



PRESIDENT'S MALARIA INITIATIVE



# Malaria Vector Control Needs Assessment for Burundi: Summary of Findings

Integrated Vector Management (IVM) Task Order 2

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## Terminology

AIDS	Acquired immunodeficiency syndrome
CAMA	Corporate Alliance for Malaria in Africa
CDC	US Centers for Disease Control and Prevention
ELISA	Enzyme-linked immunosorbent assay
FAO	The Food and Agriculture Organization of the United Nations
GFATM	Global Fund for HIV/AIDs, TB and Malaria
IVM	Integrated vector management
IRS	Indoor residual spraying
LLIN	long lasting insecticide treated nets
MOC	Ministry of Commerce
MOE	Ministry of Environment
MOH	Ministry of Health
NGO	Non-governmental organization
NIPH	National Institute of Public Health
PMI	United States President Malaria Initiative
PNLP	Programme National de Lutte contre le Paludisme (National Malaria Control Program)
NISC	National Inter-Sectoral Committee
PCR	Polymerase chain reaction
RBM	Roll Back Malaria
RTI	Research Triangle Institute
USAID	United States Agency for International Development
VBD	Vector borne diseases
WHO	World Health Organization
WHOPES	World Health Organization Pesticide Evaluation Scheme

## 1.0 INTRODUCTION

Integrated vector management (IVM) is defined as “*A rational decision making process to maximize the use of resources for vector control*” (WHO 2008). IVM is recognized as a primary strategy for the cost-effective and sustainable control and prevention of vector-borne diseases. The WHO currently recommends that countries with vector borne diseases, transition to comprehensive IVM through the implementation of the following six key elements:

1. *Advocacy, social mobilization*: Integration of IVM principles in the development policies of all relevant agencies, organizations and civil society.
2. *Legislation*: Establishment of effective regulatory and legislative controls for public health and pesticide management that are reviewed and kept relevant.
3. *Collaboration within the health sector and with other sectors*: Functional collaboration within and between stakeholder public and private sectors. Creation and use of effective channels timely and adequate communication among policymakers, VBD control programs and partners.
4. *Evidence-based decision-making*: Strategies and interventions are adapted to local ecology, epidemiology and available resources, informed by effective monitoring and evaluation and relevant operational research.
5. *Integrated approach*: Rational utilization of available resources, including appropriate integration of non-chemical and chemical vector tools and methods and multi-disease control approaches, predicated on sound knowledge of the local disease eco-epidemiology.
6. *Capacity-building*: Essential physical infrastructure, financial resources and adequate human resources developed at all levels to manage programs

A Vector Control Needs Assessment (VCNA) was carried out as a first step to the development of a national IVM strategy in Burundi. The assessment was conducted by RTI International, in close collaboration with the National Malaria Control Program (PNLP) of the Ministry of Health, Burundi. The activity was funded by USAID/Burundi. Ideally, national VCNA should cover all vector-borne diseases in the country. However, the current VCNA is largely related to Malaria.

The objectives of the VCNA were to:

1. Review policy framework and institutional arrangements for vector control;
2. Review the burden of malaria and the existing vector efforts, 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 malaria cases. The report does not provide step-by-step instructions on how to control or eliminate the local 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) enhance national goals and strategies on vector control and (ii) evolve feasible and measurable work plans to address constraints to national vector control endeavors 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**

### **2.1 Policies and Institutional Framework Related to Vector Control**

This section cover policies and institutional frameworks related to vector control that could provide a sound basis for developing a national IVM policy and strategic plan.

#### **2.1.1 Health Sector Policies and Plans**

The central level is responsible for defining health policies and for developing intervention strategies, planning, administration and coordination of the health sector. It sets quality standards, and monitoring and evaluation. The central level is represented by the Minister of

Public Health, Director General's Office, and Directors and managers of the various health programs.

Burundi currently has no overarching policy or strategic plan on IVM. There are efforts, led by the PNLP, to initiate the development of an IVM strategy. The elements of vector control are not expressed in a comprehensive and integrated manner in the existing policy documents and strategic plans that were reviewed, as part of the VCNA.

The following policies/strategic plans, which guide the health sector, provide a sound basis to develop an overarching IVM policy and strategic plan. These plans include:

- i. Strategic Framework for Growth and Poverty Alleviation, September 2006;
- ii. National Health Policy 2005-2015
- iii. National Plan for Health Development, 2006-2010;
- iv. Strategic Plan for Malaria Control in Burundi, 2008-2012 ;
- v. National Policy for Basic Hygiene and Sanitation.

The *Strategic Framework for Growth and Poverty Alleviation* of September 2006 was prepared under the auspices of the Ministry of Finance. Its objective is to facilitate Governmental efforts to promote national reconciliation and reconstruction after years of conflict and economic decline. The framework notes, among the constraints in the health sector, a lack the capacity in many programs to provide necessary services prescribed for national minimum standards, due to inadequate infrastructure and technical resources, logistical constraints and limited financial resources. To address this constraint, the government initiated the development of a national policy for development of health sector (NHDP), in 2005, based on the findings of a national forum on health status. The Framework for Growth and Poverty Alleviation revolves around four objectives:

- (i) Reduction of maternal and neonatal mortality,
- (ii) Reduction of infant and child mortality,
- (iii) Reducing the prevalence of communicable diseases, including malaria and malnutrition, and
- (iv) Enhancing the performance of the health sector by improving access to services and quality of care. The implementation of the framework provided an opportunity for developing coordination mechanisms among development partners, national and

international NGOs, and the Government of Burundi. The mechanism became a primary avenue for the implementation and monitoring of the Poverty Reduction Strategic Paper (PRSP).

