MINISTRY OF HEALTH

Rwanda Malaria Control Extended National Strategic Plan

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RWANDA BIOMEDICAL CENTER

A Healthy People. A Wealthy Nation

Rwanda Malaria Control
National Strategic Plan Extension 2013-2020

Table of Contents

List of Tables

List of Figures

Preface

The Ministry of Health has made significant progress in child mortality, malaria and other infectious diseases. Achievements in the Rwanda health sector have been possible with leadership, accountability, vision and facilitated by innovation such as community based interventions and access to community health insurance performance based financing. These innovations were implemented to improve access to health care through the delivery of effective, efficient, and quality health services.

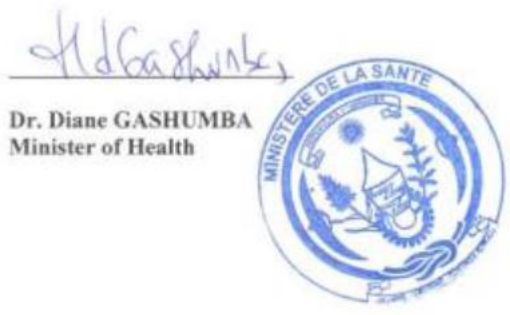
In the fight against malaria, Rwanda had achieved significant malaria burden reduction over the past decade. In 2005, Malaria was the first killer of children under 5. By 2008, malaria had decreased by over 50% and had dropped to the third and 11th killer of under five children in 2008 and 2011 respectively. By September 2016 the malaria incidence rate increased from 112 per 1,000 in 2013-2014 to 308 per 1,000 in 2015-2016. The increase in malaria cases was observed in all provinces with the largest increases recorded in the Eastern and Southern provinces. The malaria test positivity rate (TPR) increased from 34% in 2012 to 42% in 2015-2016.

An increase in malaria-related deaths was also observed from 592 in 2013-2014 to 698 in 2015-2016. Rwanda is still in search of understanding the real cause of this. Several factors may have contributed to the observed reversal in gains in the past four years; failure to provide adequate funding for key malaria interventions on time, insecticide resistance, poor quality of LLINs, a shift of infective malaria vectors from feeding indoors to outdoors (54%) and community health workers overwhelmed by the introduction of home based malaria management for adults.

In addition to the MTR 2016 results, most of guiding national documents end with 2020 and developing a malaria strategic plan for five years would be difficult without a national vision. Therefore, there was need of revising the strategies, objectives and activities according to MTR recommendations and lesson learned and development of an extended MSP 2013-2020 in order to reverse current situation of malaria in Rwanda.

The successful implementation of this plan will require commitment from all stakeholders at all levels throughout the country. It will also be highly dependent on the availability of resources and their equitable distribution at all levels. It is imperative, therefore, that everybody, i.e. the Government, development partners and the private sector join hands to avail and commit the necessary resources.

This strategic plan is a dynamic document and calls for changes and improvements in response to regular annual reviews based on the changing epidemiology of malaria in Rwanda.



Dr. Diane GASHUMBA
Minister of Health

Acknowledgement

Rwanda Biomedical Center **(RBC)** would like to take this occasion to express its deep appreciation and sincere thanks to all who participated in the development of the initial Malaria NSP 2013-2018 and the its updated 2013-2020 extension.

The NSP development process was mainly coordinated through the Disease Prevention and Control technical working group (TWG) that met regularly in working sessions and workshops to provide input and advice, from the start of the previous NSP Mid Term review until the final validation of the NSP document. These sub-TWGs are composed of representatives from all groups of stakeholders involved in the national Malaria response supported by National and International Consultants through WHO-Rwanda. The National Malaria Steering Committee was the leading body coordinating this process, but several divisions and units within MOH and RBC and decentralized units of health institutions participated together with partners and stakeholders, civil society organizations, private sector partners, local government, and development partners in all the steps of Malaria NSP development, ensuring that the final NSP document is fully inclusive and comprehensive.

May all partners be congratulated here for their active participation in the elaboration of this Extended Malaria NSP, and more broadly for their continuous contribution to malaria control in Rwanda.

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List of Abbreviations

ACT	Artemisinin-based combination therapy
AL	Artemether-Lumafantrine
ALMA	African Leaders Malaria Alliance
ASM	Agents de Santé Maternelle
BIOS	Biomedical Services
CHW	Community health worker
DHS	Demographic and Health Survey
DHIS2	District Health Information System
EAC	Eastern African Community
EDPRS	Economic Development and Poverty Reduction Strategy
EIR	Entomologic inoculation rate
EMSP	Extended Malaria Strategic Plan
FY	Fiscal year
GDP	Gross Domestic Product
GIS	Geographical Information Systems
GMEP	Global Malaria eradication program
GOR	Government of Rwanda
GSSM	General Senior Management Meeting
HBM	Home-based management (malaria)
HBMA	Home-based management of fever for adults
HMIS	Health management information system
HRH	Human Resources for Health
i-CCM	Integrated community case management
HSSP	Health Sustainable Strategic Plan
ICT	Information and communications technology
IHDPC	Institute of HIV/AIDS, Disease Prevention and Control
IRM	Integrated resistance management
IRS	Indoor Residual Spraying
ITN	Insecticide-Treated Bed Net
IVM	Integrated Vector Management
JHSR	Joint Health Sector Reviews
LLIN	Long-lasting insecticide-treated bed net
Mal&OPDD	Malaria & Other Parasitic Diseases Division
MDG	Millennium Development Goals
MINECOFIN	Ministry of Economy and Finance
MIS	Malaria Indicator Survey
MPHSS	Ministry of Public Health and Social Services
MPPD	Medical Procurement and Product Division
MOH	Ministry of Health
MSP	Malaria Strategic Plan
MTEF	Medium Term Expenditure Framework
MTR	Mid Term Review
NGOs	Non-Governmental Organizations
NISR	National Institute of Statistics Rwanda
NMCP	National Malaria Control Program
NRL	National Reference Laboratory
OAG	Office of the Auditor General
PBF	Performance Based Financing
PMI	President's Malaria Initiative
PSM	Procurement Supply Management

QA/QC	Quality Assurance/Quality Control
R-HMIS	Rwanda Health Management Information System
RBC	Rwanda Biomedical Center
RBM	Roll Back Malaria
RDT	Rapid Diagnostic Test
RPPA	Rwanda Public Procurement Authority
SBCC	Social Behavior Change Communication
SDG	Sustainable Development Goals
SIS-com	Health Facility and Community Health Worker Information System
SMS	Short Message Service
SPR	Slide Positivity Rate
TPR	Test positivity rate
WHO	World Health Organization

Executive Summary

The Extended Malaria Strategic Plan (MSP) 2013-2020 provides articulates the interventions that will be put in place towards the improvement of the health status of Rwandans and the fight against poverty by reducing the significant socioeconomic burden due to malaria. The MSP was developed through consultations with health service providers at all levels of the health care system, development partners, experts and draws on the lessons learned and recommendations from the Mid Term Review (MTR) undertaken in September 2016.

Between 2005-2011, Rwanda scaled up malaria control interventions successfully. Indeed, during this period, malaria morbidly decreased by 87 % and at least eight districts had achieved pre-elimination with a slide positivity rate of < 5%. As a result, Rwanda set the ambitious goal of achieving pre-elimination status by 2018. However, the country has faced unexpected increase of malaria cases and deaths since 2013-2016. This was in part due to the fact that the Demographic Health Survey 2014-2015 showed that less than half of the population has access to one net for every two persons. In addition, although vector control measures have been deployed by the programme, and there is a vector surveillance system to guide vector control interventions Long Lasting Insecticidal Nets (LLINs), which is the main preventive measure may no longer be efficacious due to pyrethroid insecticide resistance which has been reported country-wide. Surveillance data also shows that the behaviour of the malaria vectors have changed and most now feed outdoors (54%). This has far reaching implications on the effectiveness of the Indoor Residual Spraying (IRS) and LLIN programme carried out in the country.

The proportion of suspected malaria cases that received a parasitological test at public health facilities and in the community (for children under 5 years) has been sustained at 99.9%. In addition, the proportion of confirmed malaria cases that received first-line antimalarial treatment was sustained (96.5% and 98.4% respectively in 2013 and 2016. In 2015, to respond to the increasing malaria cases, the country introduced home based management of fever for adults (HBMA) by Community Health Workers (CHWs) and this has been scaled up countrywide. It is expected that this will bring care closer to communities and those with fever will be tested and treated promptly. The Ministry of Health will continue to work with other sectors in the decentralized levels to facilitate and ensure that CHWs are able to manage malaria in addition to their other responsibilities.
Rwanda has a strong health information management system (HMIS) and malaria surveillance, monitoring and evaluation system has been functioning well. However, there was no structured operational research agenda even though drug efficacy testing, insecticide resistance monitoring and other studies were ongoing at various sentinel sites. This will be a critical component of the extended malaria strategic plan.

To address the raising malaria morbidity and mortality, the extended malaria strategic plan 2013-2020 provides guidance on the priority interventions that will be implemented in accelerating and scaling up in interventions by all stakeholders. Below is the vision, mission, goal, objectives and guiding principles of the EMSP.

Vision
Rwanda free from malaria as a way to contribute to the socio economic development.

Mission
The mission for the program is to contribute towards social- economic development of Rwanda through malaria control by strengthening and implementing appropriate interventions and quality health delivery services in partnership with stakeholders.

Goal
This strategic plan has the main goal to reduce malaria mortality by 30% of 2015-2016 level by 2020.

Objectives:
The following objectives will lead to achievement of the goal:

a) By 2020, at least 90 % of population at risk will be effectively protected with locally appropriate preventive and vector control interventions;
b) By 2020, all malaria cases will be promptly treated in line with the national guidelines;
c) By 2020, all health facilities provide complete reporting so as to strengthen surveillance, monitoring and evaluation and inform operational research;
d) By 2020, strengthen coordination, collaboration and effective program management at all levels;
e) By 2020, 75% of the population will have correct practices and behaviours towards malaria control.

The implementation of the Rwanda extended Malaria Strategic Plan 2013-2020 will be guided by the following principles:

a) **Decentralization:** Decentralization has been a key policy of the Government of Rwanda (GOR) since 2000. The strategy will seek to ensure that all levels of the Rwanda health system can adequately fulfill its role, especially with regard to health service delivery;
b) **Equity and Accessibility**: Provision of quality and equitable services will be emphasized. Quality assurance (QA) measures have recently been initiated, standards and norms have been defined for district hospitals and an accreditation process of three referral hospitals has started. Following WHO recommendations, Rwanda is committed to reach universal coverage with insecticide-treated bed nets (ITNs) and malaria diagnosis and treatment;
c) **Partnership and multi-sectorial approach**: The multi-sectorial approach will develop new partnerships and strengthen existing ones to ensure that malaria interventions are fully implemented at all levels including the community level and in a sustainable way;
d) **Ownership, leadership and political will**: The Government will lead the implementation of malaria interventions and will be at the forefront of promoting a sense of stewardship, accountability and transparency;
e) **Evidence-based interventions**: all malaria control interventions and strategies will be derived from research findings at international and country level. Their impact will be regularly monitored and evaluated;
f) **Integration**: Interventions will be delivered in an integrated manner to avoid duplication, improve efficiency and increase coverage levels in order to achieve the intended results. Malaria interventions will be integrated in each service delivery mode at all levels: household, community, health centers and district hospitals.

Monitoring of the Evaluation of the EMSP

In order to measure and analyze the success of the EMSP interventions in reaching outcomes and targets, a set of annual and periodic indicators have been developed through consultations with all stakeholders. The indicators are important for measuring malaria progress in the health sector's performance and have been informed by the country's long term vision and strategic direction (Vision 2020, SDGs and EDPRS). Malaria Performance Reviews will be undertaken annually as part of the Health Sector Review. Malaria Programme and Mid Term Reviews will be done as part of the WHO recommendations. The annual and periodic performance indicators as well as process indicators will be the basis for assessment. Impact indicators will be measured on annual basis through the HMIS and national surveys carried out every 3-5 years such as the demographic health survey and the malaria indicator survey.

Funding requirements

The total funding required over the three-year period will be **$ 230,411,850.**

Chapter One: Introduction

1.1 Malaria as a public health and socioeconomic problem

Malaria is a complex deadly disease caused by *Plasmodium* species of parasites and transmitted by multiple mosquito vectors. Malaria impacts more than 90 countries and territories around the world. In 2015, there were an estimated 212 million cases of malaria worldwide and more than four hundred thousand deaths, most of them occurring in the African and Asia-Pacific regions. In addition to its health toll, malaria places a heavy economic burden on many endemic countries, contributing to the cycle of poverty and limiting economic development. The World Health Organization (WHO) estimated that 6.8 million malaria deaths were averted between 2001 and 2015 through improved malaria control, from which the highest proportion of deaths was averted in the WHO African Region (94%). This decrease in malaria deaths have contributed substantially to progress towards achieving the target for Millennium Development Goal (MDG) 4, to reduce, by two thirds, the under-5 mortality rate between 1990 and 2015. In addition, of the 103 countries that had ongoing malaria transmission in 2000 59 were able to meet the MDG target of reversing the incidence of malaria. Of these, 52 were on track to meet Roll Back Malaria (RBM) and World Health Assembly targets of reducing malaria case incidence rates by 75% by 2015. Rwanda was among the 8 from WHO African Region[1].

