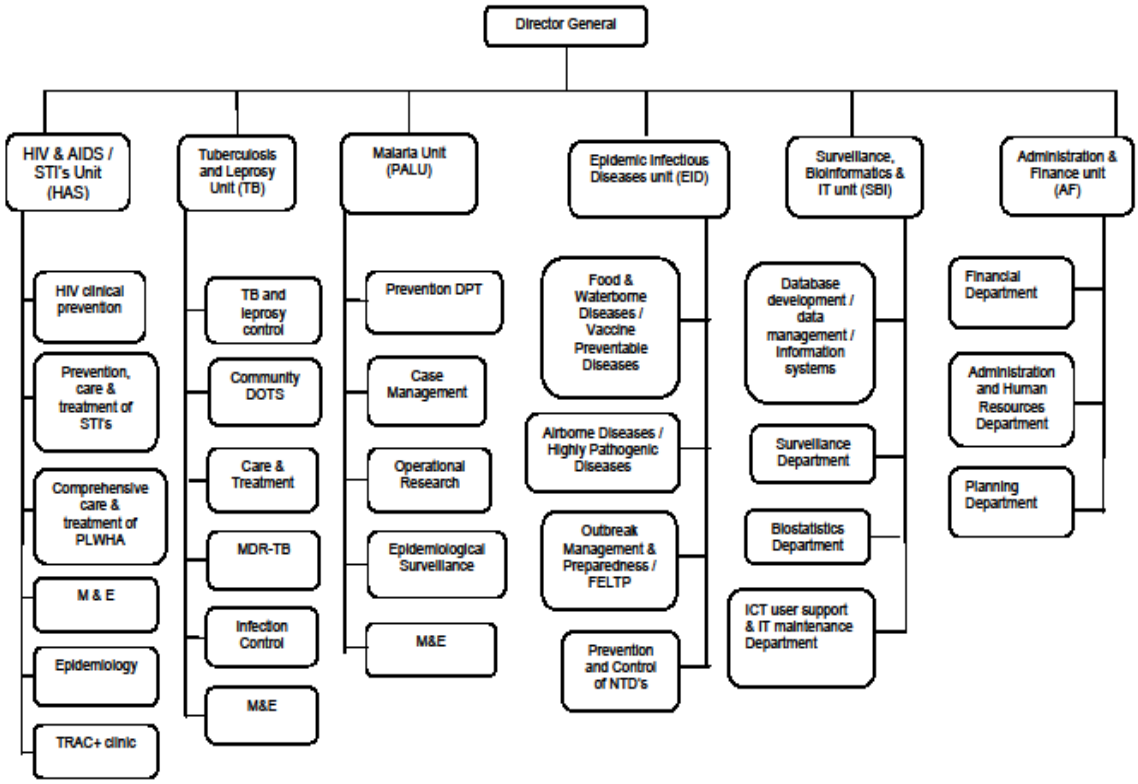



There are six functional units in TRAC *Plus* each headed by a unit director and organized into departments. Four units have disease-specific strategic sub-plans including the HIV & AIDS /Sexually Transmitted Infections unit (HAS), the Tuberculosis and Leprosy unit (TB), the Malaria Unit (PALU/ PNLP), and the Epidemic Infectious Disease unit (EID). NTDs are covered by the EID unit and supported by a Columbia University collaborative project known as Access Project.

The Malaria Unit houses a Vector Control Manager/Senior Entomologist to supervise and coordinate malaria related activities. While there are very commendable efforts of coordinating vector control implementation, the focus of action is currently solely on malaria disease. The EID Unit provides some support and coordination to non-autochthonous vector borne diseases of epidemic concern such as dengue and Rift Valley Fever, and historically indigenous vector borne diseases in Rwanda such as schistosomiasis, onchocerciasis, trypanosomiasis, and lymphatic filariasis (Fig. 2). However, the vector control actions under EID are, in all practical sense, vestigial and inadequate for diseases it oversees.

**Fig. 2: TRAC-Plus Current Unit and Department Structure**

(Source: *TRAC Plus Strategic Plan. 2009 – 2012)*




### *2.2.1b Integration among disease control programs*

A major constraint to effective control of VBDs is the absence of a functional coordinating mechanism between the different MOH units with oversight of various vector borne diseases (e.g. Malaria Unit, EID). There is very little collaboration, if any at all, between the units.

### *2.2.1c Communication and information flow*

There are plans for a Communication, Documentation, & Publication (CDP) team to be developed as part of the Director General's office of TRAC *Plus* to coordinate all communication and information sharing. TRAC *Plus* currently maintains a system for disease reporting through existing health facilities. District hospitals are expected to aggregate data collected by health centers and submit reports to TRAC *Plus*, where data is cleaned, analysed, and shared. It is anticipated that all existing parallel information systems

for infectious diseases, including data on vector populations, will be integrated into one Integrated Disease Surveillance and Response System (IDSR). Once in place, this system could potentially be linked into the national Health Management Information System (HMIS) and work closely with decentralised "Epidemic Management Committees" which have been set-up in these districts. As new technologies and indicators are added to routine disease/vector reporting attention must be given to ensure collaboration and integration with the HMIS. There is currently no vector management information system. Such a system must be established and integrated into the IDSR and HMIS.

### *2.1.2d Human Resources, including functions and authority with MoH*

Rwanda has currently 421 health centers, 40 district hospitals, and 5 referral hospitals, covering 30 districts. While health staff from these facilities play vital roles in vector control activities by providing oversight of reporting, trainings, community outreach, implementation of prevention and control activities and monitoring of vector borne diseases, most facilities are not fully staffed and are constrained by high turnover rates and underutilization of services by the local population.

There are approximately 156 staff members that fall under one of 6 units of TRAC *Plus*. The largest of these units is the HIV & AIDS / Sexual Transmitted Infections unit with 63 current staff. The Malaria unit is the second largest disease unit with 30 staff members. Approximately 20+ positions still need to be filled, which is a reflection of other gaps in human resources seen at other departments and projects (see Table 1).

**Table 1: TRAC-*Plus* staffing levels (January 2009)**
(Source: *TRAC Plus, Strategic Plan. 2009 – 2012)*

| Unit | Current Staffing | Staffing targets | Gap |
|---|---|---|---|
| Director General's office | 2 | 3 | 1 |
| Administration and Finance Unit | 35 | 40 | 5 |
| HIV&AIDS /STI Unit | 63 | 68 | 5 |
| Tuberculosis / Leprosy Unit | 12 | 17 | 5 |
| Malaria Unit | 30 | 35 | 5 |
| Epidemic Infectious Diseases Unit | 8 | 10 | 2 |
| Surveillance, Bioinformatics and IT Unit | 8 | 12 | 4 |
| **Total** | **158** | **185** | **27** |

### *2.1.2e Infrastructure (including training, research and technical facilities)*

Each of the 30 districts in Rwanda is supposed to have one hospital, each Sector *(Umurenge)* at least one health centre, each Cell (*Akagari*) at least one health post (HP), and every village (*Umudugudu)* at least four Community Health Workers (CHWs). The Ministry of Health requires all health facilities in the public and private sectors to be registered, which includes Hospitals, Health Centers, Health Posts or FOSACOMS, Clinics providing general or specialized outpatient or inpatient care, Dispensaries, Independent Laboratories, and Prison Dispensaries. In principle, each district hospital and HC acts as a training facility.

The Kigali Health Institute (KHI) supports ongoing research and training in vector control and has established training programs for health nurses, midwives, laboratory technologists, physiotherapists, mental health nurses, radiographers, dental technicians and environmental health technicians. KHI currently hosts the newly established central insectary and entomological laboratory of the Malaria Unit.