The *National Health Development Plan, 2006-2010* focused on improving the health of the population, not only because it is a human right, but also to allow the economic recovery and poverty alleviation and finally to maintain good health of human capital. The development of the Plan started began at the provincial level (provincial plans) enabling the capture of priorities in a decentralized environment and needs of the different levels of the health system (national, intermediate and peripheral). The Plan reviewed and characterized the malaria burden and established priorities for its control, which implementation was spearheaded by the Ministry of Health, under a "Roll Back Malaria" plan. The malaria control objective was to reduce incidence by 25% by 2010. It targeted strengthening preventive measures through the use of insecticidal nets, especially for vulnerable groups; fostering intersectoral approaches to the promotion of environmental management and sanitation; and operational research on insecticide efficacy. Partner sectors included Ministry of Agriculture, Municipal Technical Services SETEMU, Municipalities, and the Ministry of Interior.

The *National Health Policy (2005-2015)*, documents the commitment of the government to improve the health status of the country's population. It provides a framework to guide actions by all sectors that are directly and indirectly related to health. It also serves as a basis for advocacy and resource mobilization for the health sector. The national health policy identifies malaria as one of 5 leading causes of mortality and morbidity in the country, and recommends prevention through the use of LLINs and case management - utilizing new treatment protocols with artesunate –amodiaquine combination. The policy advocates for strengthening multi-sectorial approaches to malaria control; strengthening of programs to prevent and treat diseases, with special emphasis on vulnerable groups; adequate preparation and response to health emergencies and natural disasters; and ontinued mobilization of funding to prevent major epidemics, including as a priority, malaria.

*Strategic Plan for Malaria Control in Burundi (2008-2012)* was developed with technical support from WHO. The target is that by 2030, malaria will cease to be a major health problem or a cause of poverty in Burundi. Ultimately, the Plan aims to improve the health of the population, by reducing the malaria burden with a long term view to eliminate local transmission. The plan urges intensification of national efforts to achieve universal coverage with key interventions by the end of 2010, and then to maintain those levels, through 2015 and beyond. The main areas of implementation are:

- Universal access to an integrate package of interventions for maximize impact
- Empowerment of individuals and communities
- Establishment of functional integrated support systems, including management capacity building at all levels.

The malaria control objectives are as follows:

- 50% reduction of malaria mortality by 2010 compared to 2000, and a further reduction of 25% between 2010 and 2015, particularly among children under five, pregnant women and other vulnerable groups
- 50% reduction of malaria morbidity in 2010 compared to 2000, with a further reduction of 25% between 2010 and 2015
- A 50% reduction of malaria-related fatality among hospitalized patients by 2015 compared to 2000

The *national policy of hygiene and sanitation* focuses on mobilizing community ownership on sanitation issues. This policy offers a great opportunity IVM, which also advocates proactive community involvement, as it sets the following core pillars of implementation:

- IEC campaigns - massive IEC campaigns through NGOs and other specialized structures (including decentralized structures of the Ministry for Health), which targets at least 100,000 households per year.
- *Hygiene education in schools* - Integration into the curriculum of all primary and secondary schools by 2012. Specific supports are developed and disseminated by the Ministry for Education
- *Enhanced partnership with NGOs and Civil Society* – The involvement of NGOs (national and internationals operating in the country) and civil society in effective national and municipal-based coordination mechanisms, to plan and implement awareness campaigns to promote hygiene.

### **2.1.2 Relevant Policies of the Environment Sector**

*National Action Plan for Adaptation to Climate Changes (2007)*. Climatic factors such as temperature and precipitation affect local eco-epidemiology of malaria and other vector borne diseases. The national action plan provides an analytical projection of climatic changes in Burundi into 2050. The analysis provides opportunity to leverage appropriate interventions in the IVM strategic plan and to establish effective partnership with meteorological services and other related agencies.

*The Environmental law of the Republic of Burundi (2000)*. The law sets the ground rules for environmental management and protection against all forms of degradation. The objective is to safeguard and promote rational exploitation of natural resources, prevent pollution, and improve the living conditions of the population. The environmental law calls for compliance with regulations and accountability, in the production, importation or use of pesticides, fertilizers or other chemicals, to safeguard the environment and human health. Projects and programs that risks polluting the environment is subject to an environmental impact Audit. The environmental law is therefore important for IVM, as most of the current vector control interventions rely on the use of insecticides.

*Law on the procedures for environmental impact (2010)* sets the terms and conditions for environmental impact assessment and list activities for which EIA is mandatory. Of relevance to IVM are storage of chemicals, pesticides and other hazardous substances. Projects for which EIA may be required include that targeting marshland management that cover an area greater than 5 hectares, as well as brick & tiles manufacturing, sand excavation with industrial and commercial processing.