For many years, malaria was a major public health problem, the leading cause of morbidity and mortality, with periodic epidemics in high-altitude areas which not only compromised the health of the population but also negatively impacted the national economic development. Although malaria is seasonal in Rwanda and has different epidemic patterns, the entire population is at risk of malaria. Data from the Rwanda Health Management System (HMIS) revealed that malaria represented 7% of outpatient consultations in 2012, while in 2014, malaria morbidity represented 20%.

Malaria also takes a significant financial toll in Rwanda. The estimated direct cost per episode of malaria has been estimated at $2.09 and the indirect cost at over $5.00 in 2003. Additionally, owing to the reduced productivity of ill persons and the time consumed in caring for them, studies have shown that malaria costs the nation about 2% of the GDP and 34% of household and 20% of health expenditures (NHA 2003[2]).

A study of the socio-economic impact of malaria conducted in 2005 showed that the total cost of malaria control was estimated to be US$32.6 million (including direct and indirect household expenditures as well as institutional costs engaged by the GOR, parastatal, private and International NGOs). Direct costs of malaria treatment and prevention per household were estimated to be US$7.53 million and indirect costs were US$7.49 million. Institutional costs were estimated to be

[1] World Health Organization, World malaria report, 2016
[2] National Health Account Report, 2003

around US$17.6 million. The total cost of malaria was estimated to be US$14.1 and US$4 per inhabitant. For 2008, annual institutional needs for malaria control were estimated to be US$ 246,617,472. Assuming that direct and indirect costs to households had decreased to 25% (given that malaria had decreased, health utilization had doubled and funding provided some subsidies), the total cost of malaria was estimated to be US$173 per household and US$31.5 per inhabitant (with household comprised of 5.5 people and total population of 9.8 million)[3].

1.2 Malaria in the national health plan

Rwanda achieved significant reductions in the burden of malaria over the past decade. In 2005, malaria was the leading cause of death among children under age five. In 2008, malaria had dropped to the number three position, and by 2012 had dropped further to number four. Success of malaria control in Rwanda has been acknowledged internationally as a result of strong country ownership, leadership, vision, and evidence-based implementation and adaptation of malaria control interventions as well as coordinated partnerships aligned with GOR priorities and needs. However, from 2012 through December 2016, Rwanda has faced a 70 % increase in malaria incidence, 41% increase in mortality and 19% increase in test positivity rate. These increases were observed in all 30 districts with predominance in districts located in the eastern and southern provinces.

In Rwanda, the health sector contributes directly to achieving five of the eight goals of the 2020 Vision: (1) eradicate extreme poverty and hunger, (2) reduce child mortality, (3) improve maternal health, (4) combat HIV/AIDS, malaria and other diseases, and (5) ensure environmental sustainability. The Rwanda Vision 2020 (developed in 2000) translates these rights into a development path, presenting the country's key priorities aimed at making Rwanda a middle income country in 2020. The health section of Vision 2020 focuses on reducing the high population growth rate of 3.2% per /year improving maternal health, and reducing malaria and HIV/AIDS.

The MSP 2013-2018 Mid-Term Review conducted in 2016, provided information to build the extended Rwanda Malaria Strategic Plan (MSP) 2013-2020. It builds on national policies and strategies and reflects the Rwanda Vision 2020, the Sustainable Development Goals, the I-HSSP III 2013-2018, and the WHO Global Technical Strategy for Malaria 2016-2030. This plan would contribute to the achievement of the SDGs mainly the SDG 1, 2 and 3. Rwanda is currently in the process of developing Vision 2050.

1.3 Process of developing the current strategic plan

The development of the current extended Malaria Strategic Plan (MSP) has been a long process under the leadership of the Malaria and Other Parasitic Diseases Division (Mal&OPDD) which is under the Rwanda Biomedical Centre (RBC) and in collaboration with malaria partners and stakeholders in

[3] Maintaining the gains in malaria control: C. Karema, Steven Micetic, September 2011

Rwanda. The development of the Rwanda MSP has been led by the malaria technical working group established by the MoH and chaired by WHO and co-chaired by the President's Malaria Initiative (PMI) while the Mal &OPDD was the secretariat.

The first step of the Rwanda MSP development was an extensive Malaria Mid Term Review (MTR) launched in Rwanda as a review of the MSP (2013-2018) which allowed the country to undertake a detailed evaluation of achievements of the malaria control program, identify enabling factors in terms of strategies/activities and define gaps between what was planned and what was implemented. This comprehensive assessment paved the way for development of the revised and extended Rwanda Malaria Strategic Plan as an important precursor for resource mobilization and to define the next steps for sustaining and improving program performance.

Following the MTR, four in-country workshops were organized with all malaria stakeholders and partners for the:

a) Development of the current extended Rwanda MSP 2013-2020 vision, goal, mission and objectives;
b) Validation of the Rwanda MSP objectives and the development of malaria control strategies and interventions in order to achieve the set objectives;
c) Development and validation of malaria implementation plan including all activities to be implemented in order to achieve targets set for different objectives and strategies;
d) Quantification of the needs to implement the plan;
e) Costing of the extended malaria strategic plan.

A costing exercise using the conventional MSP costing method was carried out and was based on fiscal years running 1st July–30th June which is aligned with the financial schedules used by the Rwandan Government and covers a three-year period. A validation workshop was carried out to adopt the comprehensive Rwanda MSP including the costing which was then adopted by the General Senior Management Meeting (GSMM) of the Health Sector.

Also during the course of the development of this plan, the Mal &OPDD and its partners attended workshops organized by the RBM-Harmonization working group. In these fora the Rwanda MSP and key related documents were shared for peer review with other National Malaria Control Programs (NMCPs) and international experts for its improvement, technical soundness and alignment with regional and global malaria control guidelines and strategies. At the international level, this plan takes into account the areas of work and commitments from bilateral and multilateral partners such as Global Fund and PMI. The Rwanda extended MSP have been technically reviewed by WHO, PMI and RBM.

Chapter 2: Country Profile

2.1. Socio-political system

Rwanda is situated in East Africa south of the equator between 1°4' and 2°51' south latitude and 28°63' and 30°54' east longitude with a total surface area of 26,338 square km of which 24,668 sq km is land and 1,670 sq km is water. It is bordered by Uganda to the north, Tanzania to the east, the Democratic Republic of the Congo to the west, and Burundi to the south. Administratively, Rwanda is divided into four provinces and capital Kigali, which are further divided into 30 districts. The districts are divided into 416 sectors and 2,148 cells that are further divided into 14,837 "umudugudu" (villages of 50-100 households).

Figure 1: Map of Rwanda showing the internal, regional and district boundaries

2.2. Demographic data

The population of Rwanda is estimated to be 11,720,998 people in 2016 as of Census 2012 Population Projection of which 51.5% are female (Census-NISR)[4] with an average household size of 4.3 persons. Rwanda is one of the most densely populated countries in Africa with 468 inhabitants per square km (Census 2012)[5]. The Rwandan population is predominantly rural: 84% of the population (9,486,498 inhabitants) reside in rural areas versus 16% in urban areas. The demographic structure indicates an almost equal ratio of 1:1 males to females with children. The population is essentially young with 43.4% of all Rwandans being under 15 years. The total fertility rate for three years preceding 2014/2015 was 4.2 births per woman with rural women having almost one child more than urban women[6].

[4] 2012 Population and Housing Census, Provisional results, November 2012
[5] Government of Rwanda, National Census, November 2012
[6] Rwanda Demographic and Health Survey, 2014-15

2.3. Ecosystem, environment and climate

Rwanda forms part of the highlands of eastern and central Africa, with mountainous relief and an average elevation of 1,700 meters above sea level. There are three distinct geographical regions consisting of western and north-central Rwanda made up of mountains and foothills of the Congo-Nile Divide, the Virunga volcano range and the northern highlands. In central Rwanda, mountainous terrain gives way to the rolling hills that give the country its nickname, "Land of a Thousand Hills." Rwanda enjoys a temperate, sub-equatorial climate with average yearly temperatures of around 18.5°C. The average annual rainfall is 1250 mm and occurs in two rainy seasons in February - May and September-December. Rwanda has a dense network of rivers and streams and several lakes surrounded by wetlands.

2.4. Socio-economic situation

Rwanda is a landlocked country with about 90% of the population engaged in subsistence farming, mining and agro-processing. Real gross domestic product (GDP) growth remained strong in 2015, largely driven by the service and industry sectors. Rwanda's economy has been growing steadily at about 8% per year since 2001, with GDP per capita more than tripling from $211 in 2001 to $719 in 2014.

The agricultural sector contributed 33% of GDP and remains the backbone of Rwanda's economy and still employs many Rwandans. The Fourth Household Living Conditions Survey (EICV4)[7] shows that the percentage of farmers whose main job is farming is 71%.

From 2012 to 2015, Rwandans' living conditions have improved considerably: life expectancy at birth increased from 64.5 to 65.6 years. The literacy rate has increased between 2010 and 2015 with 80% of women aged 15-49 years and 84% of men aged 15-49 years considered literate in 2015 compared to 77% of women and 80% of men in 2010. School attendance is mandatory in Rwanda from age 7 to 18; however, only 84.5% of the children attend school and 92.5% for children aged 7-12.

Rwandan women have an important role in the country's socio-economic life. Globally, Rwanda is the first country worldwide with a majority number of women in Parliament where women represent more than 64% of the total and more than 35% in other administrative organizations. In 2012 the crude birth rate was 31 births per 1,000 inhabitants and the total fertility rate was 4.2 children per woman. At the national level, almost two households out of ten (19%) are headed by women.

[7] Fourth Household Living Conditions Survey (EICV4)

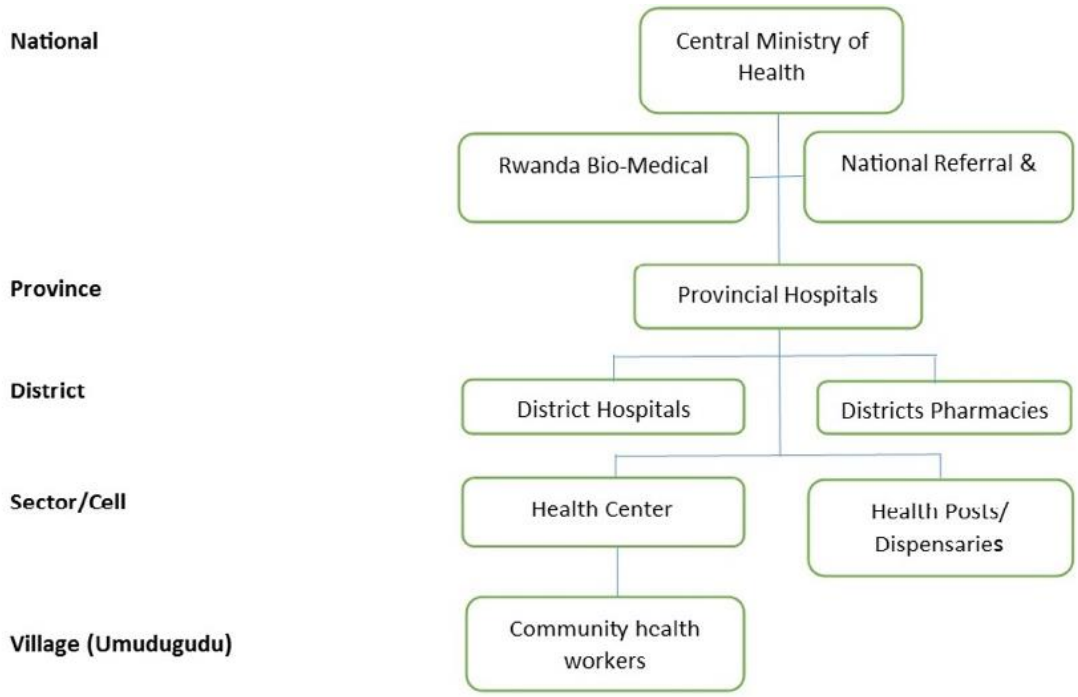
Table 1: Key Socio- economic and Demographic Information

Variable/Indicator	Value	Period	Source
Population	11,839,419	2017	2012 Population and Housing Census,
Population Growth rate	2.6	2012	2012 Population and Housing Census
Total fertility rate	3.9	2012	2012 Population and Housing Census
Crude Birth Rate (CBR)	30.7	2012	2012 Population and Housing Census
Crude Death Rate (CDR)	6.5/1000	2012	2012 Population and Housing Census
Life expectancy at birth	66.4	2012	2012 Population and Housing Census
Literacy rate	68%	2012	2012 Population and Housing Census
Under five mortality rate (/1,000)	50	2015	DHS
Maternal mortality (/ 100,000)	210	2015	DHS
Infant mortality (/1,000)	32	2015	DHS
GDP	8.10	2015	NISR

2.5. Organization of the health system

The Rwanda Health System is a pyramidal structure made of 5 levels: National, District, Sector, Cell and village.

Figure 2: Structure of the Rwanda Health System



2.5.1 National level

The central level is composed of the central departments of the Ministry of Health as well as the national reference hospitals and is responsible for the formulation of health policies, strategic planning, high-level technical supervision, monitoring and evaluation of the health situation as well as the coordination of resources at the national level. The Ministry of Health (MoH) consists of two main health entities: the core MoH and the Rwanda Biomedical Center. The Rwanda Biomedical Center (RBC) coordinates health services provided through 2 main departments: the Biomedical services (BIOS) and the Institute of HIV/AIDS, Diseases Prevention and Control (IHDPC) which includes the Malaria and OPD Division (NMCP). Rwanda has a network of public health facilities structured in a pyramid form with 8 referral hospitals at the apex followed by 4 provincial hospitals, 35 district hospitals and 495 health centers.