The Malaria Unit has planned an 11-station entomologic sentinel surveillance system, linked to selected district health clinics and district hospitals. Each sentinel station will be manned by two entomology technicians and supervised by a nurse/health worker at the clinic. An initial 7 sentinels are being equipped and have initiated nascent monitoring activities. The vision is for sites to undertake regular field monitoring and generate critical entomological data for timely assessment of the effectiveness of ongoing interventions (see Fig 3 and Section 3.3.5)

**Fig 3: Location of Entomological Sentinel Sites**


### *2.1.2f Financial resources*

It is important to note that while many of the programs' strategic plans specify interventions, intended outcomes, and indicators to measure impact of control and prevention activities, the plans often lack the necessary financial and human resources needed to achieve them. This is not so much a criticism of the plans but recognition of the financial challenges facing programs and why the development of an IVM strategy, which aims to maximize the efficiency of limited resources, is so important in Rwanda. Health sector programs are currently dependent on external aid, with nearly half of the total resources for the health sector coming from donors. The issue of financial sustainability in the long term is still one of the main challenges of the health system and the IVM process.

What Rwanda lacks in financial resources it compensates through remarkable industry, transparency and ingenuity, enabling the country to report significant and noted reductions in malaria burden in the last decade.

### 2.1.3 Relevant structure and resources in other sectors

Outside of the health sector, the Ministry of Agriculture and Animal Resources (MINAGARI) has supported the implementation of Integrated Pest Management (IPM) activities through a decentralized system. Districts and Sectors execute IPM activities with farming organization under the guidance of MINAGRI agencies (RADA, RARDA, RHODA and ISAR), together with Universities (NUR and ISAE) and the Rwanda Bureau of Standards (RBS) which are organized under the National Plant Protection Organization (NPPO). Although operationally IPM is primarily targeting pests and diseases of specific crop species, the large network of farmers and agricultural extension workers could potentially be applied to:

- Train farmers in improved production technologies and surveillance of vector populations, especially mosquitoes.
- Train farmers and community members on life cycle of vectors.
- Monitor movement (distribution mechanisms) of major vectors and diseases.
- Measure impact of vector borne diseases on productivity.
- Develop different control methods, including larvicide and biological control and environmental management
- Promote judicious use of pesticides.

## 2.3 Major Vector Borne Diseases: Burden, Distribution and Vectors

The following is a list of vector-borne diseases identified during the VCNA as having the potential of causing high morbidity and mortality in parts of Rwanda when human and environmental determinants are suitable.

### 2.3.1 Malaria

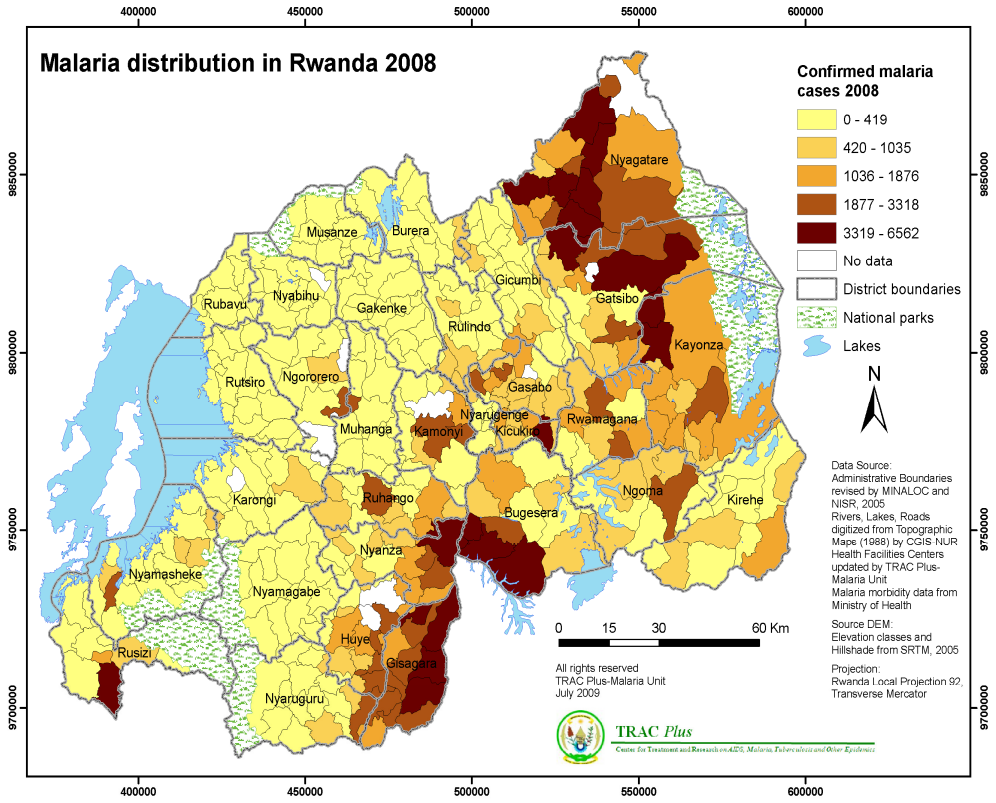
In spite of the significant reductions achieved in the last decade, malaria remains a major cause of morbidity and mortality in Rwanda, with pregnant women, children under five, and the chronically ill remaining the most vulnerable groups. *Plasmodium falciparum* is the main parasite causing malaria in Rwanda accounting for 95% of all malaria cases, followed by *P. malariae* (4.5%) and *P. ovale* (0.5% of cases).

Since 2000, there have been about 1 million annual reported cases countrywide. In 2004, approximately 845,376 cases of malaria were recorded, among which about 23,790 severe cases and 1,353 deaths were recorded in the district hospitals. There was however an increase in the number of cases during 2008 and 2009 – rising from 777,197 in 2008 to 1,247,583 cases in 2009. Malaria related deaths rose from 556 in 2008 to 764 in 2009.

Several subjective reasons have been propounded both by the national control program and partners for the observed rise in cases in 2009. They range from observed changes in rainfall periodicity which probably sustained higher malaria vector densities, possible plausible changes in mosquito biting behaviour (from observed outdoor biting of up to 70% in some areas), changing risk to population as a result of changes in LLINs utilization and/or potential reduction of the effectiveness of LLINs which were distributed as far back as 2006-2007 and not in 2008, and alleged underperformance of targeted IRS. The multiplicity of assumed reasons denotes the inadequate national capacity for entomological and eco-epidemiological evaluations. Although strong initial actions have been taken since the last quarter of 2009 to build capacity, a lot more remains to be done to provide a sounder base for informed decision making (Section 3.3.5)

Several entomological studies performed since 1942 indicate *Anopheles gambiae senso lato* and *An. funestus* as the main vectors responsible of malaria transmission in Rwanda. *An. arabiensis* should be locally an important vector, although local capacity to distinguish between *An. Arabiensis* from *An. gambiae senso stricto* is limited. The main malaria foci are in the east and south east areas where the altitude is generally below 1500 m and surrounded by marshy plains (Fig 4).

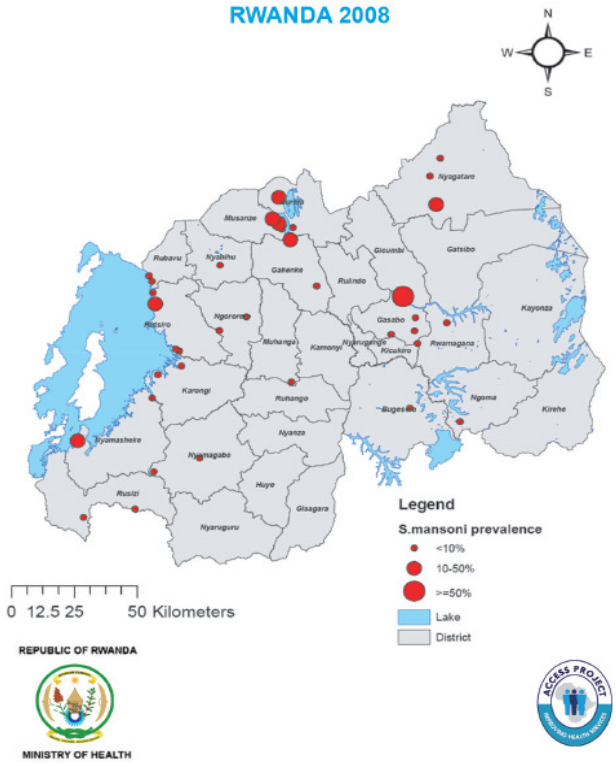
**Fig 4: Distribution of reported Malaria cases in Rwanda, 2008**




## 2.3.2 Schistosomiasis

A national prevalence study conducted between 2007 and 2008 found the prevalence of schistosomiasis (*Schistosoma mansoni*) to be 2.7% in children. Within districts and schools, the prevalence of schistosomiasis varied substantially with some schools with a high prevalence (≥30%). Most of the schools with high prevalence are located near lakes, swamps, or other foci. No case of urinary schistosomiasis (*S. haematobium*) was found in the study. A map showing *S. mansoni* prevalence in school children was developed through the Access Project (Fig 5). A snail intermediate host/vector is required in the transmission of schistosomiasis and monitoring of snail populations in areas with high schistosomiasis prevalence may provide useful information for assessing risk and the timing of vector control strategies, including the use of molluscicides.