### **2.1.3 Relevant Policies of the Agriculture Sector**

*The National Agricultural Strategy (2008-2015.)* The potential impact on agricultural activities is well document. Hence agriculture Sector is a primary stakeholder of IVM in Burundi. The national agricultural and livestock strategy prepared by the Ministry of Agriculture Livestock in

2008, provides the strategic direction and priority actions aimed to boost production and modernize the agricultural sector. The plan emphasizes the commitment of government to prioritize irrigation schemes as part of overarching national food production strategy. Small areas of marsh and shallows (small) will be constructed throughout the country for irrigation and drainage to increase productivity of various food crops (rice, corn, bean, potato crops vegetables etc.). The plans also envisage the creation of micro-dams at the head of the irrigation networks. The need for close coordination and consultation between PNLP/MOH and the ministry of agriculture (MINAGRI) to mitigate potential impacts on vector borne diseases cannot be overemphasized.

## **2.2 Burden of Malaria**

Malaria is endemic in the lower portions of the country and epidemic in the higher elevations. About 80% of the national population of 8.7 million is at risk. Malaria is the primary cause of mortality and morbidity in the country. Malaria accounted for 72.7% of cases of disease treated in health centers in 2005 and 77% in 2006. The proportional mortality due to the disease was 31.5% in 2004, 39.6% in 2005 and 41.6% in 2006. There has been increasing trends of deadly epidemic outbreaks in the central highlands - exposing non-immune populations in eight provinces (Gitega, Karuzi, Kayanza, Muramvya, Muyinga, Mwaro, Ngozi and Cankuzo) that account for 56% of the total national population. 80% of the epidemic outbreaks were located near wetlands where the use of irrigation channels for rice cultivation, or for wetland mixed farming, promote persistence breeding sites. As at the time of the VCNA, a 2010 malaria survey was underway. The survey report will be available in 2011, which should provide updated information on the disease

The primary vector of malaria in Burundi, is *Anopheles gambiae s.s.*, (80% in some places) while secondary vectors include *An. funestus*, (12% reported in some places) and *An. arabiensis*. (PNLP unpublished). The vector profile of the country is however outdated and requires urgent update to inform disease control efforts.

Three epidemiological strata were previously identified in Burundi<sup>1</sup>:

- Hyper-endemic area below 1400 m of altitude where transmission is stable;
- Hypo- to meso- endemic area, at altitudes between 1400 and 1750 meters, where transmission is medium / low with high potential of epidemic risks.
- Non-endemic area above 1750 meters, with imported cases.

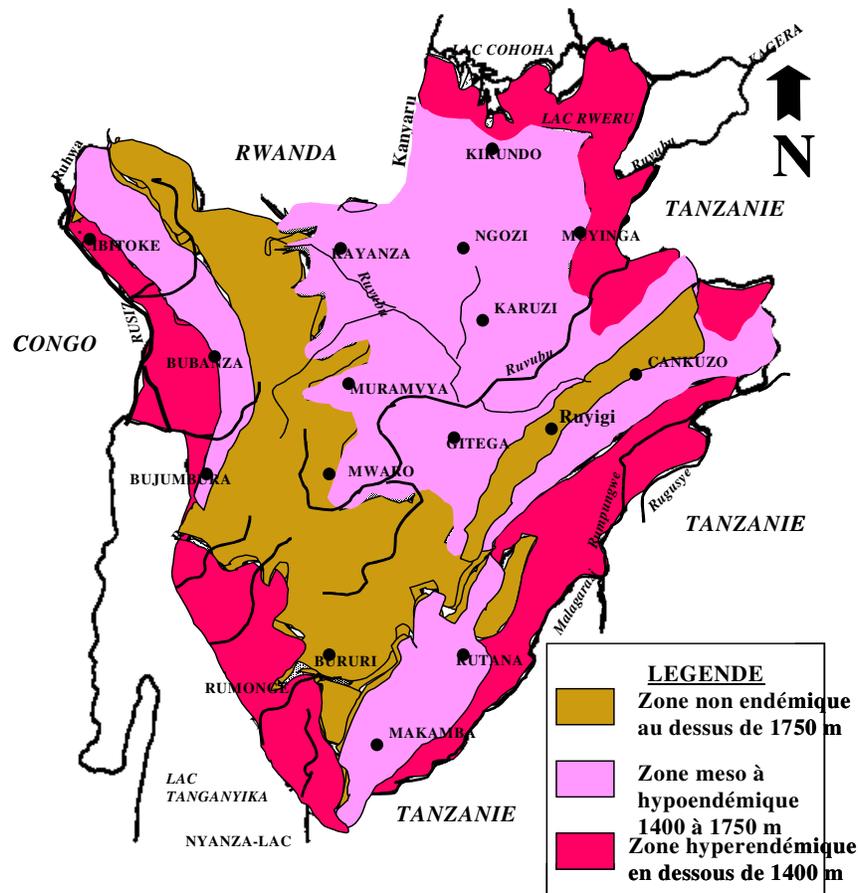


Fig. 1: Malaria Endemicity in Burundi (PNLP 2010)

A study of the local *A. gambiae s.l.* populations in Karuzi showed insecticide susceptibility of 54% to permethrin, 58% to DDT and 95% to deltamethrin. Susceptibility for *A. funestus* to DDT was 95%<sup>2</sup>. It is noted that these results are from isolated evaluations. There is urgent need for a

<sup>1</sup> Transmission profile may be outdated. It needs to be updated urgently.

<sup>2</sup> Pers. Comm, staff of PNLP.

nationwide and systematic evaluation of vector susceptibility to current WHOPEs approved insecticides for malaria vector control, to inform ongoing interventions.