2.5.2. District level

The district level is comprised of 4 provincial hospitals and 35 district hospitals. The district is responsible for the provision of primary and secondary health care services (apart from the national hospitals, which fall under the auspices of the central MOH). The main role of the district is to improve quality of hospitals, enhance general hygiene, assist sectors to promote better nutrition and establish a health insurance scheme within its area. The 30 districts receive funds from the GoR through direct transfers from the Ministry of Finance and some benefit from donor funding. The districts are responsible for administrative supervision of health facilities and collect essential indicators on health and services which they share with the MOH. Each district has at least one district hospital and an average of one health centre per 20,000 population. The referral system is anchored on the provision of an average of four ambulances per district as well the CHWs' access to cell phones.

2.5.3. Sector level

The sector level aims to enhance the functioning of health centers by establishing health center executive committees, monitoring the functioning of health centers, mobilizing resources, building capacity, designating areas for the disposal of waste products, and directing the use community health workers and other community based associations for community outreach activities. Currently, the sector level includes 495 health centers, 406 health posts and 13 community owned health facilities[8].

2.5.4. Cell Level

The cell level has the role of integrating and harmonizing cell and Umudugudu activities by monitoring the functioning of health counselors and other volunteers in the Umudugudu in delivery of basic health care services. The cell level also monitors how health insurance schemes are working and the frequency with which the population joins these schemes.

2.5.5. Village (Umudugudu) level

The Umudugudu or community implements health policies by providing community health workers; creating awareness of hygiene and primary health care (including distribution of condoms, mosquito nets, etc) in the community; mobilizing the communities to join health insurance schemes; giving

[8] MOH Statistical Booklet, 2015

children basic emergency health care before taking them to health centres; sensitizing pregnant women of the need for antenatal care and facility-based deliveries; registering deaths, and submitting reports on death. There are 30,000 community health workers who are indispensable in integrated community case management (iCCM). Each of the CHWs is equipped with a cell phone.

Faith-based organizations play an important role in the health system. In 2015, 18% of primary and secondary health facilities were congregational structures. The authorized structures pledge to follow the policy of the Ministry of Health to which they are linked by an agreement[8].

The private sector, representing less than 35%, is involved mainly in treatment activities and is predominantly located in urban areas. The services offered do not always take into account the needs of the population as a whole, but rather the capacity of patients to pay for the care provided. This sector is poorly organized and controlled, and its relationships with the public sector are not clearly defined[8].

2.6. Summary of the Health system analysis

The most recent Rwanda DHS from 2015-2015 showed that overall achievements of the health sector led to improvement in the health status of Rwanda's population with reductions in morbidity and mortality rates[9]. Human Resources for Health (HRH) has seen an increase in the number of doctors and nurses (with current ratios of 1 doctor per 10,055 population, and 1 nurse per 1,142), both surpassing the targets described in the HSSP III[10]. The ratio for midwives has not yet reached the target and stands at a ratio of 1 / 4,037 population. However, much is still to be done to obtain sufficient health staffing levels, strengthen human and technical skills, and equitably redistribute health providers.

The Medical Procurement and Production Division (MPPD) at the central level, along with 30 district pharmacies, are in charge of procurement, distribution and monitoring availability of health commodities at the health facility and community level. Biomedical equipment maintenance, provision of energy and water, and rehabilitation of existing health infrastructures are high priorities for improved functioning of the entire health system. Quality Assurance (QA) measures have been implemented, standards and norms defined for district hospitals (infrastructure, equipment, HRH staffing, and pharmaceuticals) and an accreditation process of health facilities have been put in place.

Planning at the district and facility levels is aligned to HSSP III. Annual operational plans show resource commitments from various stakeholders, and the budgeting process is guided by ceilings provided from Ministry of Economy and Finance (MINECOFIN) through the Medium Term Expenditure Framework (MTEF). Joint Health Sector Reviews (JHSRs) take place annually, assessing the performance of the sector based on the annual programmatic and financial reports. Financial accessibility benefits from three recent and interrelated policies: the Health Financing Policy, the Health Insurance Policy, and the Community-Based Health Insurance Policy. An increase in public expenditure has been seen from 11% of the GOR budget in 2010 to 14% in 2015, and a reduction in the percent of external assistance from

[9] Rwanda Demographic Health Survey, 2014-2015
[10] Mid Term Review of the HSSP III Report, August 2015

38 percent to 33 percent. 83% of the health sector is funded by external assistance, with 1% of all external funds being channeled through sector budget support mechanisms. Financial accessibility through the CBHI was integrated under the RSSB scheme in order to empower the health insurance system. For Performance Based Financing (PBF), the challenge is to continue to reward priority services. Several enabling factors and initiatives (such as strong political will and commitment, improved access to health facilities, community-based programs, the introduction of performance-based approaches, and Community-Based Health Insurance) have enhanced good practices in the quality of care and increased access to and utilization of health services, mutual accountability, and efficiency at all levels. However, a number of challenges still remain such as insufficient human resources (quality and quantity), and lack of sustainable funding, which goes along with issues related to the operational framework at the decentralized levels.

Chapter 3: Malaria Situation Analysis

3.1. Historical perspective of malaria

Malaria in Rwanda was first documented at the beginning of the 20th century (Ivorra-Cano 1982)[11]. In 1917 malaria morbidity and mortality were highest in northwestern Rwanda. Malaria became increasingly prevalent in the 1920s and 1930s, with endemic malaria in the plains and epidemics in the high central plateaus. From 1950-1951, a malaria parasite survey of 1,000 children in four sites in the Ruzizi Valley in western Rwanda found that parasite prevalence was greatest at altitudes less than 1000m, with prevalence of 98.7%, 83.4%, and 46.5% at 775m, 900-950m, and 1500-1580 m, respectively, largely driven by *An. funestus* and *P. falciparum* with some *P. malariae* and *P. vivax* infections reported (Meyus 1962)[12].

During the global malaria eradication program (GMEP)1955-1969 MEP, Rwanda implemented IRS with DDT as the primary intervention, a strategy endorsed by the World Health Organization's 8th Global Assembly of Health in 1955. In areas below 1500m, antimalarials for chemoprophylaxis were also included in the strategy. No local transmission occurred at altitudes greater than 2000m in Rwanda, indicating malaria did exhibit a spatial limit. After 1962, Rwanda's Ministry of Public Health and Social Services (MPHSS) implemented malaria through treatment with chloroquine and in 1983, the MPHSS standardized the malaria treatment guidelines. Before 2006, insecticide treated bed net coverage of pregnant women and children under five was very low. Since then the distribution of LLINs and conduct of IRS have been the cornerstone of vector control for malaria.

The Rwanda National Malaria Control Program was established in 1995. A 2004 situational analysis conducted in five health districts revealed that only 2.4% of children under five with malaria were correctly treated according to national malaria treatment policy (USAID 2007). In response, the NMCP introduced a strategy for home-based management (HBM) for malaria. HBM was designed to decrease barriers to children receiving appropriate antimalarial therapy in a timely manner and relies on a workforce without formal medical training, such as community health workers and primary caregivers, to diagnose malaria with rapid diagnostic tests (RDTs), treat confirmed uncomplicated cases with pre-packaged antimalarial drugs, and refer complicated cases to health facilities as needed (Mugeni 2014)[13].

[11] Ivorra Cano V. Paludisme. In Meheus et al., eds. Santé et maladies au Rwanda. Bruxelles : Acta Tropica 1978 ; 35 : 69-82 AGCD, **1982** : 427-47

[12] Meyus, H., Lips, M., & Caubergh, H. (1962). L'état actuel des problèmes de paludisme d'altitude au Ruanda-Urundi. *Ann Soc Belg Med Trop*, *42*(5), 771-782.

[13] Mugeni, C. et al. Nationwide implementation of integrated community case management of childhood illnesses in Rwanda, August 2014.

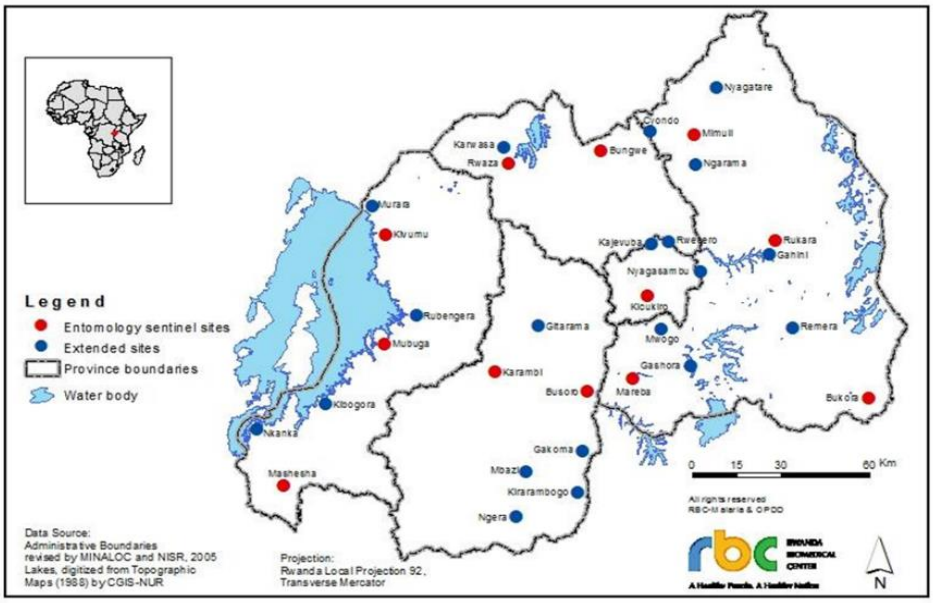
3.2. Malaria species

Three parasites species namely *Plasmodium falciparum*, *Plasmodium ovale* and *Plasmodium malariae* have been detected in Rwanda to date. *P. falciparum* is by far the most common contributing 97-99% of the parasite population. The second most common species is *P. ovale* with 0.5-2% and followed by *P. malariae* 0.5-1% as mono-infection. *P. vivax* has not been detected to date in Rwanda.[14]

3.3. Main malaria vectors

The species of *An. arabiensis, An. gambiae s.s* and *An. funestus* are the malaria vectors in Rwanda. *An. arabiensis* is the dominant species constituting 60.8% of all malaria vectors, *Anopheles gambiae s.s* represent 39.2% and *Anopheles funestus* 0.2%. *Anopheles gambiae s.l.* averages 6 to 8 bites/person/night, with an exophagic rate of 53-60%, infection rate of 9% and a human blood meal index of 61%. *Anopheles funestus* shows an exophagic rate of 53-55%. Insecticide resistance in Rwanda is currently as follows: bendiocarb 0.1%, fenitrothion 1%, pirimiphos methyl 0.25%, DDT 4%, permethrin 0.75%, deltamethrin 0.05%, and lambdacyalothrin 0.05%.

Figure 3: Sites for entomology and insecticide resistance monitoring, 2015-2016



Also the resistance of *An. gambiae s.* to pyrethroid insecticide began to spread after 2013 when the percentage of sites displaying confirmed resistance to permethrin 0.75% and deltamethrin 0.05% was less than 50%. Resistance monitoring conducted from 2014 to 2016 confirmed resistance to pyrethroids in over 50% of the sites surveyed. Little resistance was confirmed to the classes of insecticides belonging to carbamates (Bendiocarb 0.1%) and organophosphates (fenitrothion 1% and pirimiphos methyl 0.25% in 2013-2015). However, in 2016, resistance to bendiocarb 0.1% was confirmed in two sites (Nyagasambu in Rwamagana district and Karwasa in Musanze district).

[14] Richard Culleton ; Failure to detect *Plasmodium Vivax* in West and Central Africa by PCR species typing : 7:174

3.4. Malaria parasites and resistance

In Rwanda, high levels of Chloroquine CQ treatment resistance were reported between 1980s and 2000 and resulted into policy changes to replace it with other drugs based on therapeutic efficacy findings. CQ was replaced with Sulphadoxine/pyrimethamine plus Amodiaquine (SP+AQ) as the first -line drug for treatment for uncomplicated malaria.
One year after introduction of AQ+SP, rapid selection of resistance spread due to Chroroquine cross resistance to Amodiaquine of parasite resistance, where the AQ+SP were resistant in eastern province up to nearly 70% in Rukara sentinel site.

Thereafter, resistance was detected in other parts of the country and rendered the drug ineffective for treatment of malaria, which led to another policy change in 2006, this time to Artemether-Lumefantrine (ALu). Therapeutic efficacy tests conducted in 2007–2010 showed that malaria parasites are still sensitive to ACT and the efficacy of ALu and other ACTs are still very high. A recent study which concluded with recruitment in December 2015, showed ALu still have good clearance parasite time at day 3 at above 98% in sentinel sites.