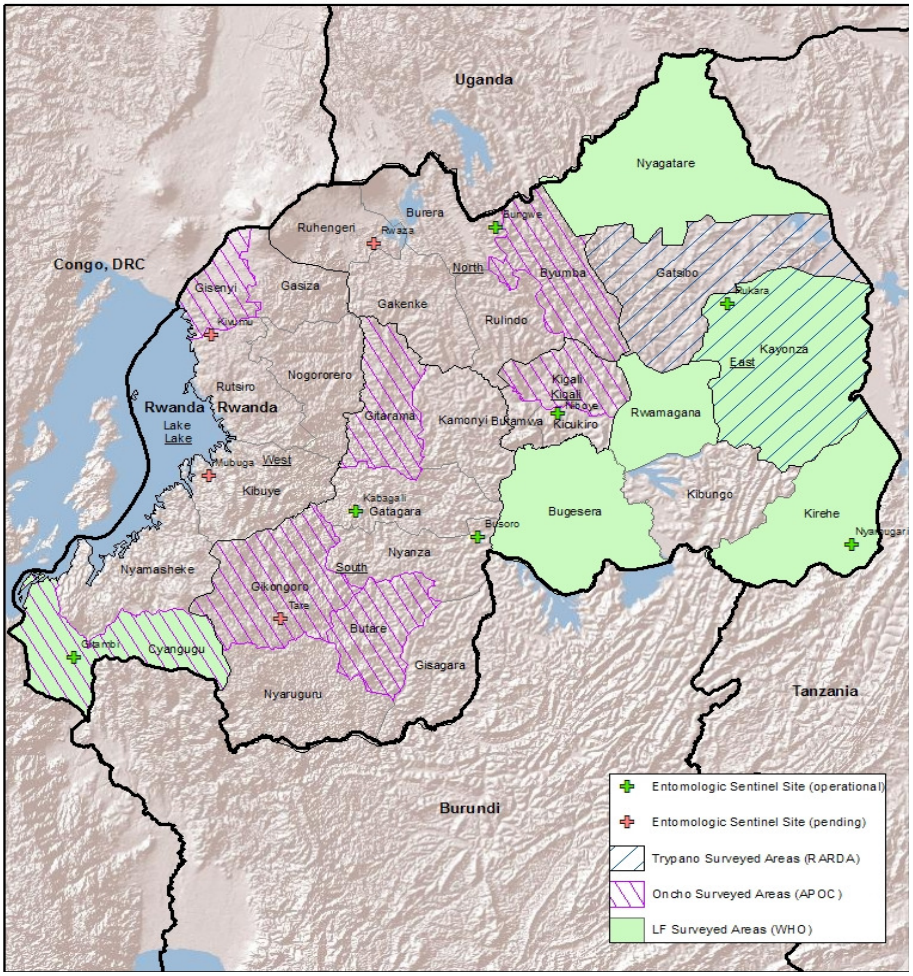
**Fig 5: *S. mansoni* prevalence in school children in Rwanda, 2008**




## 2.3.3 Lymphatic Filariasis

Although Rwanda is listed as endemic to lymphatic Filariasis (LF), the Global Alliance to Eliminate Lymphatic Filariasis (GAELF) does not operate in Rwanda. In 1987 and 1988, several cases of LF were documented across the country. However a survey conducted in 2008 involving 596 individuals concluded that infection with *W. bancrofti* in Rwanda is unlikely to be endemic, contrary to previous information on the disease. On a first test, four individuals were found positive by ICT cards. However, after further testing, only one individual was confirmed positive by ICT card and mid-night thick blood film (for the detection of microfilariae). During the same study, it was noted that 60 cases of hydroceles had been operated on between July 2006 and July 2007. The occurrence of hydrocele operations indicates morbidity perhaps caused by LF, however no control program has ever been put in place.

**Fig 6: Vector borne disease survey areas and proposed entomological sentinel sites**




*An. gambiae, An. funestus* and *Cx. quinquefasciatus* are the major vectors of LF in the region. Neighboring DRC is thought to be highly endemic for LF because of climatic conditions as well as the proximity to neighboring endemic countries of Uganda and Tanzania. Currently there is no surveillance mechanism for people returning from LF endemic countries back to Rwanda. In general, LF transmission occurs only in altitudes below 1200m. Areas where LF transmission is possible, given the presence of appropriate mosquito vectors (Fig 6) are Kayonza District in the Eastern province and bordering Akagera National Park, Kirehe District in the south east bordering Tanzania, Rusizi in the south west bordering DRC and Burundi, Bugesera in the south - bordering Burundi, and Rwamagana in the Eastern province. Annual monitoring of mosquito vectors in identified risk areas may provide additional information on actual risk and potential integration of malaria control interventions to prevent reintroduction of LF.

### 2.3.4 Onchocerciasis

The African Programme for Onchocerciasis Control (APOC) conducted a nation-wide rapid epidemiological mapping of onchocerciasis (REMO) in Rwanda in July 24 August 22, 1999 (Fig. 6). The results of the mapping exercise showed that onchocerciasis is prevalent at low hypo-endemic areas (WHO, 2009). It is not clear what the current situation is as the disease is most likely under detected and underreported. Black flies (*Simulium damnosum*) are the primary vectors. Annual collection of entomologic data on black flies may assist the country in determining high risk areas and the appropriate timing and use of traps and/ or larvicides.

### 2.3.5 African Trypanosomiasis

African Human Trypanosomiasis is believed to be present in Rwanda particularly in areas close to the Akagera National Park. However, its prevalence is not well known, as human cases are rare with only occasional "outbreaks" of *T. brucei rhodesiense* in the tsetse fly population (primary vector) that may lead to small localized epidemics among people frequenting the tsetse fly zone, primarily in and around the Akagera National Park.

In 2007, a pilot survey was conducted by the Veterinary Services Unit of Rwanda Animal Resources Development Authority (RARDA) in areas known to have tsetse fly populations, or with known presence of trypanosomes in cattle. Areas targeted were located near the National parks and forests, (Fig. 6). 408 tsetse flies were trapped in 7 days during the survey using 8 traps installed in the National Park. The number of tsetse flies was more than any other species of flies. Additional surveys are needed to assess the prevalence of human trypanosomiasis.

### 2.3.6 Dengue

Although Dengue is generally endemic in the tropics and have caused several epidemics in neighboring countries of DRC and Uganda, hemorrhagic fever epidemics have never been reported in Rwanda. Rwanda does however remain at risk due to cross border movements of people and animals from endemic areas and high population density of communities in the at-risk areas. *Aedes aegypti* mosquitoes are the primary vectors. Greater communication with regional surveillance mechanisms to alert of potential outbreaks in neighboring countries

would better prepare the timing and targeting of prevention measures including space spraying and use of IRS and LLINs.

### 2.3.7 Other Vector borne diseases

Other VBDs present in Rwanda include borreliosis and typhus. However very little information is available about the burden of these diseases and the distribution of their vectors. These diseases are characterized by fever, severe headache, a rash and fatigue and could be easily presumed as malaria.