### **2.3 Malaria Vector Control**

The *Strategic Plan for Malaria Control in Burundi (2008-2012)*, sets the following priorities among others:

- Development of an integrated vector management plan;
- A plan for promoting community-based interventions;
- A response plan for malaria epidemics management;
- A surveillance system for monitoring of susceptibility of local malaria vector to insecticides;
- All provinces to use health information for malaria control;
- The public-private partnership for implementation of malaria control interventions

The current vector control interventions in use, are indoor residual spraying (IRS) and long lasting insecticidal nets (LLIN).

IRS - The objective for IRS implementation under the 2008-2012 National Malaria Control Strategy is that “*At least 90% of people living in targeted areas will sleep in homes treated with indoor residual spraying according to the schedule established by the national policy in this area.*” IRS is currently used for epidemic prevention and control in the central highlands. Local spray operators have been trained on IRS techniques in all of the 8 affected provinces. Spray equipment and a supply of insecticide are provided. The current method of validating epidemic outbreaks, which involved sequential validation and transmission of information from the province through various programs to the PNL, is however cumbersome and should be improved to ensure timely response. There is a need to strengthen relevant capacities for effective management and judicious use of vector control insecticides.

LLINs - There has been free distribution of insecticide-treated nets (ITNs) since 2004. In 2006, a national policy on universal coverage was adopted, which targets LLIN for every two persons.

The strategy prioritizes pregnant women and children. LLINs are distributed through routine services such as the Expanded Program on Immunization (EPI) and antenatal clinics. Beginning in 2009, the government has targeted the distribution of 1.2 million to pregnant women and children in Burundi through a Round 2 Global Fund grant. As at the time of the VCNA there were preparations to further ramp up the distribution of needs, predicated on a detailed analysis of the gap in coverage.

### 3.0 OPPORTUNITIES TO ADDRESS EXISTING CHALLENGES TO VECTOR CONTROL

The following table (Table 1) lights the main constraint to vector control implementation

**Table 1: Major constraints to effective vector control**

<b>Vector Control Policy</b>
<ul style="list-style-type: none"> <li>• <i>Lack of overarching vector control policy; absence of IRS strategy and less than desirable LLIN strategy</i></li> <li>• <i>Less than desirable review of vector policies effectiveness/impact of.</i></li> <li>• <i>Inadequate translation of strategies into disease control work plans.</i></li> </ul>
<b>Institutional Arrangements</b>
<ul style="list-style-type: none"> <li>• <i>Absence of unified vector control department and ineffective coordination within VBD programs</i></li> <li>• <i>Inadequate coordination of non-health stakeholders and with developmental partners</i></li> <li>• <i>Absence of mandated mechanism inter-sectoral action on vector control;</i></li> <li>• <i>Need to further harness the full potential of communities for vector borne diseases control</i></li> </ul>
<b>Tools, technologies and logistics of intervention</b>
<p><i>Less than maximal deployment of tools</i></p> <p><i>LLINs: Absence of effective monitoring field performance of LLINs; significant dependency on external funding for LLIN procurement and associated uncertainties; absence of well-defined criteria for timely replacement of distributed LLINs in households</i></p> <p><i>IRS: Absence of critical monitoring such as residual efficacy of IRS insecticides( wall bioassay; uncertainties of funding for scaling up; limited capacities within PNLP for IRS; cumbersome and therefore lethargic response mechanism to epidemic outbreaks</i></p> <p><i>Larval Source Management: Lack of environmental management strategy including larviciding, particularly in irrigated highland areas</i></p> <p><i>Control of other vector borne diseases: Absence/inadequate vector control for other VBDs</i></p> <p><i>Vertical programs with inadequate collaborations</i></p>
<b>Entomological surveillance and M&amp;E of vector control</b>
<ul style="list-style-type: none"> <li>• <i>Inadequate national capacity for eco-epidemiological and entomological assessments to support decision making and evaluate outcomes and impact of vector control</i> <ol style="list-style-type: none"> <li><i>Absence of a national entomological surveillance plan</i></li> <li><i>Absence of critical infrastructure for vector surveillance-insectaries, sentinel sites equipment supplies</i></li> <li><i>Inadequate numbers of field entomology technicians</i></li> <li><i>Need to properly characterize local vectors of malaria and other VBDs and their distribution</i></li> <li><i>Unmet need for transmission survey and disease and vector stratification</i></li> </ol> </li> <li>• <i>Need to proactively prevent and manage the development of resistance to WHOPES approved insecticides in local disease vector populations.</i> <ol style="list-style-type: none"> <li><i>Current information on existing insecticide resistance levels largely unknown</i></li> <li><i>Absence of country capacity for bio-molecular evaluation of vector resistance</i></li> <li><i>Absence of a resistance management plan</i></li> <li><i>Inadequate national capacity for insecticide quality validation</i></li> </ol> </li> <li>• <i>Inadequate capacity for program monitoring and evaluation due to limited staffing of M&amp;E Unit of PNLP</i></li> <li>• <i>Inadequate clarification of indicators for vector control and M&amp;E strategy</i></li> </ul>