3.5. Dynamic of Malaria transmission and level of endemicity

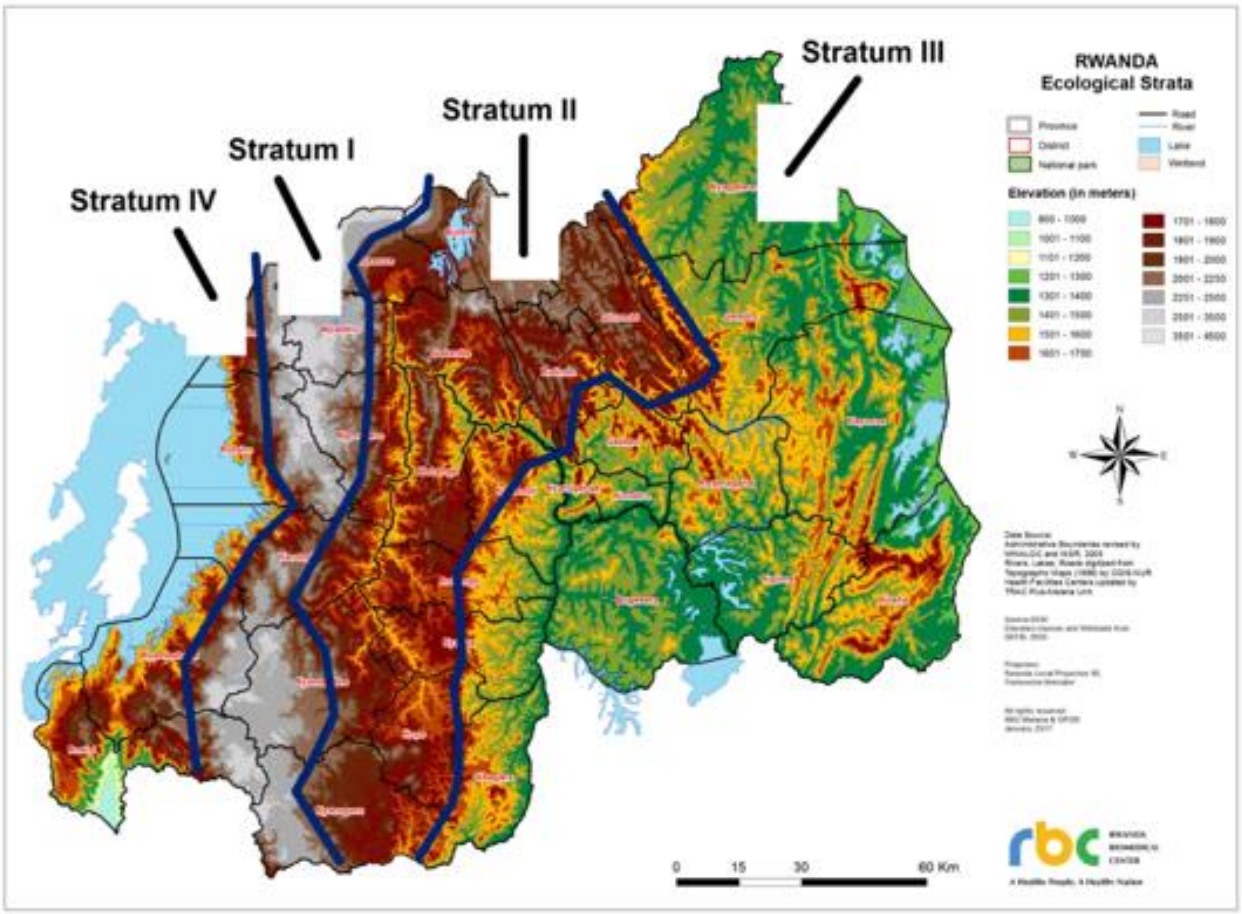
In Rwanda, malaria transmission occurs throughout the year primarily during/after the rainy seasons with peaks in May/June and November/December each year . Malaria has predictable patterns in season and level of endemicity across Rwanda with the entire population at risk. However, geographic variation and magnitude of malaria transmission remains unstable, correlated with variable total rainfall and degree of implementation of malaria control interventions such as mass distributions of LLINs, IRS, etc.

3.6. Malaria stratification and mapping

3.6.1. Malaria mapping

A 1982 stratification of malaria in Rwanda (updated in 2015) using altitude, climate, *Plasmodium* index and disease vector distribution divided Rwanda into four eco-epidemiological strata and are described as follows from west to east. Stratum IV extends from the Kivu Lake to the "Crête Congo–Nil" (1460-1800m) which is characterized by a parasite prevalence (*Plasmodium* index) of 5-30% and malaria morbidity of 19% (Rusizi district). Stratum I is a north-south stretch of land east of Stratum IV measuring about 160 km by 25-50 km and is at an altitude of 1,800-3,000m above sea level. The parasite prevalence in this stratum is less than 2%. Stratum II is located in the central plateau at an altitude of 1500-2000m above sea level with parasite prevalence in this stratum ranging from 10% to 50%. Stratum III is located in the lower floor of the eastern Central Plateau at an altitude of 1,000-1,500m above sea level and has endemic, stable malaria transmission.

Figure 4: Malaria stratification map showing the four malaria strata



3.6.2. Current Malaria epidemiological stratification

Malaria is endemic in Rwanda with the Eastern and Southern Provinces accounting for over 60 % of the disease burden. In the remaining parts of the country, malaria remains unstable. As indicated in the incidence maps below (figure 5) in 2013, some districts in Rwanda had reached pre-elimination with a slide positivity rate of < 5%. The HMIS incidence data from 2016 showed a general increase in malaria cases across the country with high intensity of transmission in eight districts. Table 2 shows the districts classified by disease incidence and the interventions that will be implemented.

Figure 5: Trend of malaria incidence 2013-2016

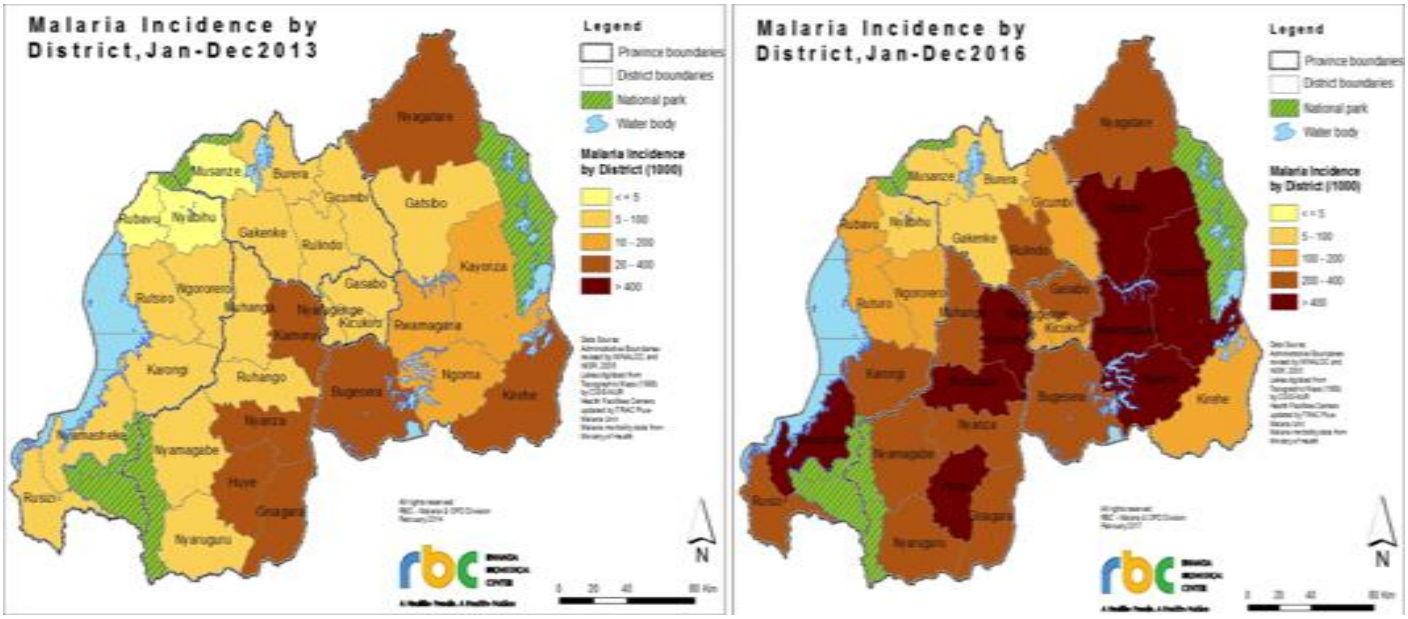


Table 2: Malaria stratification based on the 2016 malaria incidence and proposed interventions

Districts	Zones	Incidence/1,000	Interventions
None	None	< 5	None
Musanze, Nyabihu, Burera, Gakenke	Low endemic	5-100	Test and treat, LLINs, Surveillance, M&E
Rubavu, Rutsiro,Ngororero, Gicumbi,Kicukiro,Nyarugenge, Kirehe	Moderate endemic	100-200	Test and treat, LLINs, Surveillance, M&E, IRS*
Nyagatare, Rulindo, Gasabo, Bugesera,Muhanga, Karongi,Nyanza,Nyamagabe, Gisagara,Rusizi, Nyaruguru	Endemic districts	200-400	Test and treat, LLINs, Surveillance, M&E, IRS*
Gatsibo, Ngoma, Kayonza, Rwamagana, Kamonyi, Ruhango, Huye, Nyamasheke	High endemic	>400	Test and treat, LLINs, Surveillance, M&E, IRS*

**IRS will be implemented in the following endemic districts: Nyagatare, Kirehe, Gatsibo, Bugesera, Gisagara based on available funding and as a mitigation measure against pyrethroid resistance.*

3.7. Malaria Morbidity and Mortality

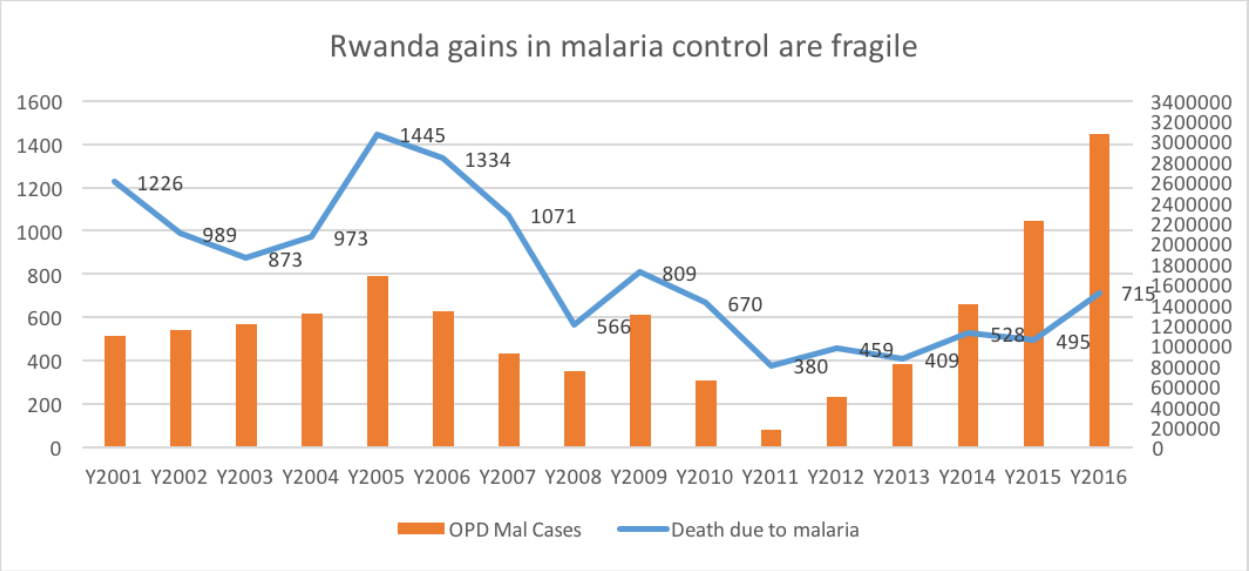
Malaria morbidity and mortality data is collected through the Rwanda health information system (HMIS) from all public-supported and faith-based health facilities. Based on the MOH Statistical Booklet 2015[15], malaria is the second cause of morbidity in children under five years of age and second cause overall for Rwanda accounting for 7.4% and 19.4%, respectively. Malaria mortality among children under five years of age and overall, represents the sixth cause of death at 3.1% and 4.3 %, respectively.

Malaria cases declined by 86% in malaria incidence between 2005 and 2011, by 87% decline in outpatient malaria cases between 2005 and 2011, 74% decline in inpatient malaria deaths between 2005

[15] MOH Statistical booklet 2015

and 2011, and 71% decline in malaria test positivity rate (TPR) between 2005 and 2011. The 2010 DHS showed that malaria prevalence decreased from 2.6% in 2008 to 1.4% in 2010 among children under 5 years of age and from 1.4% in 2008 to 0.7% in 2010 among pregnant women.

Figure 6: Trends in malaria morbidity and mortality 2013-2016



However, since 2012, malaria incidence increased every year from 112 per 1,000 in 2013-2014 to 308 per 1,000 in 2015-2016. At a baseline of 93 per 1,000 in 2012, the incidence of malaria had tripled by 2016. The increase in malaria cases was in all provinces with the largest recorded in the Eastern and Southern provinces. The number of cases tripled in the Eastern province (460,460 in 2013-2014 to 1.4 million in 2015-2016), and doubled in the Southern province, from 554,035 in 2013-2014 to over 1.1 million in 2015-2016. In addition, the DHS 2015 showed an increase of malaria prevalence among children under-five years and pregnant women from 1.4 % in 2010 to 2% and 0.7% in 2010 to 0.6%, respectively.

The malaria test positivity rate of 34 percent as at 2012 did not decrease to 28 percent as anticipated in the MSP (2013-2018), but increased to 42 percent in 2015/2016. There was also an increase in deaths attributed to malaria from 592 in 2013-2014 to 698 in 2015-2016. The MTR undertaken in 2016 confirmed an increase in malaria cases in all districts including those targeted with pre-elimination interventions. In the past three years, no single pre- elimination district had achieved an average SPR <5%.

Data from the 2015 HMIS shows that malaria became the second cause of morbidity in Rwanda representing 7.4% of outpatient cases among all ages and the sixth cause of mortality in all ages representing 4.3% malaria proportional mortality. These data show that malaria control gains in Rwanda are fragile and interventions need to be scaled up and gains consolidated.