## 2.4 Tools, Methods, Strategies and Coverage

Two main vector control tools are currently utilized in Rwanda and all linked primarily to the control of malaria: Long lasting insecticidal nets (LLINs) and Indoor residual spraying (IRS). Status of their implementation is described below:

### 2.4.1 LLINS

Rwanda adopted the current WHO recommendation of full coverage of population at risk with LLINs in the last quarter of 2009 – changing from the previous targeting of vulnerable subpopulations such as pregnant women, children under five years of age and immuno-compromised individuals. During 2006 – 2007 the National Malaria Control Program distributed more than 3 million LLINs. A Malaria Indicator Survey conducted in 2007 found that 54% of households owned at least one insecticidal net, and 60% of children under five and pregnant women had slept under a net the night before.

The scale up of LLIN coverage has however been occasioned by protracted delays in procurement. In 2009, plans for disbursement of about 5 million LLINs was postponed to 2010 due to stock-outs in anti-natal centers around the country in 2009. The reasons provided are that the procurement difficulties were due to delays in fund disbursement by external donor partners. A total of about 6.0 million nets were scheduled for distribution in 2010 and by end of March 2010, about 2.68 million nets were either already delivered or enroute to the country for distribution. About 11.5 million LLINs are estimated for procurement to cover all needs, including replacements through 2013 with funding from the Global Fund for HIV/AIDS, TB and Malaria (GFATM) and anticipated contributions from other partners such

as PMI. Distribution strategies include routine distribution at antenatal clinics (ANC), as well as mass distribution targeting household coverage or through vaccination campaigns for children under five years. An intensive behavior change communication (BCC) is planned to maximize utilization.

The Malaria Unit, in collaboration with PMI and other partners quantifies LLIN needs based on district needs. A Central Drug Purchasing Agency for Rwanda then undertakes procurement and warehousing at the central level. The LLIN implementation faces a number of challenges:

- Limited storage capacities within the districts;
- Limited experience in coordinating deliveries and routine stock inventories, which is an important consideration under the current national policy of full population coverage.
- Lack of national capacity to assess the quality of the procured nets and ongoing evaluation of the field effectiveness of the nets once in use. The absence of such capacity frustrates net replacement strategies and risks exposing populations hitherto protected by the nets to malaria.
- The initial collection, storage and disposal of packaging sachets of LLINs

### 2.4.2 Indoor Residual Spraying

IRS operations began in August 2007 with the support of PMI and jointly implemented by the National Malaria Control Program and the Research Triangle Institute (RTI), a PMI Partner Organization. Lambda cyhalothrin 10% Wettable Powder (WP) was used in all sectors of 3 districts (Gasabo, Nyarugenge, and Kicukiro) within Kigali Municipality. By August 2009, IRS operations expanded to selected sectors in 10 districts, with PMI supporting operations in 7 districts (Gasabo Nyarugenge, Kicukiro, Nyanza, Kirehe, Nyagatare, and Bugesera), and the Malaria Unit adding focal spraying in selected sectors within 3 additional districts (Rusizi, Gicumbi, Kayonza). The targeting tactic was changed in 2008 from district-wide coverage to selected sectors within the districts, focusing on high malaria transmissions and epidemic prone areas. Lambda cyhalothrin was used in about 28% of houses with the rest being covered by Deltamethrin 250 Wettable Granules [WG] phased in from 2008. Deltamethrin 250 WG was initially used together with the remaining stock of Lambda cyhalothrin WP. In 2009, the insecticide was changed to Deltamethrin 250 WG. Fig.

7 and Table 2 present the timeline of IRS introduction in the PMI supported districts and the number of sectors within the districts covered.

The IRS operations involve close collaboration and coordination with the district and sector political administration, which participated in the selection of the various temporary staff (IRS operators and supervisors, store keepers, IEC implementers, etc.). These temporary staff are residents of the sectors and districts covered. The IEC implementers were also local resident community health workers who are routinely involved in IEC and community education outreach programs of the MOH. IRS operations enjoy high acceptance among the target communities and good political support.

**Fig 7: Timeline for IRS introduction in target districts, including sectors covered, insecticide used and WHOPES estimated length of residual efficacy**

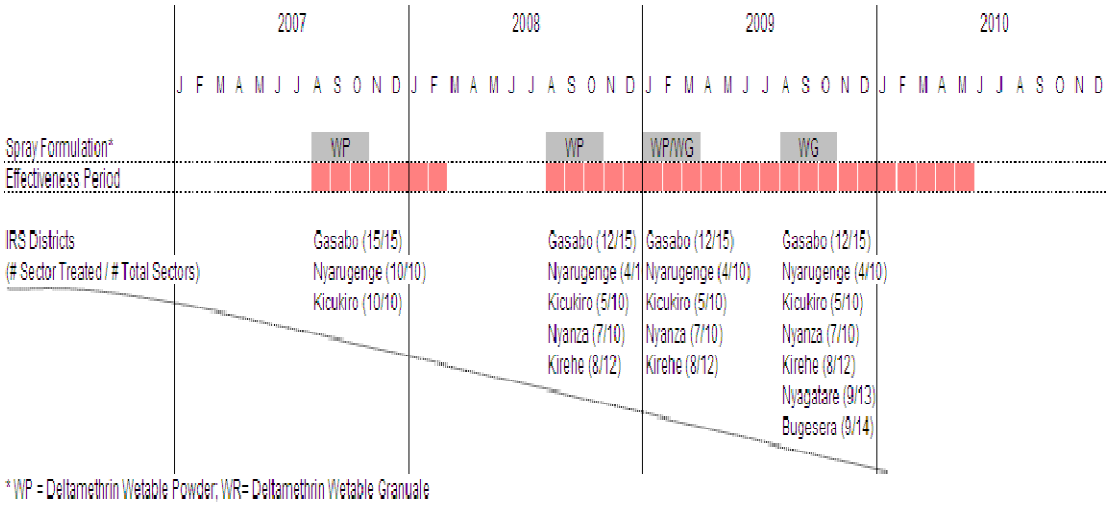


**Table 2: Coverage Rates in PMI and MOH Supported Districts**

| Spray Round | Year | Districts | Targeting tactic | Coverage Households |
|---|---|---|---|---|
| | | | | |
| **PMI Supported Operations** | | | | |
| 1 | 2007 | *3 districts*: Gasabo, Nyarugenge, Kicukiro | District-wide coverage of all 35 sectors | 152,072 |
| 2 | 2008 | *5 districts*: 3 districts above + Kirehe and Nyanza | 36 Selected Sectors | 184,319 |
| 3 | Jan - Feb 2009 | *5 districts*: As above | 36 selected Sectors | 191,051 |
| 4 | Aug - Oct 2009 | *7 districts*: 5 districts above + Bugesera and Nyagatare | 54 Selected Sectors | 295,174 |
| 5 | March 2010 | *2 Districts:* Kicukiro and Gasabo Districts | 14 sectors | 63,395 |
| 4 | Aug - Oct 2010 | *7 districts*: 7 districts above (R4) | 54 Selected Sectors | 303,659 |
| **MOH Self-funded Operations** | | | | |
| 2 | Nov-Dec 2009 | *Selected Sectors in 3 districts:* Rusizi, Gicumbi and Kayonza | 5 sectors | 18,852 |

Perhaps the major constraint in IRS implementation in Rwanda is inadequate financial resource which limits coverage and negatively impact on the strategic approach to IRS deployment. Currently, PMI is the only funding source for the intervention. Coverage is clearly below desirable levels and there should be renewed efforts to mobilize additional funding from among others, GFATM.

There is an existing weakness in the current IRS deployment strategy. Generally, two broad strategic approaches may be used:

i) IRS is used as a broad malaria transmission suppression tool in the hyperendemic areas with attendant goal of full coverage, or as a supplementary intervention (perhaps

linked to LLINs) where the combination of tools attains maximal population coverage[2]

ii) IRS is used as a focalized tool in epidemic prone areas[3]. In such cases the conditions for effectiveness are that there is capacity for epidemic prediction, epidemic detection and rapid response to outbreaks. IRS is used then in focal areas at the very onset of epidemic outbreak to quickly crush transmission.