**Table 1 (cont'd): Major constraints to effective vector control**

<b><i>Funding</i></b>
<i>Limited funding for vector control and related activities: resources, far below existing needs to scale up vector control to desired coverage levels</i>
<b><i>Human Resources</i></b>
<ul style="list-style-type: none"> <li>• <i>Inadequate human resource unclear job functions/description for vector control, particularly in provinces</i></li> <li>• <i>Inadequate human resources and system structures central to integrated vector management</i></li> <li>• <i>Inadequate placement of staffing/competencies, especially within the provinces</i></li> </ul>
<b><i>Community mobilization</i></b>
<ul style="list-style-type: none"> <li>• <i>Inadequate IEC/BCC</i></li> <li>• <i>Less than desirable community- empowerment and involvement in vector control</i></li> <li>• <i>Less than adequate use of opportunities provided by Community-based Associations (AAC)</i></li> </ul>

### **3.1 Opportunities for Strengthening Policy for IVM**

The major constraints are listed in Table 1. Relevant policies on vector control are fragmented and embedded in 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. It is proposed, as a first step, 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 be 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 Burundi, the Vector Control Manager of the PNLP should be a member of the NISC and serve as a liaison of the NISC responsible for the day- to-day implementation of NISC decisions between meeting sessions. As required, external partner representations (USAID, WHO, World Bank, Global Fund, Red Cross etc) 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.

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.

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

### 3.2 Opportunities for strengthening institutional frameworks for IVM

Referencing Table 1, there is a need for a very robust mechanism to foster coordinated planning and implementation within the MoH to fully address cross-cutting and integrated control of the vectors of human diseases. 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.) the aim is purely to maximize efficiencies and

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 Burundi (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 2: POTENTIAL FUNCTIONS AND ROLES FOR INTER-SECTORAL ACTION ON HEALTH**

<b>Health Sector Functions</b>
<ul style="list-style-type: none"> <li>• Periodic eco-epidemiologic evaluation &amp; surveillance,</li> <li>• Document and disseminate lessons</li> <li>• Update priority R&amp;D needs and agenda</li> <li>• Establish and update institutional and operational frameworks</li> <li>• Harmonize relevant sectoral policies and legislation</li> <li>• Evaluate policy, institutional and operational framework</li> <li>• Identify sector-specific vector control measures, quality control of activities and monitor compliance</li> <li>• Capacity building</li> </ul>
<b>Functions of Other Sectors</b>
<ul style="list-style-type: none"> <li>• Include health criteria in sectoral operational frameworks and procedures</li> <li>• Undertake health impact assessment for new development projects and ensure the implementation of mitigation measures proposed for potential negative health impact</li> <li>• Vector control measures in line with sectoral mandates</li> <li>• Participate in joint activities of an integrated nature</li> <li>• Inform health sector on new technical and project developments</li> </ul>

### **3.3 Strengthening Human Resources and Systems for Vector Control**

#### **3.3.1 Leadership and Governance**

Burundi has strong political commitment for malaria control. A primary responsibility of the NISC, when established, will be to inform realistic recommendations to government on policy and financial frameworks for increased efficiencies and cost-effectiveness in the use of resources. The NISC mechanism should have the capacity for ongoing review of policy impact

to ensure that national policies and strategies stay relevant to disease eco-epidemiological and control realities. Malaria vector control should be an integral part of a national strategy.

### **3.3.2 Sustainable Financing for IVM**

An IVM strategy and work plan under the leadership of the proposed NISC will provide a sound basis for targeted resource mobilization to ensure adequate and timely resources for vector control activities. The NISC will need to facilitate the matching of specific aspects of the work plan to donor interests, while ensuring that the objective of the funding fits within the overarching national IVM goals. A medium to longer term mobilization strategy, synchronized to the IVM work plans, will reduce/eliminate procurement bottlenecks and prevent stock-outs of critical supplies of vector control tools and products. Donors often (e.g. GFATM) require comprehensive national plans that go beyond determination of gaps in coverage; clarity in distributions strategies, and modalities for validation the targeting of recipients and utilization of procurement. The absence of such details is often the root cause for delays in fund disbursement.

### **3.3.3 Strengthening Information Systems for IVM**

A vector control information system is practically non-existent in Burundi. There is a paucity of current information either on the disease burden or any related vector control efforts. Timely flow of information between the Central, District and community levels are critical for successful and sustainable implementation of vector control. An integrated information system on IVM should be established with the following characteristics:

- i. Adequate capacity 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.
- ii. Clear definition of indicators or data sets to be measured/collected and the frequency of measurement. It should include indications on the levels (district, provincial, central) responsible for such measurements. 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.

- iii. The capacity, 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] for on-time decisions towards improved health outcomes.
- iv. Adequate capacity to manage the expectation of policy makers and politically oriented concerns. 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.

A national entomology sentinel system discussed elsewhere in this report must form the core of 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 Bujumbura and research institutions (e.g. Universities). The USAID-funded IVM2 Project will collaborate closely with the PNLP 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. Timely access to relevant information is critical for detecting threshold indicators to significant shifts in disease transmission in local areas. Such transmission shifts are normally occur 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 community) of a VBD program (Table. 4) and secondly, from a political will to make the staffing changes/redistributions that are necessary.

The number of entomologists and epidemiologists in Burundi will need to be urgently increased to adequately cater for anticipated national ramp up in vector control.