Chapter 4: Review of the Malaria Strategic Plan 2013-2018

In 2011, the MOPDD conducted a MPR for 2008-2012 MSP which led to the development of the 2013-2018 malaria strategic plan. Following a Mid Term Review conducted in 2016, the 2013–2018 Malaria Strategic Plan was revised and an extended MSP 2013-2020 was developed. The following traces the main achievements and issues in the implementation of the said strategic plan as outlined by the Mid Term Review of the plan.

4.1. Main Achievements made so far

4.1.1 Review of Capacity of the NMCP to Implement Planned Activities

The rate of implementation of the MSP 2013-2018 planned activities measured by the proportion of the planned activities implemented under each objective was moderate with 77.8% of the planned key activities fully implemented, 10% percent partially implemented (or in progress) and 12.2% percent not implemented.

Two of the six objectives had an implementation rate of above 90% (High), two were between 75 and 90% (moderate) and another two had implementation rate below 75% (low). The overall rate of implementation the MSP 2013-2018 at the mid-term was moderate. However, the implementation of some of the activities falling under the poorly performing objectives is likely not be achieved by end of the MSP term. In addition, there is low level of implementation of the recommendations of the 2011 malaria programme review which may affect moving forward the malaria control and elimination agenda within the country. These findings may also point to the fact that some of the targets set in the MSP were unrealistic given the existing programme capacity and the limited resource base.

4.1.2. Progress towards MSP Epidemiological and Entomological Impact Targets

The malaria incidence rate increased every year over the strategic plan period from 112 per 1,000 in 2013-2014 to 308 per 1,000 in 2015-2016, equivalent to a tripling of the incidence at baseline of 93 per 1,000 in 2012. The increase in malaria cases was in all provinces with the largest recorded in the Eastern and Southern provinces. The number of cases tripled in the Eastern province (460,460 in 2013-2014 to 1.4 million in 2015-2016), and doubled in the Southern province, from 554,035 in 2013-2014 to over 1.1 million in 2015-2016.

In Rwanda, the malaria test positivity rate of 34 percent as at 2012 increased to 42 percent by 2015/2016. The period also witnessed an increase in deaths attributed to malaria from 592 in 2013-2014 to 698 in 2015-2016.

Entomological impact indicators relating to the mosquito vectors for malaria, though not reflected in the MSP, were regularly monitored, albeit with some data gap. The dominant mosquito specie, Anopheles gambiae s. s., was reported to average 6-8 bites per person in a night, and with more than half of the sampled population (53-60 percent) resting and biting outside (exophilic and exophagic). The

Entomological Inoculation Rate (EIR), a measure of exposure to infectious mosquitoes and thus the intensity of malaria transmission, rose from 24 percent in 2013 to 65 percent in 2015.

4.1.3. Review of Financing of the Mal&OPDD

The GoR's contribution to the health sector has been consistent (average of 8.2% of the total national allocation) although there is need to continue to make efforts towards the attainment of the Abuja target of 15%. The contribution of the GoR budget in the fight against malaria is low (2 percent) over the 3 years and is a threat to program sustainability in the long term. Over the 3 years assessed, the main malaria funding was by three key partners (GoR, the Global Fund and PMI) and there still remained a huge total funding gap of 42%. The funding contribution of other ministries and the private sector in the fight against malaria could not be assessed due to lack of information.

4.1.4. Review of level of outcome targets

a. Vector Control Outcome Targets

The Malaria Vector Control Unit has sufficient technical and infrastructural resources to conduct an Integrated Vector Management (IVM), which included and vector surveillance. The main interventions were distribution of long-lasting insecticidal nets (LLINs) through continuous/routine channels and periodic mass distribution campaigns; Indoor Residual Spraying (IRS) of insecticides in targeted areas; and environmental management. The proportion of households owning an LLIN was virtually stable at 83 percent in 2013 and 81 percent in 2015. Latest data on use of LLIN showed that 68 percent of children under 5 and 73 percent of pregnant women slept under an LLIN the preceding night. However, this high rate of LLIN use is below the set target of 76 percent. Pertinently, the indicator that measures universal coverage within the population was also low at 43 percent compared with the target of 60 percent. In addition, the anticipated mass distribution of about 6 million nets in 2015-2016 did not hold because of delayed procurement, and the delivery of substandard nets with poor physical integrity. Periodic monitoring of LLIN durability and bio-efficacy was efficiently done in Rwanda; data showed that 22 percent and 50 percent of distributed LLINs had deteriorated within 6 and 12 months after distribution respectively.

IRS in Rwanda is not a nationwide program but focused in malaria high burden districts. There was a steady expansion of IRS from 3 to 5 districts and in the number of sprayed structures from 227,969 in 2013 to 453,457 in 2016. The proportion of structures sprayed in these targeted areas remained high at about 98 percent. However, the population protected by IRS in Rwanda has only expanded from 975,259 (8.2 percent) in 2013 to 1,8041,121 (15.1 percent) in 2016.

Monitoring of resistance to the insecticides used for LLINs and IRS by malaria vectors was regularly done countrywide in 32 sentinel sites. Resistance to pyrethroids such as permethrin was confirmed in 24 sites (75 percent), and to DDT in 17 sites (53 percent). These high levels account for a reduction in the effectiveness of LLINs as a malaria vector control measure.

The reviewed entomological data showed a steady change in the behaviour of the major mosquitoes that transmit malaria in Rwanda; more than half (51 to 54 percent) bite outdoors. This vector behaviour contributes to outdoor malaria transmission and has implication on the effectiveness of IRS and LLINs.

b. Malaria Diagnosis and Treatment Targets

The proportion of suspected malaria cases that received a parasitological test at public health facilities and in the community (for children under 5 years) was sustained at 99.9% over the review period. Likewise, the proportion of confirmed malaria cases that received first-line antimalarial treatment was sustained (96.5% and 98.4% respectively in 2013 and 2016). The proportion of the population tested for malaria through RDT or slide microscopy (Annual Blood Examination Rate) more than doubled between 2013 and 2015, from 32.8 percent to 73.6 percent. The ABER indicates that the endemicity of malaria and the risk of contracting malaria have increased.

Numbers of severe malaria cases are on an upward trend increasing from about 10,000 to 18,000 between July 2013 and June 2015. Deaths attributable to malaria have also increased in Rwanda, but the proportion of malaria cases that died (Case Fatality Rate) has been remained stable at 4 percent since 2014 to present. In December 2015, a Malaria Contingency Plan (2016) was developed in response to the increase in malaria cases, which adopted a scale-up of Home Based Management of fever for adults at community level in order to reduce the malaria burden and prevent severe malaria and death.

c. Procurement Supply Management (PSM) Outcome Targets

The Supply Chain Management of malaria commodities is well organized; health facilities reporting having 'no stock-out' of ACTs have increased from 92 percent in 2013 to 96 percent in 2015. This indicates that the access to medicines has been increased through an effective supply chain system.

d. Advocacy, Social Mobilization and SBCC Outcomes Targets

SBCC activities were conducted over the period of the review using various communication channels at different levels of implementation. The SBCC component of the malaria programme had outcome indicators that were included and to be tracked in the MSP. The 2013 Malaria Indicator Survey (MIS) reported that the proportion of women who recognize fever as a symptom of malaria, and the proportion of women who reported mosquito bites as a cause of malaria were 88 percent and 95 percent respectively. No other survey has yet been conducted, making the assessment of progress difficult.

e. Pre-Elimination Outcomes Targets

Since 2014 pre-elimination activities were implemented in four districts with low Slide Positivity Rate (SPR) <5%, and in two districts with high burden as controls. The notification rate (proportion of malaria cases notified within 24 hours of detection) exceeded the targets of 62, 65 and 67 percent set in the 3 years of pre-elimination, respectively) although it decreased from 84 percent in 2014 to 70 percent in 2016. On the contrary, the proportion of confirmed index cases investigated within 48 hours at health center in targeted districts declined significantly from 84 percent in 2014 to 34 percent in 2016. The review confirmed an increase in malaria cases in all districts including those targeted with pre-

elimination interventions. In the past 3 years, no single pre-elimination district has achieved an average SPR <5%.

f. Surveillance, Monitoring and Evaluation and Operational Research Outcome Targets

The SMEOR systems are in place and functioning. The reporting system is using the DIHSS-2 at all levels. Some M&E activities were fully implemented (47 percent) others partially implemented (23 percent) and not implemented (30 percent) due in part to lack of funds or required staff, etc. The private sector reporting is integrated into HMIS but not well followed-up on for the malaria data reported. Research initiative strategy is not well defined and the strengthening of epidemic preparedness and response strategy has not been completed.

g. Functionality of Programme Management Support System

The current position of the NMCP is appropriate and functional to support implementation of the MSP. There are strong linkages between NMCP (main implementer), MoH (governance) and stakeholders (donors as well as other implementing partners). Appropriate legislative framework, policy document, strategic plans and guidelines are available to guide governance, coordination and implementation of malaria control and elimination interventions in Rwanda.

Table 3 below also shows some of the achievements based on the DHS 2014-15, MIS 2013 and HMIS, 2008-2016.

Table 3: Achievement of key malaria indicators (household surveys and HMIS) 2008-2016

Indicators	2008	2010	2012	2013	2014	2015	2016	Source
Mortality attributable to malaria (All) (%)	16.3	12.9	6	4.9	4.6	3.8	5.4	HMIS
Incidence of confirmed malaria cases (all ages) per 1,000	80	61	48	93	155	239	403	HMIS
Slide Positivity rate in fever cases (%)	24	23.6	15.6	29	39	41	42	HMIS
Proportion of morbidity attributed to malaria at health facilities (%)	11.8	7.8	5.7	9.9	14	19	31	HMIS
Proportion of U5 morbidity attributed to malaria at health facilities (%)	8.1	7.9	4	7	16	13	13	HMIS
Number of malaria attributed deaths at the health facilities	566	670	459	409	528	495	715	HMIS
Number of malaria attributed deaths under five at the health facilities	197	175	162	112	171	123	147	HMIS
Proportion of under-five with malaria/fever receiving appropriate treatment within 24h (community) (%)	62	89	96	79	N/A	N/A	N/A	HMIS
Proportion of patients who receive antimalarials at HF that are laboratory confirmed before treatment (%)	41	94	99.9	99.9	99.9	99.9	99.9	HMIS
Malaria prevalence in Children under five years (%)	2.6	1.4	N/A	N/A	N/A	2	N/A	DHS
Malaria prevalence in pregnant women (%)	1.4	0.7	N/A	N/A	N/A	0.6	N/A	DHS
LLINs Ownership (%)	56	82	N/A	84	N/A	81	N/A	DHS
Proportion of children under 5 who slept under a LLIN the previous night (%)	56	70	N/A	74	N/A	64	N/A	DHS
Proportion of pregnant women who slept under a LLIN the previous night (%)	60	72	N/A	74	N/A	73	N/A	DHS
Proportion of cases of severe malaria in the health facilities that are treated in accordance with the national treatment guidelines (%)	68	N/A	N/A	84	N/A	N/A		HFS
Proportion of simple malaria cases in the health facilities that are treated in accordance with the national treatment policy (%)	68	N/A	N/A	96	N/A	N/A	98.4	HFS

4.2. Main issues and challenges in implementing the strategic plan

Several issues and challenges and lessons were learned during the implementation of this plan. The main lesson learnt is that failure to provide adequate funding for key malaria interventions on time can lead to the reversal of the gains achieved in the past and serious malaria resurgence as was experienced in this country for the past two years.

The capacity of the Mal&OPDD to implement MSP activities was moderate to high although the third objective on pre-elimination could not be met. There was low level implementation of the recommendations of the 2011 MPR which may have affected moving forward the malaria control and elimination agenda within the country. The programme structure is optimal and the Mal&OPDD Manager placement enables the manager to influence policy and resource allocation in the RBC/MoH. The country faced an increase of malaria cases and deaths attributed to malaria within the review period, thus the targets set in the MSP for malaria–specific impact indicators were not achieved.

Vector control measures have been deployed by the programme, and there is a vector surveillance system to guide vector control interventions. However, LLINs, which is the main preventive measure are no longer efficacious due to pyrethroid insecticide resistance, which is country-wide, most have deteriorated and require replacement, and less than half of the population have access to LLIN at present. Surveillance data show that the behaviour of the infective malaria vectors have changed and most now feed outdoors (54%). This has far reaching implications on the effectiveness of the Indoor Residual Spraying and LLIN programme carried out in the country.

There is an increase in malaria testing rate and treatment of cases with appropriate antimalarial drugs. However, due to the upsurge in malaria cases; Home Based Management of fever for adults (HBMA) by CHWs was introduced for scale-up in the Malaria Contingency Plan (MCP) of 2016[16]. In spite of this, the worrisome increase in annual cases of severe malaria with attendant increase in deaths is unrelenting and requires urgent attention. This may be due to a number of reasons including the fact that CHWs are overwhelmed, thus hampering the effectiveness of the HBMA strategy. Also, the lack of health insurance and the co-payment at the point of service for those insured, combine to limit the achievement of prompt treatment and universal coverage with ACTs.

The supply chain management performance has improved over the past three years of the strategic plan. Though there was a delay in the last round of procurement and delivery of sub-standards LLINs (physical integrity and efficacy). Available information suggests that the challenges faced by the QA/QC processes for ensuring access to quality-assured malaria commodities, in particular LLINs, have raised doubts and concerns in ensuring timely delivery and distribution.