The current strategy of targeting selected sectors within clearly endemic-hyperendemic districts is not the best option for eliciting maximal impact from IRS operations. Given the current inadequate national capacity for eco-epidemiological and entomological evaluations, the selection of the target districts is largely influenced by broad classical (ecological) perception on transmission risks and less on specific locally generated data on actual risks. In addition, the inability to discriminate cases from IRS and non-IRS sectors confounds the assessment of impacts on local disease burden and risk perception. It may be worthwhile to concentrate current IRS operations in a few districts with the highest reported annual cases. This will ensure that the all sectors in the selected districts are fully covered.

Wall bioassays conducted in the September 2009 spray round seems to indicate that perhaps the quality of spraying by some spray operators may be less than desirable. In the subsequent February 2010 spray round, the ratio of spray team members to the team leader was reduced and supervisors oversaw only 3 teams (instead of 5). The changes improved spray quality as wall bioassays from randomly selected sprayed homes mostly yielded 100% mosquito knock downs. Bioassays for a few teams still produced outliers. The teams involved will be interviewed and provided additional training to improve spray quality in subsequent rounds[4].

### 2.4.3 Larval Source Management (LSM)

There is currently no organized ongoing LSM activity being implemented in Rwanda, although in January 2008 there was a general larviciding in Kigali City Council around the wetlands of Kigali City, using *Mosquiron* larvicide. Given the national policy to expand

[2] Although there is currently a knowledge gap on the levels of combination between LLIN and IRS that will maximize impact in various ecological settings, it is desirable that the combination provides the maximum coverage of target populations

[3] Epidemic prone either due to existing ecological milieu (e.g. highlands, colder temperature areas) or as a result of significant suppression of transmission leading to focalized outbreaks

water based agriculture production (e.g. rice), the extensive valley farming and bricks/tiles making in proximity to settlement areas, the utility of LSM as a complementary intervention should be fully explored. Community based LSM activities, particularly in the central urban Kigali Municipality, may help to significantly reduce nuisance mosquito bites, which may influence decisions to continue current high coverage IRS operations in densely populated urban areas. Additional consideration is needed on the use of larvicide and environmental management through trained Community Health Workers (CHWs), including draining of stagnant water and environmental sanitation. Additional information collected from entomological monitoring will assist in identification of target areas and to assess the effectiveness of these additional tools.

### 2.4.4 Pesticides Management Needs, Safety and Environmental Issues

In general, REMA and MINAGRI/RADA are the main institutions involved in regulating the handling of chemicals. In Rwanda, there are two major sources of pesticide importation: 1) importers having trade licenses of importation and 2) gifts coming from external partners [European Union, FAO, PMI and NGOs]. The strategic planning of the Rural Sector Support Project indicates "The Republic of Rwanda and the World Bank agreed to apply the World Bank's Operational Policy on Pest Management (OP 4.09), which is an environmental safeguard policy for promoting safe pesticide use and the use of integrated pest management (IPM) in reducing crop losses due to pest damage." Rwanda is also a signatory on The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, as well as signatory to the Stockholm Convention on Persistent Organic Pollutants (POPs), the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, and the Montreal Protocol on Substances that Deplete the Ozone Layer.

The PMP report by MINGARI notes that:

> *"Pesticide marketing is liberalized and supply is done by private sector…due to low purchasing power of farmers and high price of pesticides (e.g. insecticides and some fungicides), the retailers have tendency to buy in large quantities and repack in small ones with minimum label. The capability and competence of end-users to*

[4] Rwanda shows a high rate of returning spray operators from previous rounds.

*handle products within acceptable risk margins is variable, but in general most farmers have little capability."*

Such lapses in control may contribute to insecticide resistance in certain vectors over time if not closely monitored. ICON 10% Wettable Powder (WP) which contains lambda-cyhalothrin, has been approved for use in IRS by the Rwanda Bureau of Standards and REMA.

The ongoing PMI supported IRS operations has inbuilt mechanisms to safeguard human and environmental health. Through strict application of both national and USAID requirements on pesticide handling, tailored training, redundancies in field supervision and robust inventory and tracking of pesticides, it is ensured that the IRS operations fully satisfies international standards and recommendations on safe and rational use of pesticides in public health.

### 2.4.5 Intersectoral collaboration

The IVM process requires close cooperation among health, environment, water, agriculture, land use, local government and other sectors, as well as the overarching planning sectors, from the local to the national and even regional levels. At the conclusion of the VCNA exercise, Rwanda remains at a critical point in developing IVM as intersectoral collaboration is still limited. A good understanding of how health and environment objectives may be incorporated into a single IVM policy and organizational framework will be critical to the successful execution of vector-borne disease control.

For IVM, there are particular benefits in strengthening collaboration with the agricultural sector involved with integrated pest management (IPM) – however to this date, no formal mechanism for collaboration is in place. IPM's strength lies in the methods it developed and tested for promotion at the local level. Farmer Field Schools (FFS) have demonstrated their value as an environment for rural communities to learn – hands-on – about the ecosystem upon which their livelihoods depend. Such forums can also be used to disseminate knowledge about IVM in relation to disease vectors.

### 2.4.6 Community Mobilization

The effectiveness of vector control efforts depend on the level of support, awareness, and action it generates in the target community. A range of social, economic, and livelihood concerns will influence community support for various IVM approaches, and must be considered as part of the total strategy. The development of grass-roots technical capacities is highly compatible with government efforts to decentralize and can result in greater local community empowerment overall.

Rwanda is globally noted for its strong community empowerment and involvement. For example, the last Saturday of every month is a communal work day known as "*umuganda*". *Umuganda* dates back from colonial times and affords every able body 18 years and above to participate in unpaid communal activity (e.g. street cleaning, cutting grass and maintaining public property, clearing bushes around roads and waterways, attending neighborhood meetings). The *umuganda* initiative could be harnessed into efficient and sustainable community-based vector control operations.

Another mechanism for IVM community mobilization is through the Health Communication Centre which is responsible for coordinating the implementation of behavior change communication for the health sector. This unit is charged with building capacity at a decentralized level for districts to disseminate correct health messages to increase knowledge and to increase adoption of healthier behaviors among target populations, including acceptance of health services and interventions.

The Neglected Tropical Disease (NTD) Program has also developed training modules for Community Health Workers (CHWs), journalists and teachers. This approach has helped in integration efforts between schistosomiasis and soil transmitted helminths that both rely on CHWs, teachers, drug distribution and education in schools.

# 3.0 OPPORTUNITIES FOR ADDRESSING EXISTING CHALLENGES TO VECTOR CONTROL

## 3.1 Opportunities for Strengthening Policy for IVM

The major challenges identified from the review of existing policy frameworks were:

i. Absence of an overarching and harmonized policy on vector control;

ii. Absence of a functional inter-sectoral mechanism for regular review of policy effectiveness/impact;
iii. Inadequate translation of existing strategies into work plans on vector borne diseases (VBDs), particularly outside of malaria.

Relevant policies on vector control are fragmented and embedded across different program and agency mandates. These entities take independent actions based on perceived policy mandates, often with little knowledge or consultation with relevant stakeholders, if any. A first step to address this will be to establish an Inter-sectoral mechanism with the requisite expertise and mandate to develop a comprehensive and harmonized national policy framework for IVM: A group of high level and experienced experts/professionals from core public sectors (e.g. health, agriculture, environment, water resource development), academic/research and private sector, should be constituted as a National Intersectoral Steering Committee for IVM (NISC). It is important that the NISC members are able to make decisions on behalf of their agencies (senior directors/heads of department). The MOH representative preferably, should be working in health systems management and in the monitoring and evaluation unit (particularly of health system functioning). Due to the prominence of malaria among other VBDs in Rwanda, the Vector Control Manager of the Malaria Unit should be a member of the NISC and serve as a focal point/liaison of the NISC responsible for day- to-day oversight in the implementation of NISC decisions between meeting sessions. As required, external partner representations can be invited for specific deliberations in advisory positions or as observers.