Currently the PNLN does not have an entomologist within its Vector Control Unit. Burundi does not have a functional insectary at the time of this VCNA. The author acknowledges 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, through standardized training, as a first step to enhancing vector control capacities. In the longer term, opportunities for engaging some entomology technicians, as part of Global fund and other donor awards should be vigorously pursued. This has proved very successful and cost-effective in several African countries.

**Table 3: Desirable IVM Core Functions in Burundi**

<b>National/Central Level</b>	
<ul style="list-style-type: none"> <li>• Strategic direction to programs</li> <li>• policy development</li> <li>• Standard settings, norms and M&amp;E indicators</li> <li>• Programme funding/resource mobilization</li> <li>• Prioritize and allocate financial resources</li> <li>• Epidemiologic analysis</li> <li>• Quality assurance</li> <li>• Training and support for district/sector programs and vector control</li> </ul>	<ul style="list-style-type: none"> <li>• Coordination of emergency response</li> <li>• Evaluation and validation of operational research</li> <li>• Decision-making and planning of district programs/activities</li> <li>• Determine human resource needs</li> <li>• Monitor and evaluate district/sector IVM implementation</li> </ul>
<b>Provinces/commune Level</b>	
<ul style="list-style-type: none"> <li>• Local planning of implementation</li> <li>• Resource prioritization and allocation</li> <li>• Disease surveillance</li> <li>• Programme monitoring</li> <li>• Health education</li> </ul>	<ul style="list-style-type: none"> <li>• Train field staff/village health volunteers</li> <li>• Undertake vector control activities, assist in operational research</li> <li>• M&amp;E: collection and initial collation of local data on various VC aspects)</li> </ul>

### **3.3.5 Enhancing Implementation: Tools, Technologies and Logistics**

Referencing the major constraints listed in Table 1, the following are proposed to improve the impact of current IRS operations:

- (i) Devise a national strategy on IRS, as part of a broader IVM strategy, to inform the mobilization to scale up coverage in the above mentioned target areas. It is

recommended that a specific proposal on IRS should be submitted for the next round of GFATM solicitations (Round 11).

- (ii) IRS operations should concentrate on covering all sectors in the high elevation provinces of Burundi (Gitega, Karusi, Kayanza, Muramvya, Muyinga, Mwaro, Ngozi and Cankuzo) to prevent and control outbreaks of malaria epidemics. Other potential targets are lowland areas with exceptionally high incidence – such as areas surrounding lake districts.
- (iii) Strengthen and maintain appropriate and sufficient human, technical and infrastructure capacities for IRS in the target districts. If the aim for IRS intervention is to control epidemics then configuration must be within the context of epidemic preparedness – which means prepositioned resources, tools and adequately prepared/training human resource.
- (iv) Existing procedures for determining epidemic outbreak is laborious and is not time sensitive. This should be improved to reduce the lag time between the onset of epidemics and on the ground intervention

The following are proposed to facilitate the national objective of total coverage of populations at risk of malaria with LLIN:

- (i) 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.
- (ii) 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.

There is practically very little knowledge on the effectiveness/utility of distributed LLINs. Monitoring on LLIN field effectiveness is required and should include utilization and related behavior determinants (via household surveys), the presence and quantity of insecticide (colorimetric), mosquito knock down effect of the LLIN, as well as mechanical wear and tear, over time. The data generated will support ongoing review of effectiveness and the for devising strategies for timely replacement of LLINs within the households.

Efforts to strengthen national capacity for eco-epidemiological and entomological evaluations must begin in earnest and should include the establishment of sentinel sites and support monitoring activities. The PMI, through the USAID-funded IVM2 Project, will support the establishment of a central insectary and entomology laboratory and also conduct training of entomology technicians, as well as support the development of monitoring protocols and field monitoring (refer Section 4).

Given the current policy of full population coverage with LLINs, questions on appropriate combination of LLINs and IRS will assume increasing importance. 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 Burundi, 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<sup>3</sup>, 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 provinces and Zones, program planning and management at the central level, and policy review processes under the proposed NISC arrangement.

### **3.4.1 Opportunities for Community Mobilization**

Community empowerment is critical to vector control. Trainer-trainee opportunities (possibly using community health workers) should be provided to build embedded capacities and skills within the target communities. The MOH units dealing with health communication will need to enhance coordination with the implementing units, both within and outside of the health sector.

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<sup>3</sup> Recalling Rwanda national goal of malaria elimination

## 4.0 PRIORITY FOLLOW ON ACTIONS

Table 3 lists some priority actions to be undertaken within the context of national transition to IVM. As part of the preparations, the following actions will be conducted/initiated in 2011, with the support of USAID and its implementing partner – the IVM Project/RTI International:

1. **Support development of relevant policies and strategies:** The VCNA activity will be followed by the development of an overarching national IVM strategy. The VCNA proposes reintroducing IRS in proposed 8 highland districts. Should the timeline of the NMCP require, a separate evaluation can be done for IRS.
2. **Support strengthening of entomological capacity:** technical support will be provided to strengthen core competencies and capacities that are prerequisite to the successful implementation of ongoing vector control activities and which need not wait for the conclusion of a national IVM strategy. The IVM Project is well positioned to undertake the following:
  - a. Establishment of a central insectary and entomology laboratory
  - b. Entomology technicians training to quickly build capacity at the central and district levels for monitoring and surveillance activities
  - c. Initiation of monitoring system to quickly provide baseline and ongoing monitoring of vector populations and the outcome and impact of ongoing vector control activities.