[16] Ministry of Health, Malaria Contingency Plan, 2015

The implementation of SBCC activities to increase knowledge and uptake of malaria control measures has improved over the years with the use of an integrated approach involving several partners and mechanisms including *Umuganda*. However, evaluating the outcomes of SBCC interventions require periodic surveys which were too far in-between to allow closer monitoring. Over the years, the budget for SBCC has declined affecting the effective implementation of SBCC activities.

Malaria surveillance, monitoring and evaluation system is functioning optimally in Rwanda. However, there is no structured operational research agenda even though drug efficacy testing, and insecticide resistance monitoring are ongoing at various sentinel sites.

4.3. Way Forward

Based on the MTR report, the following recommendations are drawn for the future:

- Conduct further investigation to obtain empirical data on the causes of the increase in reported malaria in Rwanda, in order to confirm that the potential contributing factors such as influence of infrastructure development and agriculture, climatic change (El Nino phenomenon), decline the durability and efficacy of LLINs, insecticide resistance and change in vectors behavior;
- Conduct strong advocacy to policy makers, members of parliament and partners to mobilize the expected and needed increase in domestic and external funding for malaria control. All ministries involved in fighting against malaria should share their plans and budgets to show their contribution toward malaria control. A joint and robust investment/business plan for resource mobilization should be developed;
- Lead an inter-sectorial advocacy for the formation of cross-border malaria collaboration initiatives with neighbouring countries as one of the viable options to reducing the increase in malaria burden and to facilitate the return to the pre-elimination levels. Within the country, the NMCP should establish a public-private partnership to scale-up concerted efforts in the control of malaria;
- Develop a long-term LLIN procurement, distribution and monitoring plan to ensure continuous supply and replacement of LLINs with products that are likely to provide protection for at least 3 years in the Rwanda context;
- Continue insecticide rotation for IRS as part of an insecticide management strategy in the context of revision of the current IVM Strategy;
- In view of the observed shift in the biting behaviour of malaria vectors to exophagy, NMCP should consider the deployment of larval source management in a strategic manner and in conformity with global recommendations. This should include environmental management, environmental manipulation, biological control and larviciding as complementary interventions to IRS and LLIN;
- Maintain the implementation of the HBM for adults. The Rwanda Biomedical Center should urgently set up structures to retain current CHWs. The NMCP should monitor the implementation of the free treatment with ACTs for vulnerable people and/or explore other sustainable options through an

integrated approach involving RBC, MOH and the Rwanda Social Security Board and other agencies/ministries;

- Integrate the Procurement, Supply Chain Management for malaria commodities into the proposed Coordinated Procurement Distribution System (CPDS) and sustain funding to maintain the availability of malaria commodities;
- Develop a comprehensive research agenda for SBCC and conduct regular KAP surveys by NMCP in collaboration with other government agencies and development partners. SBCC should be sustained especially to promote seeking of prompt diagnosis and treatment, the use of LLINs and personal protective measures by the population and the environmental management. In addition, NMCP should ensure provision of a specific budget line for SBCC in the revision of the MSP;
- Maintain the current level of performance of the HMIS for effective malaria surveillance. NMCP and partners should develop and implement a structured Operational Research Agenda that will provide information understanding the peculiarities of the programme, and for evaluating and shaping the processes and mechanisms of implementing malaria interventions in the country;
- The NMCP should set up a system for real-time notification of severe malaria cases before transfer to district hospital to minimize the number of death due to malaria. In addition, NMCP should institutionalize a formal QA/QC System to assure the quality of diagnosis and treatment done at community level;
- Strengthen the use of data for timely decision-making by taking advantage of the existing comprehensive partnership mechanisms and platforms.

Chapter 5: Strategic Plan Framework 2013-2020

The vision, mission, goal and objectives outlined in this revised and extended MSP as well as the strategic policy priorities, interventions and strategies are essentially the result of the implementation of activities since 2013 and the 2016 mid-term review of the 2013-2018 malaria strategic plan. This strategic plan therefore represents the collective learning and commitment of the people of Rwanda with all stakeholders [development partners and civil society organizations] to attain the vision of a malaria-free Rwanda.

5.1. Vision

Rwanda free from malaria as a way to contribute to the socio economic development.

5.2. Mission

The mission for the program is to contribute towards social- economic development of Rwanda through malaria control by strengthening and implementing appropriate interventions and quality health delivery services in partnership with stakeholders.

5.3. Strategic directions and policy priorities

The implementation of the Rwanda extended Malaria Strategic Plan 2013-2020 will be guided by the following principles:

a) **Decentralization:** Decentralization has been a key policy of the Government of Rwanda (GOR) since 2000. The strategy will seek to ensure that all levels of the Rwanda health system can adequately fulfill its role, especially with regard to health service delivery.
b) **Equity and Accessibility**: Provision of quality and equitable services will be emphasized. Quality assurance (QA) measures have recently been initiated, standards and norms have been defined for district hospitals and an accreditation process of three referral hospitals has started. Following WHO recommendations, Rwanda is committed to reach universal coverage with ITNs and malaria diagnosis and treatment.
c) **Partnership and multi-sectorial approach**: The multi-sectorial approach will develop new partnerships and strengthen existing ones to ensure that malaria interventions are fully implemented at all levels including the community level and in a sustainable way.
d) **Ownership, leadership and political will**: The Government will lead the implementation of malaria interventions and will be at the forefront of promoting a sense of stewardship, accountability and transparency.
e) **Evidence-based interventions**: all malaria control interventions and strategies will be derived from research findings at international and country level. Their impact will be regularly monitored and evaluated

f) **Integration**: Interventions will be delivered in an integrated manner to avoid duplication, improve efficiency and increase coverage levels in order to achieve the intended results. Malaria interventions will be integrated in each service delivery mode at all levels: household, community, health centers and district hospitals.

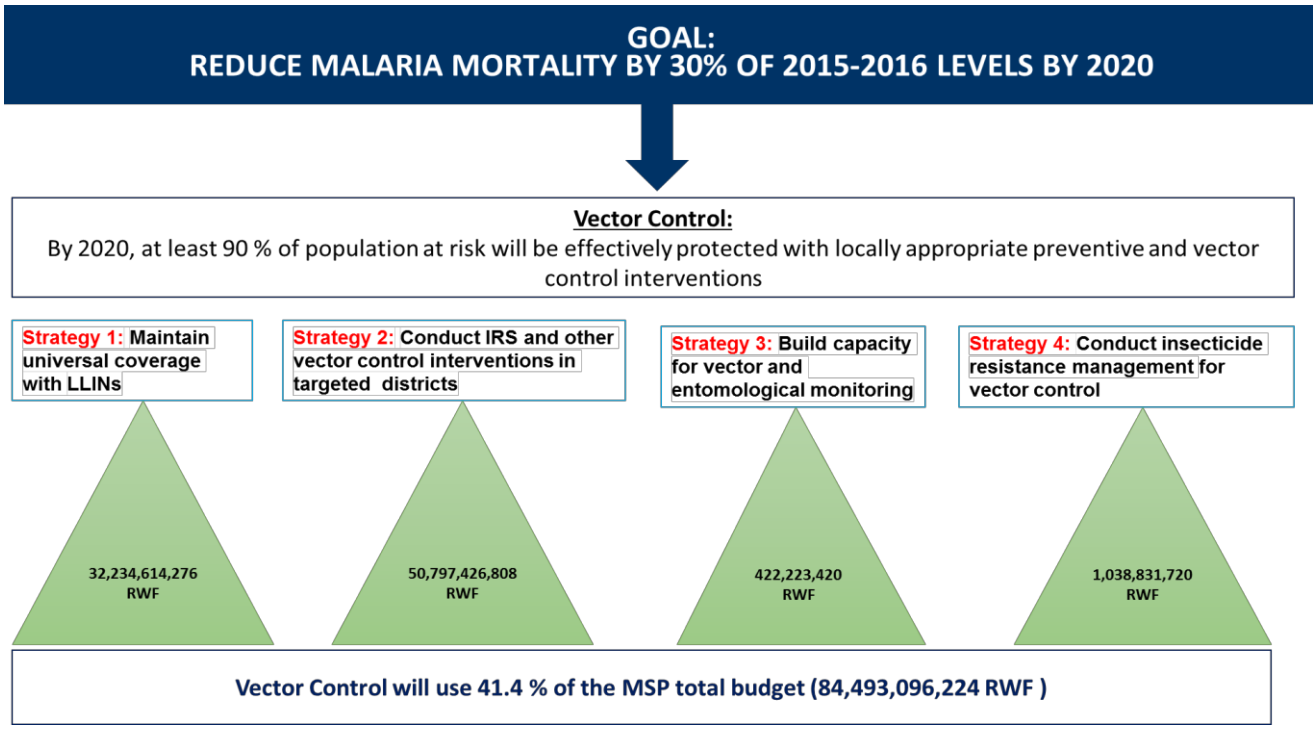
Finally, the following priorities have been identified in the Global Technical Strategy, and endorsed by Regional Committee for Africa as follows:

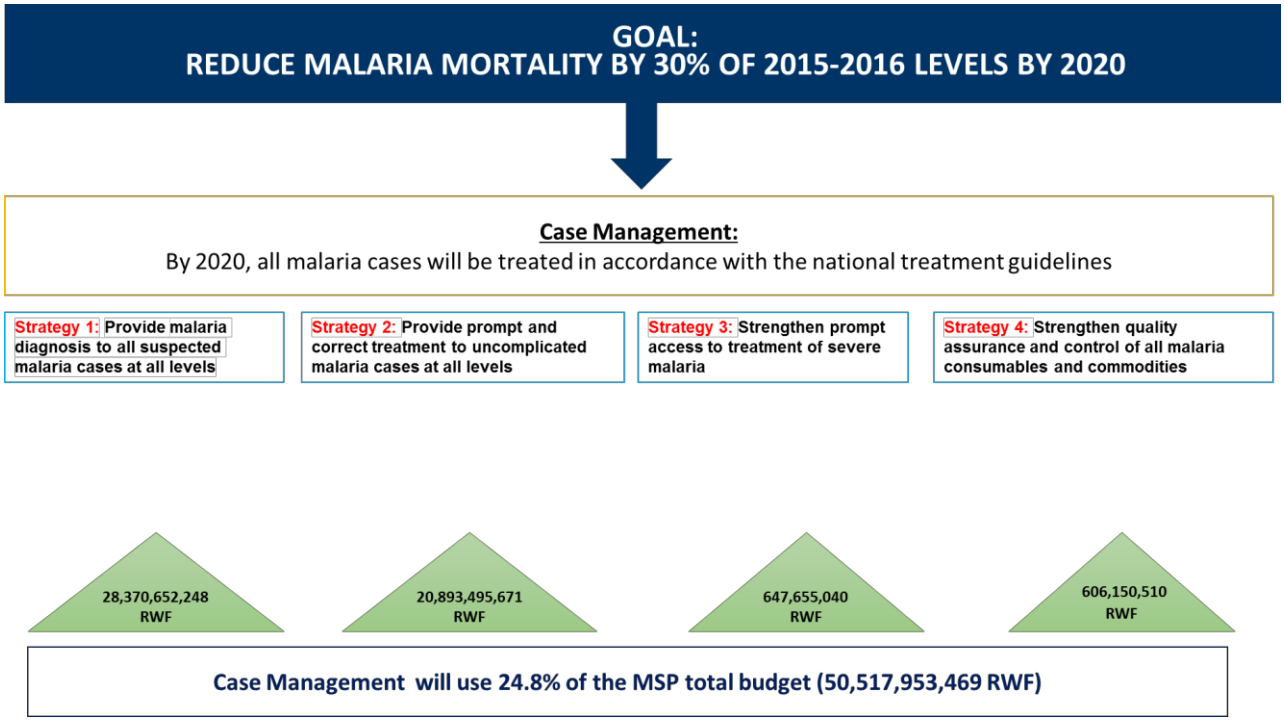
a) Vector Control: to maximize the impact of vector control, to maintain adequate entomological surveillance and monitoring, to manage insecticide resistance and residual transmission, to strengthen capacity for evidence -driven vector control, to implement malaria vector control in the context of integrated vector management;
b) Diagnostic testing and treatment: to ensure universal diagnostic testing of all suspected malaria cases, to provide quality- assured treatment to all patients, to scale up community -based diagnostic testing and treatment, to monitor safety and efficacy of antimalarial medicines and manage antimalarial drug resistance.

5.4. Goal and objectives

This strategic plan has the main goal to reduce malaria mortality by 30% of 2015-2016 level by 2020. Following the mid-term review recommendations of 2016, the following objectives were discussed and agreed upon by all stakeholders as necessary to achieve the above stated goal.

a) Objective 1: By 2020, at least 90 % of population at risk will be effectively protected with locally appropriate preventive and vector control interventions
b) Objective 2: By 2020, all malaria cases will be promptly treated in line with the national guidelines
c) Objective 3: By 2020, all health facilities provide complete reporting so as to strengthen surveillance, monitoring and evaluation and inform operational research
d) Objective 4: By 2020, strengthen coordination, collaboration and effective program management at all levels.
e) Objective 5: By 2020, 75% of the population will have correct practices and behaviours towards malaria control.