The NISC should have well-defined terms of reference (Box 3) and be backed by unambiguous governmental mandate, which provides relevant authority for policy recommendations and to make operational decisions and ensure accountability among stakeholders. In addition, there should be clear rules to guide the conduct of Committee business (meeting and decision making procedures, etc.). The establishment of the NISC should be informed by previous national experiences in inter-agency efforts, to ensure that lessons on constraints and effectiveness are adequately considered. As appropriate, an existing inter-agency structure could be reconfigured and mandated to serve as the NISC.

A core function of the NISC is to evaluate the effectiveness and impact of existing policies and make suggestions to Government on their improvement. Therefore, it is the responsibility of the NISC to facilitate the development of relevant national capacity for translating policies into feasible and informed work plans with measurable outcomes and impacts. The Committee should also ensure the creation of national monitoring and evaluation capacities to generate and manage required data.

**BOX 3 Potential Terms of Reference for National Intersectoral Committee**

- Review national policies relevant to vector borne diseases and develop a unified overarching national policy and strategies for their control
- Coordinate and provide oversight to the implementation of national IVM strategy and work plans, ensuring cost-effectiveness, efficiencies, and sharing of lessons/experiences
- Coordinate the mobilization of resources for intersectional action consistent with national aspirations for VBD control ensuring transparency and accountability
- Facilitate rationalized roles and responsibilities among stakeholders and evolve mechanisms to promote/ensure accountability.
- Undertake regular review of the implications of policies, strategies and work plans on VBDs and make recommendations to Government and appropriate authorities to enhance the achievement of national objectives.

The NISC should be sensitive to the tendency for intersectoral action to disproportionately skew towards priorities set by funding sources (both internal and external). It should balance the sectoral/partner expectations with the broader national VBDs goals in order to ensure that all VBDs risks are given appropriate consideration. This is consistent with the principle of ensuring that partner agenda fits into the overall national strategic objective and actions.

### 3.2 Opportunities for strengthening institutional frameworks for IVM

The major challenges relating to the institutional arrangements for vector control include:

i. Absence of a substantive and unified vector control department within the Ministry of Health to coordinate and harmonize cross-cutting vector control efforts;
ii. Absence of a functional mechanism for intra-sectoral (within MoH) and inter-sectoral (outside MoH) action on vector control;
iii. Inadequate human resources and system structures critical to integrated vector control

The absence of a unified vector control department within the MoH that is dedicated to cross-cutting control of the vectors of human diseases limits integrated approaches to the control of VBDs. A substantive Vector Control department, perhaps reporting directly to the head of

TRAC-Plus, is needed to ensure effective coordination of vector control actions, improve efficiencies and promote a more rational use of limited resource. In the short-term, it will be worthwhile to institute measures to ensure joint planning by Units and Departments involved in or are critical to the control of VBDs (Malaria Unit, the NTD Unit of EID, and Environmental Health Desk of MoH, etc.)

Opportunities to scale up and integrate vector control activities within the health sector (intra-sector) depends on the degree to which current disease control programs can, and are willing to be integrated. Integration of disease programs just for the sake of integration does not inherently guarantee greater efficiency or effectiveness. Integration of health services can only occur successfully when the combined benefits of integration are greater than the benefits of programs competing against each other for financial resources and political capital. Hence clarifying the added benefit of collaboration (e.g. the efficiencies of linking malaria and other VBDs ) are important and measuring and demonstrating impact across these diseases and other such multi-disease control opportunities should be vigorously pursued to assure success.

**BOX 4: BASICS FOR EFFECTIVE INTRA/INTER-SECTORAL ACTION**

Collaboration must:

- Be designed to overcome/manage vested interests, ensuring that combined output is greater than the sum of individual outputs of partners
- Be able to generate agreement on a number of principles
- Have effective mechanisms to resolve conflicts and custom-design mechanisms to address needs at various levels of a decentralized environment
- Enable rational process of integration based on agreed criteria and common goals
- Be anchored in the overall governance structure

The setup of a national inter-sectoral mechanism in Rwanda (Section 3.1) should be reflected within the decentralized districts as well as to enable effective joint action among corresponding sector outfits.

Clear definition of sectoral/stakeholder functions and roles, as well as transparency and accountability are important criteria for successful collaboration (Box 4). Given the Health Sector's comparative advantage, in terms of competencies in health issues and mandate, it must provide leadership and facilitate the development of relevant internal competencies of other sectors to undertake their functions effectively. Possible functions and roles are proposed below in Table 3:

**Table 3: POTENTIAL FUNCTIONS AND ROLES FOR INTER-SECTORAL ACTION ON HEALTH**

| **Health Sector Functions** |
|---|
| • Periodic eco-epidemiologic evaluation & surveillance,<br>• Document and disseminate lessons<br>• Update priority R&D needs and agenda<br>• Establish and update institutional and operational frameworks<br>• Harmonize relevant sectoral policies and legislation<br>• Evaluate policy, institutional and operational framework<br>• Identify sector-specific vector control measures, quality control of activities and monitor compliance<br>• Capacity building |
| **Functions of Other Sectors** |
| • Include health criteria in sectoral operational frameworks and procedures<br>• Undertake health impact assessment for new development projects and ensure the implementation of mitigation measures proposed for potential negative health impact<br>• Vector control measures in line with sectoral mandates<br>• Participate in joint activities of an integrated nature<br>• Inform health sector on new technical and project developments |

## 3.3 Strengthening human resources and systems for vector control

The WHO defines six major components of health system strengthening (leadership and governance; sustainable financing; workforce; methods, technologies and logistics; and information systems). These components are critical to successful IVM implementation:

### 3.3.1 Leadership and Governance

Rwanda already enjoys exceptionally strong political commitment for malaria control. However, there is an urgent need for similar support for the other VBDs indicated in the country (Section 2.3). A primary responsibility of the NISC will be to make informed and realistic recommendations to government on policy and financial frameworks that places the control of vectors in its proper place in the control of VBDs – promoting efficiencies and cost-effectiveness to assure the maximal use of available resources.

### 3.3.2 Sustainable Financing for IVM

Adequate and timely resources for planned vector control activities are critical to effective protection of populations at risk. The development of a national IVM strategy and work plan under the leadership of the NISC will provide a sound basis for targeted resource mobilization. Through the NISC mechanism, Rwanda will be better positioned to package and match specific aspects of the work plan to donor interests, while ensuring that the objective of the funding fits within the overarching national goals for controlling/preventing VBDs. It will also ensure that the timing of such mobilizations is synchronized to the IVM work plans. For example, the implementation of LLINs has been severely constrained in the past by procurement delays. In 2009, procurement delays resulted in LLIN stock-outs in the anti-natal centers. Reasons provided are that these are largely as a result of delays in fund disbursement by external partners. Whiles this may be the case, it is important to note also that often donors (e.g. GFATM) require comprehensive national plans that go beyond determination of gaps in coverage to clarified distributions strategies, and modalities for validation targeting of recipients and utilization. The absence of these details is often the root cause for delays in fund disbursement.

### 3.3.3 Strengthening Information Systems for IVM

While curative services, particularly for malaria, benefit from a Health Management Information System (HMIS) to compile data on cases, treatment, mortalities etc., there is hardly any information system related to vector control. Indeed, for most VBDs, there is a paucity of current information either on the disease burden or any related vector control efforts. A 2006 Rwanda HMIS Assessment report highlights the following:

> *"Rwanda not only lacks the ability to exchange data electronically through a common format (like XML) between systems, but has many users who find it difficult to access data in the various systems. There appears to be a lack of strong policy or enforcement on data sharing and availability across organizations within the GoR and also across donors. New systems are funded and built without enforcement of common standards, definitions, or data dictionaries…"*

For effective IVM implementation in Rwanda, it will be important to have timely flow of information between the Central, District and Sector levels. An integrated information system on IVM should be established with the following characteristics:

i. Adequate capacity must be built at all levels for timely collection, management and utilization of data on specific vector species, disease eco-epidemiology, and progress of interventions, outcomes and impacts. It is important that indicators or data sets that will be measures/collected are clearly identified, and the levels and frequency at which they are to be measured clarified. Collection methods/protocols should be standardized and quality controlled to assure data integrity from the point of collection/measurement through to the point of data interpretation and utilization.

ii. There should be the ability at all levels, for regular and timely communication/ dissemination of level-appropriate information to both internal and external clients [program implementers, service providers, policy makers at these levels, and the general population] to ensure on-time decisions towards improved health outcomes. For example, district setups should be able to offer timely district-specific information on implementation, coverage and outcomes to local policy makers/implementers (Mayors, Sector leaders, district health management team, etc.).

iii. The capacity to effectively manage the expectation of policy makers and politically oriented concerns cannot be overemphasized. This can be done effectively through a functional policy review mechanism and principled utilization of gathered scientific data. The IVM policy review mechanism under the proposed NISC provides such opportunity.