### Establishing a central insectary and related laboratory to support monitoring

A central insectary should be established to house separate colonies of primary local vector specie(s) and a fully susceptible strain (e.g. Kisumu strain from ICIPE). An insectary is a prerequisite to entomological monitoring. Associated with the insectary should be at least an ELISA-based entomology laboratory. The set up will coordinate monitoring activities.

There will be a lead time to developing local capacity for molecular/biochemical evaluation of insecticide resistance mechanisms. In the short-term, a collaborating partner of the IVM project (ICCIPE/Kenya) could support annual evaluation of resistance mechanisms until such time that local capacity is established in Burundi. The IVM project is providing a similar scope of support to Rwanda in close collaboration with CDC. There is great potential for cross country mentoring and collaboration between Burundi and Rwanda.

**Table 3 Priority Actions in the Six Key Areas of IVM Implementation:** Modalities for implementing will have to be detailed out in a subsequent strategy and work plans.

<b>IVM Element</b>	<b>Summary scope</b>	<b>Application to Operations</b>
Legislation	<ul style="list-style-type: none"> <li>Regulatory and legislative controls for public health and pesticide management well established, reviewed and kept relevant</li> </ul>	<ul style="list-style-type: none"> <li>Assure adequate and up to date national insecticide legislation and regulations to safeguard human health and environment</li> <li>Establish appropriate taxes and tariffs regimes to promote priority interventions ( IRS, LLINs and larviciding)</li> </ul>
Advocacy/social mobilization	<ul style="list-style-type: none"> <li>IVM principles embedded in development policies of all relevant agencies, organizations &amp; civil society</li> </ul>	<ul style="list-style-type: none"> <li>Advocacy/communication on interventions-targeting policy makers, implementers, communities and other stakeholders including donors to foster favorable policy environment</li> </ul>
Cross sector collaboration	<ul style="list-style-type: none"> <li>Functional collaboration within &amp; between public/ private sectors. Effective communication among policymakers, VBD control programs and partners</li> </ul>	<ul style="list-style-type: none"> <li>Establish fully mandated national and subnational mechanisms for consultations, joint planning and implementation by stakeholders, with clearly defined roles/responsibilities</li> </ul>
Capacity building	<ul style="list-style-type: none"> <li>Essential physical infrastructure, financial resources and adequate human resources developed at all levels to manage local vectors</li> </ul>	<ul style="list-style-type: none"> <li>Identify range of skills/competencies, staffing levels and location for vector control operations</li> <li>Range of skills/competencies, staffing levels and location identified for effective IRS operations</li> <li>Trained human resources (spray operators, pesticide warehouse managers, entomology and epidemiology capacities, vector control, environmental safety/compliance etc.) and mobilization of relevant cross sectoral capacities</li> <li>Establish infrastructure for IRS and LLIN (e.g. insecticide &amp; LLIN warehouses, insectaries and entomology labs, waste disposal systems)</li> <li>Establish and integrated vector control information system with national disease (malaria) information system</li> </ul>
Evidence-based decision making	<ul style="list-style-type: none"> <li>Strategies and interventions adapted to local ecology, epidemiology and resources, guided by routine monitoring and evaluation and operational research and</li> </ul>	<ul style="list-style-type: none"> <li>Clarify information needs, indicators and data collection methods</li> <li>Establish entomological and epidemiological monitoring plans for targeting, and M&amp;E</li> <li>Select insecticide based on local knowledge on vector susceptibility/resistance</li> <li>Assure timeliness and completeness of data; manage and utilize evidence for decisions on implementation and strategy refinement</li> </ul>
Integrated approaches	<ul style="list-style-type: none"> <li>Rational utilization of available resources, including appropriate integration of vector tools and methods and multi-disease control approaches.</li> </ul>	<ul style="list-style-type: none"> <li>Clarify/justify target areas for priority interventions within a national IVM context, utilizing generated local evidence</li> <li>Assure adequate and evidence-based guidance on combinations with LLINs, short-term impact and</li> </ul>

*Strengthening technical skills and competencies in entomological monitoring*

The PNILP has four entomology technicians. However the lack of equipment, infrastructure and funding means these individuals have been unable to undertake any significant monitoring activity for the most part of the last 6 years. These individuals will receive refresher courses and will form the core of a revamped entomological monitoring effort by the malaria program

A critical mass of trained personnel will be required (at the central and district levels) to support monitoring efforts. The IVM project has developed basic and intermediate entomology technicians training courses that have been implemented successfully in other African countries and has led to the initiation of monitoring activities. Such training can be organized to quickly build technical capacity in Burundi as well.

*Establishing entomological monitoring and surveillance regimes*

There were 4 sentinel sites used during earlier research carried out with Belgian institutions (2 in hyper endemic and 2 in epidemic prone areas), which folded in 2004. Potentially the four sites could be reestablished as an initial core monitoring sites. There are also opportunities for collaboration with the NTD program, which now operates 31 school-based data collection sites (for annual determination of NTD morbidity). Hence, there are opportunities for multi-disease entomological approaches within the context of IVM.