GOAL:
REDUCE MALARIA MORTALITY BY 30% OF 2015-2016 LEVELS BY 2020
Vector Control:
By 2020, at least 90 % of population at risk will be effectively protected with locally appropriate preventive and vector control interventions
Strategy 1: Maintain universal coverage with LLINs
Strategy 2: Conduct IRS and other vector control interventions in targeted districts
Strategy 3: Build capacity for vector and entomological monitoring
Strategy 4: Conduct insecticide resistance management for vector control
32,234,614,276 RWF
50,797,426,808 RWF
422,223,420 RWF
1,038,831,720 RWF
Vector Control will use 41.4 % of the MSP total budget (84,493,096,224 RWF)


GOAL:
REDUCE MALARIA MORTALITY BY 30% OF 2015-2016 LEVELS BY 2020
Case Management:
By 2020, all malaria cases will be treated in accordance with the national treatment guidelines
Strategy 1: Provide malaria diagnosis to all suspected malaria cases at all levels
Strategy 2: Provide prompt and correct treatment to uncomplicated malaria cases at all levels
Strategy 3: Strengthen prompt access to treatment of severe malaria
Strategy 4: Strengthen quality assurance and control of all malaria consumables and commodities
28,370,652,248 RWF
20,893,495,671 RWF
647,655,040 RWF
606,150,510 RWF
Case Management will use 24.8% of the MSP total budget (50,517,953,469 RWF)

GOAL:
REDUCE MALARIA MORTALITY BY 30% OF 2015-2016 LEVELS BY 2020

Surveillance, Monitoring and Evaluation:

By 2020, all health facilities will provide complete reporting so as to strengthen surveillance, monitoring and evaluation and operational research

Strategy 1:	Strategy 2:	Strategy 3:	Strategy 4:	Strategy 5:	Strategy 6
Strengthen the HMIS and SISCom	Strengthen reporting for severe malaria and malaria deaths from monthly to real time reporting	Improve reporting from the private health sector	Strengthen malaria surveillance monitoring and evaluation	Strengthen capacity building in data analysis and use at all levels	Develop and implement an operational research agenda for malaria
3,849,800 RWF	704,355,547 RWF	110,878,544 RWF	3,756,457,520 RWF	2,859,885,360 RWF	382,994,100 RWF

Surveillance, Monitoring &Evaluation will use 3.8% of the MSP total budget (7,818,420,871 RWF)

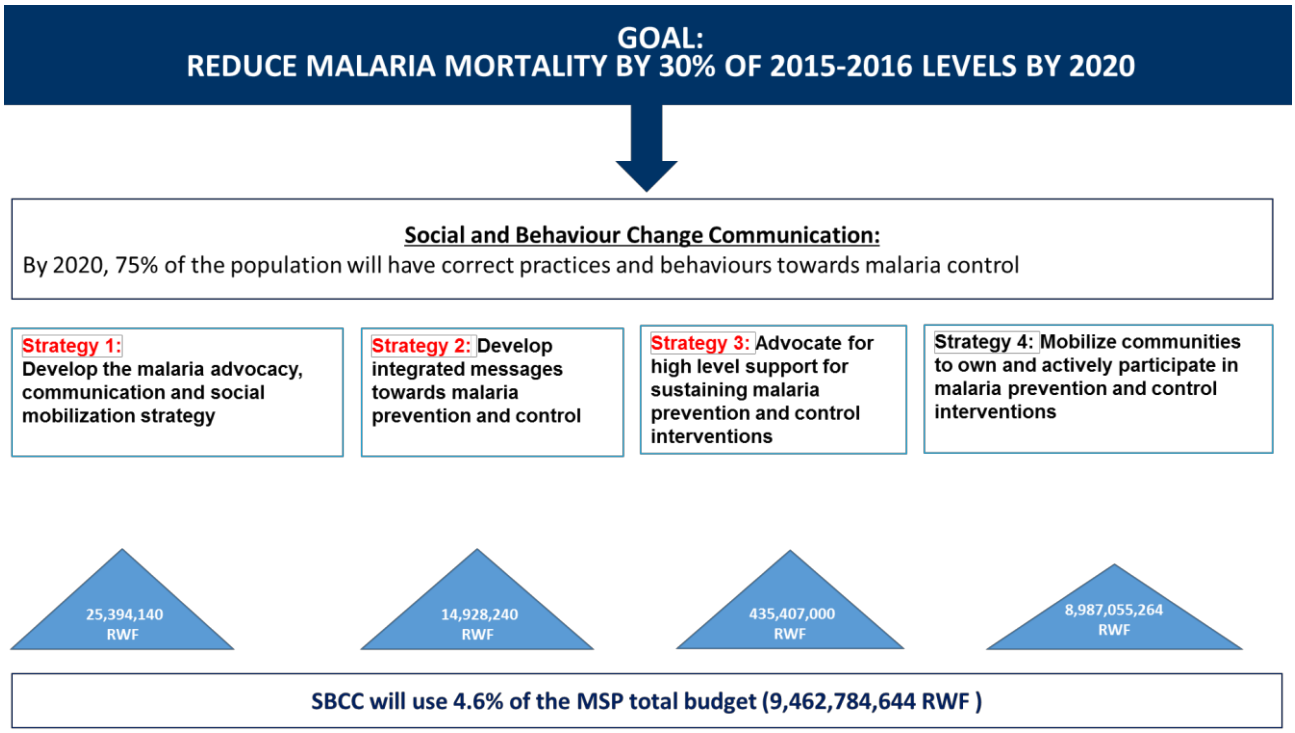
GOAL:
REDUCE MALARIA MORTALITY BY 30% OF 2015-2016 LEVELS BY 2020

Programme Management:

By 2020, strengthen coordination, collaboration and effective program management at all levels

Strategy 1:	Strategy 2:	Strategy 3:	Strategy 4:
Mobilize financial resources for malaria control	Conduct coordination and planning sessions for the NMP and key stakeholders	Strengthen human resources, equipment capacity of the programme	Advocate for concerted inter country efforts against malaria in the East Africa
49,069,600 RWF	49,069,600 RWF	1,733,775,072 RWF	64,083,140 RWF

Program management will use 25.3% of the MSP total budget (51,714,396,974 RWF)



5.5. Strategies and key activities

To achieve these objectives and based on the findings of the 2016 MTR recommendations, below are the strategies and interventions to be implemented. These will be further developed in the subsequent annual plans.

Objective 1: By 2020, 90% of the population at risk will be effectively protected with locally appropriate preventive and vector control interventions based on evidence

Vector control is an essential component of malaria control contributing to the prevention of malaria transmission and will therefore remain one of the priority intervention in Rwanda's Malaria &OPDD response to consolidate gains in malaria control and driving down transmission. A strong integrated vector management program combining evidence based vector control methods for selected areas will be implemented through this plan with the aim of maintaining the effectiveness of vector control despite the current threat of insecticide resistance in Rwanda.

Strategy 1: Maintain universal coverage with LLINs

During the period of this extended MSP, the Mal&OPDD will ensure that the LLINs universal coverage is maintained in all districts. To maintain the ownership already achieved in 2016-2017, this plan will procure and distribute LLINs through a mass campaign in all districts in 2019. Mass distribution campaigns will be undertaken in line with WHO guidance with a view to having 1 LLIN for every two

persons. Routine distribution of LLINs to primipara attending ANC and children coming for measles vaccination at routine EPI services will continue to be implemented.

Although net manufacturers recommend a 3–5 year longevity, a longitudinal net durability study in Rwanda showed that LLINs lose efficacy within 18-24 months mainly due to holes and insecticide decay[17] Rwanda will work with WHO and external stakeholders to ensure improved net quality monitoring and work with the population to encourage net care. In addition, the program will continue to undertake net durability monitoring.

Strategy 2: Conduct IRS and other vector control interventions in targeted districts

The WHO (2014) guidance recommends that in areas of high coverage with LLINs, IRS may be used as part of insecticide resistance management. Rwanda adopted the WHO's global plan for insecticide resistance management in malaria (GPIRM) in its 2013 Integrated resistance management (IRM) Plan. Rwanda is cognizant of the ongoing debate on the efficacy of IRS plus LLINs in reducing morbidity and mortality by combining LLINs and IRS. The Mal & OPDD aims to spray in targeted endemic districts in line with WHO guidelines as a way of insecticide resistance mitigation measure.

Working with partners, the program will ensure the procurement of required insecticides, related consumables and equipment for IRS and then conduct indoor residual spraying to reduce the burden of the disease and mitigate against insecticide resistance. Additional vector control measures such as larviciding where appropriate, will be implemented based on WHO guidelines and other international regulatory frameworks. The WHO recommends larviciding in areas where mosquito breeding sites are few, fixed and findable, and where the sites are easy to identify, map and treat. In addition, the Mal&OPDD will continue to advocate for implementation of environmental control measures through Umuganda.

Strategy 3: Build capacity for vector and entomological monitoring

To build capacity, malaria focal points at district level will be trained on vector control activities in line with the decentralization policy and integrated vector management (IVM) strategy through an integrated approach for reducing malaria. There is a need to integrate vector control within district development plans and development projects. In addition to training communities on vector control there is also a need to collaborate with University of Rwanda/College of Medicine and health sciences to introduce a program on medical entomology and involve other non-health sectors in vector control programs such Ministries in charge of Agriculture, environment, infrastructures and local government.

[17] Hakizimana E, et al. Monitoring long lasting insecticide net (LLIN) durability to validate net serviceable life assumptions in Rwanda. Malaria Journal 2014, 13:344

Strategy 4: Conduct insecticide resistance management for vector control

The programme will review the insecticide resistance management plan through which entomological surveys will be conducted. Entomology technicians will also be trained and entomology annual review and planning meetings will be conducted. Entomology equipment and supplies will be procured and the programme will also conduct supervision, monitoring and reporting of entomology activities.

Objective 2: By 2020, all malaria cases will be treated in accordance with the national treatment guidelines

Diagnosis and treatment is a primary component in malaria control. With regard to diagnosis and treatment the following strategies will be used to achieve the above objective.

Strategy 1: Provide malaria diagnosis to all suspected malaria cases at all levels

This plan proposes to ensure the universal coverage for diagnosis by continuing the provision of diagnostic testing to all suspected malaria cases presenting at health facilities and the community. Malaria diagnosis supporting materials will further be reviewed, produced, distributed to all levels of the system for use and improvement of service delivery especially in the preparation of good quality samples and testing results. The program will continue training laboratory technicians in blood smear testing (identification of species).

Strategy 2: Provide prompt and correct treatment to uncomplicated malaria cases at all levels

The fourth edition of the malaria treatment guidelines will be finalized and published for implementation taking into consideration WHO recommendations. Based on local settings some points will be considered and this will be approved by the malaria technical working group. Based on available funds, through mentorship approach at least two health workers will be regularly trained in malaria case management for the public sector, while the private sector were trained through CPD approach. The internal and external quality control will further be conducted every year to ensure that antimalarial drugs have active ingredients as required per WHO pharmacopoeia in collaboration with UR/Pharmacy, PMI/USAID and WHO. The management of malaria cases will be extended also to the private sector by training health providers and availing required commodities at affordable price for accessibility and equity. Furthermore, the program will work closely with MCCH Division and other departments to ensure that CHWs are facilitated and able to implement the i-CCM package effectively. This will require addressing CHWs motivation, retention and reducing turnover.

Strategy 3: Strengthen quality assurance and control of all malaria consumables and commodities

In collaboration with MPDD and the National Reference Laboratory (NRL), the malaria program has established the new approach Laboratory Malaria Diagnosis EQA program to ensure the quality of malaria diagnosis is available to the population. Besides the laboratory routine testing, it includes Slides Blind Retesting, Proficiency Testing Scheme and on site supervision. Quarterly evaluation of the quality of

thick and thin smear practices, Giemsa staining and microscopy results will be enforced in health facilities. The quality assurance will strengthen of the whole supply chain by availing clear products specifications.

In addition to this, in collaboration with WHO the program will ensure the country has qualified and accredited staff especially in laboratory skills to ensure quality assurance and control of diagnostic is well done for accurate service delivery.

Objective 3: By 2020, all health facilities will provide complete reporting so as to strengthen surveillance, monitoring and evaluation and operational research

Surveillance, Monitoring and Evaluation are critical component in malaria control. Recognizing that the quality of data is essential to guide the continuous design and delivery of appropriate interventions. Rwanda needs to sustain its robust malaria surveillance system with inclusion of private sector reporting for prompt actions and response.
Operational research is critical in adopting informed decisions in the control of malaria. The Mal&OPDD in collaboration with academic institutions and other partners will define a malaria operational research agenda, maintain collaboration with local and international research institutions and provide a forum for research results dissemination.

Strategy 1: Strengthen the HMIS and Systeme d'Information Sanitaire Communautaire (SISCom)[18]

There will be close follow up of staff in charge of reporting at health facility through telephone calls, targeted supervision for health facilities with difficulties of reporting to improve completeness and timeliness. Monthly report compilation at central level will continue with quarterly feedback at decentralized level. For capacity building, the Mal&OPDD will train health care providers and CHWs on tools of data collection, data analysis, reporting and data use. This strategy comprises the strengthening of the reporting system (HMIS, SIS-Com) into DHIS2, including reporting of cause of death using standardized medical certificate ICD 10 and notification of severe malaria cases and death through SMS reporting system for early notification. The program will continue to collect monthly reports on malaria indicators. It will also conduct malaria surveillance training in data analysis, reporting, and use for health workers.

Strategy 2: Strengthen reporting for severe malaria and malaria deaths from monthly to real time reporting

With regard to the severity of the disease, the program will implement the real-time notification of severe malaria cases at all level of care and also will implement the reporting of malaria death through the IDSR system. The timely reporting will allow a timely management of severe case at referral health facility level.

[18] Health Information System for the community level

Strategy 3: Improve reporting from the private health sector

To improve reporting, meetings with the private sector leadership (on data reporting) will be held. Advocacy will be strengthened in order to ensure that health facilities in the private sector report in the available platform. Key to this is the follow up that needs to be undertaken to ensure that private facilities are reporting on malaria indicators.