The ongoing establishment of a national entomology sentinel system discussed elsewhere in this report could form the core of such a vector control information system at the Sector/district level, feeding to a central system that also incorporates data from critical evaluations at the central insectary and entomology lab in Kigali and research institutions. The USAID-funded IVM2 Project is collaborating closely with the Malaria Unit to establish a robust information system. The system should ultimately be part of an integrated information system (IDSR and HMIS). This will ensure full consideration of vector control related information in disease control decisions and strategies. Recalling the inability to detect increases in malaria cases in 2008/2009 until much later, there is a need for a more robust mechanism to enhance timely access to relevant information in order to detect threshold indicators of significant shifts in disease transmission. Such transmission shifts are

a normal occurrence in malaria control and strategies need to be put in place to detect them quickly and prevent potential negative impact on disease burdens.

### 3.3.4 Vector Control Workforce

A critical mass of well trained and fairly distributed technical staff is required for effective delivery of vector control. A fair distribution of technical staff and core competencies will result firstly, from a clear understanding of the roles/functions of the various levels (Central, District and Sector) of a VBD program (Table. 4) and secondly, from a political will to make the staffing changes/redistributions that are necessary.

There are few entomologists and epidemiologists in the country and even less engaged in VBD control. For example, the national malaria control program has only one senior entomologist. Rwanda still did not have a fully functional insectary at the time of this VCNA. The authors acknowledge the wider financial implication of additional recruitment will have on annual budget. It is therefore recommended that existing staff placement and skills could be reviewed and well targeted competency/skill development provided, as a first step to enhancing vector control capacities. In the longer term, opportunities for emulating the very worthwhile example of Malaria unit having some entomology technicians supported as integral of Global fund awards should be vigorously pursued.

**Table 4: Desirable IVM Core Functions in Rwanda**

| **National/Central Level** | |
|---|---|
| • Strategic direction to programs<br>• policy development<br>• Standard settings, norms and M&E indicators<br>• Programme funding/resource mobilization<br>• Prioritize and allocate financial resources<br>• Epidemiologic analysis<br>• Quality assurance<br>• Training and support for district/sector programs and vector control | • Coordination of emergency response<br>• Evaluation and validation of operational research<br>• Decision-making and planning of district programs/activities<br>• Determine human resource needs<br>• Monitor and evaluate district/sector IVM implementation |

| District/Sector Level | |
|---|---|
| • Local planning of implementation<br>• Resource prioritization and allocation<br>• Disease surveillance<br>• Programme monitoring<br>• Health education | • Train field staff/village health volunteers<br>• Undertake vector control activities, assist in operational research<br>• M&E: collection and initial collation of local data on various VC aspects) |

### 3.3.5 Enhancing Implementation: Tools, technologies and logistics

The major challenges identified by the VCNA include:

i. *Less than maximal deployment of malaria vector control tools and no efforts for other VBDs*
ii. *Inadequate national capacity for eco-epidemiological and entomological assessments*
iii. *Inadequate capacity for program monitoring and evaluation*

Rwanda uses the current most effective tools for the control of malaria vectors: IRS and LLINs. The weakness in the current deployment strategy of IRS is discussed in Section 2.4.2. The following are therefore proposed to improve the impact of IRS operations:

- Current IRS operations should concentrate on covering all sectors in few districts with the highest reported annual cases. It will improve prospects of realizing the full potential of the intervention on disease burden within the district.
- Current level of coverage is much less than desirable. Additional funding should be mobilized to enable scale up coverage. It is recommended that a specific proposal on IRS should be submitted for the next round of GFATM solicitations.

To facilitate the national objective of total coverage of populations at risk of malaria with LLIN, IEC/BCC efforts must be strengthened with smarter and measurable indicators to better track utilization. There is a need to improve supply chain management and storage capacities within the districts. Current anticipation of a continued straight flow of nets from central to homes may not be realistic as existing dependencies on external funding presents a degree of uncertainly in supply for which building of reserves or support local manufacturing of LLINs may be the best option to prevent stock outs as happened in 2009.

Monitoring and evaluation, utilizing well-defined and appropriate indicators on processes, outcomes and impact, is critical to enhancing the cost-effectiveness of vector control efforts and for maximizing desirable outcomes and impacts. The national capacity for eco-epidemiological and entomological evaluations is limited. Hence, there is an inadequate understanding of driving forces of local disease transmission/burden and also the effectiveness of interventions.

Little is known about the current effectiveness/utility of some 3 million LLINS that were distributed between 2006 and 2007. Given the new policy of full population coverage with LLINs, efforts are underway to establish national capacity to evaluate the quality of procured LLINs, as well as the field effectiveness of the nets, once they are distributed and in use. The Malaria Unit, in collaboration with the US Centers for Disease Control and the Liverpool Associates for Medical Health (LATH), plans to conduct a longitudinal monitoring on LLIN field effectiveness, beginning October 2010. The monitoring will include evaluations of ongoing utilization and related underlying behavior determinants (via household surveys), presence and quantity of insecticide (colorimetric), mosquito knock down effect of the LLIN and mechanical wear and tear over time. The proposed monitoring will provide concrete data for ongoing review of effectiveness and the timing of LLIN replacement campaigns.

Efforts to strengthen national capacity for eco-epidemiological and entomological evaluations began in earnest in 2009. Funding was secured from GFATM to establish sentinel sites and support monitoring activities. The PMI, through the USAID-funded IVM2 Project, is supporting the establishment of a central insectary in Kigali, an ELISA-based entomology laboratory (to be upgraded with PCR capability by the end of 2010), training of entomology technicians, development of monitoring protocols and field monitoring. As at the time of completing this draft report, nascent monitoring activities had been initiated in 7 of the 11 planned sentinel sites. These activities will be further strengthened through 2010 with additional training, equipment and protocols/implementation plans to expand monitoring indicators. Table 5 provides a list of anticipated assessments to be mainstreamed as capacity is developed. Already all of category 1 and some of category 2 have been initiated.

Given the current policy of full population coverage with LLINs, questions on appropriate combination of LLINs and IRS will increasingly come to the fore. Currently, there is a global knowledge gap on the maximal levels of combination (i.e. what percentages to apportion the

two interventions) in particular eco-epidemiological and operational settings. The operational goal for Rwanda, in the short term, should be to provide protection to all populations at risk with either one or the other of these two interventions [even within sprayed homes, the recommendation is to still have children under five years of age, pregnant women and immune-compromised individuals sleep under LLINs]. The level of mixing of the two interventions should only be determined by the extent to which successful funding is mobilized for the interventions. However, when full coverage is achieved, then as transmission is suppressed and malaria cases reduce, adjustments in the proportions could be made - informed by local relevant data generated through the full complement of surveillance and monitoring scheme, including considerations on cost-effectiveness and sustainability. As malaria transmission is drastically cut[5], it is anticipated that situations for epidemic outbreaks may become widespread. Thus, a longer term strategy should be to build national capacities for epidemic prediction, detection and quick response [a scenario where IRS has a comparatively better utility).

Data from monitoring activities will enable systematic collation, analysis and timely dissemination of information for implementation in the sectors and districts, program planning and management at the central level, and policy review processes under the proposed NISC arrangement.