Table 4 provides a list of the desirable monitoring indicators linked with vector control activities. Indicators listed under Category 1 and indicators (a) to (c) under 'Other', can be initiated immediately following the 2-week basic technician's training course. Category 2 evaluations can be phased in as local capacity is further strengthened through intermediate level training and ongoing mentoring. RTI can support the establishment of a sentinel-based monitoring and reporting regime that provides a sustainable path towards timely capture and effective utilization of data at all levels of vector control implementation (central, district and peripheral) in the medium term.

**Table 4: Desirable Entomological and Eco-epidemiological Evaluations**

<b><i>Category 1 Basic Entomological Evaluation (monthly)</i></b>
<ol style="list-style-type: none"> <li>1. Species composition &amp; morphological identification (monthly)</li> <li>2. Vector density (adult: indoors/outdoors and larva)</li> <li>3. Landing catches</li> <li>4. WHO wall bioassay of IRS insecticide residual efficacy and cone assays for LLIN</li> <li>5. Vector susceptibility tests [CDC bottle assay]- 2x/year for WHOPEs approved insecticides</li> </ol>
<b><i>Category 2: Entomological Evaluation with enhanced capacity</i></b>
<p>Yearly 1 monthly baseline followed by frequency indicated:</p> <ol style="list-style-type: none"> <li>1. Vector identification (genetic) density &amp; population structure (quarterly)</li> <li>2. Sporozoite rate (quarterly)</li> <li>3. Entomological inoculation rate (quarterly)</li> <li>4. Blood meal analysis (quarterly)</li> <li>5. Parity (quarterly)</li> <li>6. PCR-based vector resistance (annual)</li> <li>7. LLIN Effectiveness evaluation (annual)</li> </ol>
<b><i>Other: Eco-epidemiological/Biological factors</i></b>
<ol style="list-style-type: none"> <li>a. Meteorological: rainfall, humidity, temperature etc.</li> <li>b. Larval productivity: water temp, transparency, nutrients, and other vector breeding place characterization</li> <li>c. Utilization of LLINs or IRS coverage</li> <li>d. Housing structure versus vector biting rate/EIR risks</li> <li>e. Population based parasitemia</li> <li>f. Socio-economic status (Rice, bricks and tiles making ect...)</li> </ol>

#### **4.2 Needs for IRS Implementation Targeting Epidemic Prevention and Control**

PNLP would like to target 8 epidemic prone districts with IRS to prevent and control malaria outbreaks. This is consistent to current recommendations of the WHO. In practice however, effective prevention and control of epidemics is quite challenging, as it requires adequate capacities for epidemic prediction, detection and preparedness (stocks of pesticides, equipment, trained personnel and financial resource to enable rapid roll out of implementation at a moment's notice). Initially, it is possible to profile transmission risk and implement timed spray operations to coincide with annual cycle of the start of the malaria transmission periods.

Given the remote nature of the proposed locations for IRS, the previous strategy of transporting trained personnel to conduct spray operations is expensive and unsustainable. Local capacity must be developed within the districts for IRS spray operations. This will significantly reduce operational cost<sup>4</sup>. Alternatively, it may be worthwhile to explore the possibility of using insecticide impregnated wall linings, which will provide effectiveness comparable to IRS and at a lower cost in the medium to long term, as the multi-year longevity of the linings eliminate annual spraying rounds at least for 2-3 years<sup>5</sup>.

Upon request by the PNLP and subject to USAID approval, the IVM project will provide technical support to the following:

- Development of a national IRS strategy
- If requested by the PNLP, support the development of funding proposals targeting a variety of donor sources (Global Fund, PMI, DFID etc.)
- Support to designing, planning and implementation of IRS in selected highland areas,

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<sup>4</sup> 3 communes in the North of the country faced a major outbreak of malaria cases earlier in 2010. Approximately \$150,000 (the entire amount budgeted under Global Fund was used for the three communes.

<sup>5</sup> Trials by CDC and other researchers indicate up to 3 years field effectiveness. Routine and ongoing local monitoring will provide a sound basis for replacement regimes.

## **5.0 STAKEHOLDER RECOMMENDATIONS ON THE DRAFT VCNA REPORT**

A draft VCNA report was reviewed at a national stakeholder's meeting organized by the PNL and the IVM Project in November 2010. The meeting was attended by staff of PNL, as well as representatives of WHO, Red Cross, and other selected national agencies. The following conclusions and recommendations were made by the meeting:

1. The meeting acknowledges the VCNA as a good starting point for accelerating national orientation towards IVM, and recommends that the draft VCNA report, incorporating comments from partners, be finalized by the end of August 2011.
2. Noting the ongoing national scale up of LLINS and the concomitant deployment of IRS , there is a need for consensus on the integrated approaches for joint deployment of LLINS and other insecticide based interventions in Burundi, to clarify strategies for effective management of insecticide resistance. It is desirable that such consensus precede the finalization and validation of both the national IRS-specific strategy, as well as the overarching IVM strategy.
3. The meeting approves the plan for entomology capacity strengthening in the short term and recommends that the plan be implemented at the earliest opportunity. The implementation of the capacity strengthening plan will be critical to establishing functional entomological surveillance and monitoring activities
4. Recognizing the urgency for national scale up of IRS implementation, particularly in the epidemic prone areas of the country, the meeting urges accelerated development of a national IRS strategy with the technical support of the USAID-funded IVM project. It will be desirable that the said strategy be finalized by the end of September 2011, to enable due consideration as part of the Malaria Program review processes.