**Table 5: Desirable Entomological and Eco-epidemiological Evaluations for IVM**

| |
|---|
| ***Category 1*** *Basic Entomological Evaluation (monthly)* |
| 1. Species composition & morphological identification (monthly)<br>2. Vector density (adult: indoors/outdoors and larva)<br>3. Landing catches<br>4. WHO wall bioassay of IRS insecticide residual efficacy<br>5. Vector susceptibility tests [CDC bottle assay]- 2x/year for WHOPES approved insecticides |
| ***Category 2****: Entomological Evaluation with enhanced capacity* |
| Yearly 1 monthly baseline followed by frequency indicated:<br>1. Vector identification (genetic) density & population structure (quarterly)<br>2. Sporozoite rate (quarterly)<br>3. Entomological inoculation rate (quarterly) |

[5] Recalling Rwanda national goal of malaria elimination

| |
|---|
| 4. Blood meal analysis (quarterly)<br>5. Parity (quarterly)<br>6. PCR-based vector resistance (annual)<br>7. LLIN Effectiveness evaluation (annual) |
| ***Other:*** *Eco-epidemiological/Biological factors* |
| 1. Meteorological: rainfall, humidity, temperature etc.<br>2. Larval productivity: water temp, transparency, nutrients, and other vector breeding place characterization<br>3. Utilization of LLINs or IRS coverage<br>4. Housing structure versus vector biting rate/EIR risks<br>5. Population based parasitemia<br>6. Socio-economic status |

### 3.4.1 Opportunities for community mobilization

Rwanda is globally noted for its strong community empowerment and involvement. For example, the "*Umuganda*" initiative could be harnessed into efficient and sustainable community-based vector control operations, including vector larval source management and behavior change initiatives linked to improving LLINs utilization. It will however require trainer-trainee opportunities (possibly using CHWs) to build embedded capacities and skills within communities. The MOH units dealing with health communication will need to enhance coordination with the implementing unit both within and outside of the health sector.

## 4.0 FOLLOW UP STEPS

Processes for translating the findings and broad recommendations from the VCNA into the development of a national IVM strategy and work plans are summarized in Table 6. The VCNA report does not provide step by step instructions on how to control or eliminate a particular vector population, solve constraints or to dictate the roles and responsibilities of different sectors or stakeholders. The VCNA is a first step in a larger process aimed at providing a framework for informed and structured deliberation among national stakeholders sectors to, (i) recalibrate national goals and strategies on VBDs and (ii) evolve feasible and measurable work plans to address constraints to national vector control endeavours in a comprehensive manner. The VCNA indicates where bridges between different stakeholders can be built to strengthen the efficiency and effectiveness of partner and joint actions. It is anticipated that the opportunities identified in this report for overcoming the identified challenges to vector control, will be evaluated in an intersectoral setting –via an appropriately

mandated NISC (Section 3.1). The NISC should oversee and facilitate a transparent process of transitioning current vector control to a full fledge IVM.

**VCNA VALIDATION**

A stakeholders meeting was held on 3 Feb 2011 to validate the VCNA report. The participants were drawn for all relevant national institutions/Agencies in the public and private sectors. There were also representation from developmental partners, including UDAIS/PMI, WHO. UNEP. FAO etc. The participants were divided into four working groups to discuss and develop a SWOT analysis (strength, weakness, opportunities, threats) for each of the thematic areas highlighted in the VCNA report. The outputs are summarized below:

***Group 1*- Policy and Institution Framework**: This group noted the strength that favours vector control as, goodwill from the government and donors and the commitment of the communities to improve their welfare. The weaknesses noted were, illiteracy, inadequate human capacity and lack of research information on which to base effective decisions for vector control. There are several opportunities including, community empowerment and communication networks that would enhance vector control efforts. However, threats such as climate change, overreliance on donors funding, rapid population growth, poverty, ignorance, cross border disease transmission and insecticide resistance need to be considered. The institutions and organizations that would be involved in addressing these issues were also highlighted.

***Group 2* - Collaboration within the health sector and with other sectors**: In this group's analysis with particular reference to the Malaria Unit, the strength noted were, two qualified entomologists and enhanced expertise in malaria vector control and entomological surveillance at several sentinel sites. However, some of the weaknesses of the Unit are, inadequate human capacity at the decentralized levels and low level inter- and intra-sectoral collaboration. In addition to the opportunities discussed by group 1, this group noted that availability of baseline information on vectors, transparency and accountability of control operations are factors that should be taken advantage of. The cross border transmission of VBDs was seen as a threat to disease control.

A number of institutions and organizations were listed as potential collaborators in vector control. These are:

<u>Government sectors</u>

- Ministry of Agriculture
- Ministry of Lands and Environment
- Ministry of Infrastructure
- Ministry of Mines and Forests
- Ministry of Education
- Ministry of Finance
- Ministry of Local Government
- Ministry of Internal Affairs
- Ministry of Information

Government institutions

- Rwanda Development Board.
- Rwanda Environment Management Authority
- Rwanda Bureau of Standards.
- CAMERWA
- Rwanda Revenue Authority
- Meteorological Center

The NGOs that are involved in technical and financial support for vector control include, USAID/PMI, WHO, FAO, UNICEF, UNEP/GEF, GFTAM, etc.

The Private sectors are, Agro Tech, Afrishem and UTEXRWA.

The Teaching research centres are KHI, NUR, IRST and ISAE.

A number of civil societies were also highlighted.

***Group 3*** **- Integrated approach**. The community structures and networks were highlighted as key strength in vector control, for example, the decentralization of political commitment at all levels, radio communication and motivated community health workers. The weaknesses such as poverty, illiteracy and inadequate human capacity were noted. The good governance and goodwill by donors were the opportunities that vector control should consider while taking into consideration the threats of climate change and VBDs transmission from neighbouring countries.

***Group 4*** **- Capacity strengthening:** The human resource and infrastructure capacity that requires strengthening was highlighted across all levels. Political will and decentralized health system as well as existing control programs such as PNLP and NTD were noted as existing strength. The need to build on these expertise and structures was emphasized. Inadequate entomologists and lack of strong infrastructure were the weaknesses that needed to be addressed. Existence of training schools and institutions such as NUR, SPH and KHI were the opportunities that should be exploited in capacity building for vector control while noting the lack of career path for entomologists and donor fatigue as issues that could threaten efforts for vector borne disease control.

In the general discussions, it was agreed that:

- The VCNA report should be adopted as a reference document for establishment of IVM in Rwanda
- IVM should be adopted as the measure and strategy for vector borne diseases control in Rwanda.
- There is need to establish an enabling policy environment for implementation of IVM
- The Malaria Unit of *TRACPlus* should spearhead the IVM strategic plan development and implementation process

A National Inter-sectoral Steering Committee (NISC) should be established to oversee the implementation of IVM. The IVM2 Project anticipates continued technical and advisory support to the process.

**Table 6: Follow-up Steps to Develop a National IVM Strategy and Work plan**

| Follow up | | Steps |
|---|---|---|
| National Intersectoral Steering Committee (NISC) | Review Vector Control Needs Assessment (VCNA) Report | • MOH appraises VCNA report, attaches observation and recommendations on report as annexes informed by national priority strategies and vector control options.<br>• Submit final VCNA report and recommendations to key stakeholders of Health. Includes proposals to establish NISC and broad national consultative mechanism (BCM) to involve all major stakeholders (public/private) |
| | Establish a (NISC) | • MoH identify major national stakeholder for vector control and constitute a National Intersectoral Committee on Integrated Vector Management.<br>• Convene meeting, establish agenda and terms of reference.<br>• Set broad targets for vector control. |
| | Develop IVM strategy and work plan | • MoH leads development of a draft action plan for effective IVM implementation – ensuring adequate considerations of the findings and recommendations of the VCNA and full consultation with stakeholders<br>• Plan of action submitted to NISC for review and endorsement; modify as necessary.<br>• Organize BCM to gain a wider acceptance; finalize and ratify plan.<br>• NISC mobilizes or negotiates resources for action plan.<br>• Provide ongoing oversight and guidance to implementation. |

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