Strategy 4: Strengthen malaria surveillance, monitoring and evaluation

The program will strengthen supervision of malaria activities implementation at decentralized level. More focus will be put on severe malaria cases and death audits. There will be regular meeting within SMEOR TWG to develop a grid of core indicators for regular monitoring of malaria status across the country. Several malaria surveys will be conducted including community coverage surveys such as DHS and malaria indicator surveys, health facility surveys/assessments. Drug efficacy study will be conducted in sentinel sites.

Strategy 5: Strengthen capacity building in data analysis and use at all levels

The program will hold quarterly meeting to discuss data quality and use with health facilities at decentralized level. On-site trainings and refresher trainings on data management, survey methodology and M&E will be conducted for the central level. Training for data managers and M&E staff on record keeping, data analysis and reporting at decentralized will be conducted.

Strategy 6: Develop and implement an operational research agenda for malaria

The programme will annually develop an operational research agenda for malaria which will be implemented in collaboration with research institutions and partners. The programme will also provide a forum for research results dissemination/sharing. Some of the issues that need research include: establishing the effectiveness of main existing vector control interventions, research on new vector control tools as well as research on human perceptions and acceptability of vector control interventions. In addition, to the Mal&OPDD will evaluate the efficacy of diagnosis and treatment of malaria among pregnant women as IPT-p is not implemented in Rwanda since 2008.

Objective 4: By 2020, strengthen coordination, collaboration and effective program management at all levels

The focus of the program in this plan is to maintain the achievements so far and move forward to further reduce the burden of malaria. The program will focus to develop and strengthen collaborative and partnership initiatives to accelerate malaria prevention and control in Rwanda and the region. The following are the strategies to achieve the above objective.

Strategy 1: Mobilize financial resources for malaria control

The focus of this strategy will be to produce a costed investment case for maintaining government resources into malaria as well as producing a private public partnership concept for supporting the investment case for malaria in Rwanda. Finally, funding proposals to international funding mechanisms/agencies will be prepared.

Strategy 2: Conduct coordination and planning sessions for all key stakeholders

The program will organize regular planning meetings, review meetings as well as the development of work plans according to the Ministry of Health requirements. The program will establish a multi-sectoral platform, will conduct regular planning and review meetings with Ministries and institutions which play a role in fight against malaria such as MINAGRI, MINALOC, MIGEPROF, MINIRENA, PSF, RDB, etc.

Strategy 3: Strengthen human and material capacity of the malaria program

This strategy is considered as key to maintaining success and effective program management. The Malaria program will ensure the availability of sufficient staff and strengthen their capacity to better manage malaria activities. The program will avail equipment for routine activities and effective running of the program. The program will ensure that staff participate in key international meetings and conferences to learn and share best practices.

Strategy 4: Advocate for concerted inter country efforts against malaria in the East Africa

The Mal&OPDD in collaboration with the EARN will prepare a concept note for sustaining and enhancing regional malaria control under the Eastern African Community umbrella by advocating for it to become a routine agenda item at all EAC/ALMA head of states and related meetings. The Mal &OPDD will be involved in the development and implementation of various regional malaria control programs in the East Africa for harmonization of malaria control interventions. Further Rwanda will also set up a cross border initiative with one country to serve as a demonstration of what can be possible. As a follow up the program will conduct cross border initiative meetings including target district leaders and encourage conducting joint malaria interventions across the borders.

Objective 5: By 2020, 75% of the population will have correct practices and behaviours towards malaria control.

There is evidence to show that social behavior change communication (SBCC) can lead to appropriate preventive and treatment behaviours thereby reducing the burden of malaria[19].The Rwanda MIS 2013

[19] Koenker,H, Keating J. et al. Strategic roles for behavior change communication in a changing malaria landscape, Malaria Journal 2014, 13:1

showed that over 80% of women had correct knowledge on malaria. The focus in this strategic plan will be strengthening social behavior communication and mobilization in the prevention of malaria.

Strategy 1: Develop the malaria advocacy, communication and social mobilization strategy

To strengthen the communication and behavior change, the Mal & OPDD will develop a comprehensive advocacy, communication and social mobilization strategy. Furthermore, the SBCC strategy will be disseminated and will guide the implementation of SBCC activities.

Strategy 2: Develop integrated messages towards malaria prevention and control

To ensure behavior change, integrated and tailored messages on malaria will be developed targeting the different audiences and using different communication channels with high impact. The messages will be developed and coordinated with the Rwanda Center for Health Communication within the MOH. The messages will target the key interventions. For example, for LLINs, messaging will focus on hanging LLINs correctly and the importance of using them consistently. This will be undertaken through antenatal clinic, provision of information through community meetings, CHWs and mass media as appropriate.

In terms of diagnosis and treatment messages will be delivered through health facilities and CHWs in an integrated manner. The emphasis will be on knowledge of signs and symptoms of malaria and the high risk that malaria poses for all community members. Messages will also emphasize the need to seek diagnosis and treatment for children within 24 hours of onset of fever. Malaria messages will also be disseminated using communication channels and communication approaches with high impact such as radio and TV magazine, radio talk shows, radio spots, Urunana Radio Drama, educative video series, stage live community theatre performances using experienced actors and actresses specialized in delivering SBCC messages. Other possible channels such as mobile phones using short service message (SMS) will be explored with the various mobile companies. The SBCC messages will seek to reinforce and where necessary create awareness on malaria prevention, need for seeking care promptly especially with the scale up of HBMA and behaviour change with the planned large scale introduction of rectangular LLINs.

Strategy 3: Advocate for high level support for sustaining malaria prevention and control

The Mal &OPDD will organize high level meetings with policymakers, donors, civil society and private sector representatives for advocacy to enhance ownership and seek continued support for malaria prevention and control interventions. This is in a bid to mobilize stakeholders involved in health care in Rwanda to integrate malaria prevention and control messaging in their health communication interventions. There will be advocacy for development partners to increase the funding levels for malaria behavior change interventions, for private sector to increase investment in malaria interventions such as the media to use their existing forum for more awareness creation and civil society organizations for community mobilization towards malaria prevention and control.

Strategy 4: Mobilize communities to own and actively participate in malaria prevention and control

This will include sensitization meetings in communities for enhanced involvement. The mobilization will seek to inform communities of their roles and responsibilities in malaria prevention and control. Institutionalized forums that bring together large number of community members such as monthly community work (Umuganda), National services (Urugerero), Parents Forum (Umugoroba w'ababyeyi), general meetings for community members (inteko z'abaturage), churches and mosques will be used to actively create awareness and knowledge on malaria and mobilize communities to take action against malaria.

This will be realized through identifying necessary communication gaps in attitudes and practices that community members have that needs to be addressed. Correct messages that raise the awareness for acceptance and engagement to appeal to social and behavior change in individuals and communities will be developed and disseminated.

Chapter Six: Implementation Framework

6.1. MSP Work Plan

The complete work plan of the plan appears in Annex 1.

6.2. Implementation Arrangements

6.2.1. Planning and implementation mechanisms

The MOH through the Mal & OPDD is responsible for planning and implementation of the malaria activities and will be the primary coordinator of the Malaria Strategic Plan. Specific responsibilities will include building capacities of those involved in the implementation to ensure the quality of services provided both for prevention and treatment of malaria. The Mal & OPDD will ensure a regular review of the program activities to ensure realization of the malaria goal.

6.2.2. Partnership and Coordination

The Mal & OPDD will ensure that all stakeholders are on board and complement each other with their respective comparative advantages according to the Rwanda MSP and priorities. Partners will include departments in relevant ministries such as MINALOC, MINAGRI, MIGEPROF, MININFRA, development partners, research institutions, community-based organizations and NGOs as well as Army and Police forces. Links will be further strengthened to ensure joint implementation, monitoring and evaluation of malaria interventions.

6.2.3. Procurement and supply management system

The national procurement system is supervised by Rwanda Public Procurement Authority (RPPA) which is an agency affiliated to the Ministry of Economy and Finances (MINECOFIN). It oversees the implementation of the existing public procurement laws and public procurement policies issued by the Cabinet. The different procuring entities (ministries, public institutions and decentralized administrative entities) submit their annual procurement plan and monthly procurement reports to RPPA, which provides them with supervision and technical assistance for capacity building and conducts audits regularly.

6.2.4. Financial resource management

The national financial management is under the authority of MINECOFIN supervising and providing technical assistance to the budget entities. Each entity submits its annual budget to MINECOFIN on the basis of its negotiation with donors. The Office of the Auditor General (OAG) reports to the Parliament and conducts audits of all budget agencies and government projects. It verifies if the Government of Rwanda accounting and financial data are accurate and if the government collects or spends the authorized amounts, and for purposes envisaged by the Parliament and donors. It also verifies if budget entities have internal control system to safeguard the reception, custody and adequate use of public goods and finally

if programs were implemented with economy and efficiency. Its functions are guided by laws and cabinet decisions establishing the regulations of public financial management.

Other important assurance frameworks are also in place such as the Office of the Ombudsman to ensure transparency and deal with corruption and fraud, the Office of the General Prosecutor to monitor implementation of audit findings (OAG report to the Parliament) and follow up of mismanagement reported and the Parliamentary Public Fund Committee to oversee the implementation of audit recommendations on reported mismanagement. The MoH and the public institutions under its authority (including RBC) follow the general financial management mechanisms described above.

6.3. Risk management and mitigation

During the implementation of this strategic plan there may be unexpected factors beyond the control of the program that may affect its successful implementation of the MSP. Some of these risks and mitigation measures are discussed below:

a) Rwanda has in the past made dramatic achievements in terms of reduction of morbidity and mortality. However, the financial allocation of the Government and partners to malaria remains low and may jeopardize the scale up and sustainability of anticipated achievements. The impact of the envisioned interventions will be monitored including funding from all partners and the percentage of malaria expenditure provided annually by the Rwanda government;
b) History shows that malaria achievements made so far are fragile Rwanda. As a landlocked country with neighboring countries with high malaria burden it difficult to maintain border controls and any possible transmission of malaria. As a result, the programme will monitor any possible cross border transmission which might be contributing to the increase of malaria;
c) In recent times the global economy has experienced shocks unseen for decades. Because the economy of Rwanda is based on agriculture and minerals this is a major issue and may jeopardize the capacity of the government to finance social services in Rwanda. The gross domestic product growth will be used to monitor the capacity of government to finance social services from internal resources;
d) There is currently resistance to vector control insecticides used in malaria control. This remains a key risk and the programme will monitor this by conducting insecticide resistance monitoring on a regular basis. More importantly, the programme will regularly update its insecticide mitigation plan;
e) CHWs are the foundation of the community home based management of malaria in both children under five and adults. However, attrition remains a major cause for concern. The program will work closely with MCCH Division and other departments to ensure that CHWs are facilitated and able to implement the i-CCM package effectively. This will require addressing CHWs retention and reducing turnover;
f) Increasing resistance of ACTs in the Mekong region is a potential threat. Thus, the Mal&OPDD will work with WHO and other partners to ensure efficacy of antimalarial medicines is maintained. The

Mal&OPDD will undertake the therapeutic efficacy studies every two years and the QA/QC will be undertaken for ACTs.

These risks will be part of the implementation process and will be monitored and evaluated to understand the rate of progress towards achieving the targets set in the Rwanda Malaria Strategic Plan 2013-2020.

6.4. Budget of the MSP

6.4.1. Budget Summary

The Rwanda National Malaria Strategy 2013 to 2020 was costed with the conventional excel costing model. Within overall policy guidance of the RBC and technical support provided by WHO/Roll Back Malaria, the methodology adopted to articulate the cost of the Malaria Strategy involved the consultation with key stakeholders on key priorities for the MSP, review/ validation of programme gaps analysis and targets for the proposed intervention, development of the excel costing model.

Outputs generated by the model illustrated the total cost of the entire MSP, the unit cost of each intervention, the cost across the objective and strategies of the plan, the Global Fund and the GoR budget categories. Other direct cost aggregated by the model include total cost for commodities and supplies, programme specific human resource, programme supervision, monitoring and evaluation, SBCC activities and general programme management.

6.4.2. Assumption of the key costing drivers

The following assumptions were made when costing this malaria strategic plan.

6.4.2.1. Vector control

A. LLINs- Mass campaign

- Mass distribution: 1 net for 2 persons in endemic areas (A)/1.8 - using WHO recommended calculation;
- Routine nets -number of nets needed to be distributed to primipara pregnant women through ANC in all malarious areas as well as to all children under 1 [3.8% of the population in Rwanda] in all malarious areas through EPI clinics

B. Indoor Residual Spraying

- The IRS is planned for 8 districts with high malaria incidence in 2018 and funding being available this will be maintained through the extended MSP.
- Rwanda has been using Pirimiphos - methyl 300CS “Actellic” since September 2016 (a long lasting organophosphate), thus only one round of IRS per year will be conducted in the targeted districts.

6.4.2.2. Malaria case management

- The basis of calculation of RDT needed is all suspected malaria fever tested at HF and community levels;
- The Quantification and procurement of ACT needed for treatment at HF and community levels;
- The procurement of quinine and artesunate for the treatment of severe malaria cases;
- The program will introduce also the artesunate suppositories use at the community level.

6.5. Costing results

As mentioned above the programmatic teams defined the key strategic interventions based on estimates of the epidemiological impact. The impact computations have been developed using both the epidemiological statistical data collected from the HMIS. After this exercise the costing for the entire planning timeframe of the activities reported in the MSP is estimated at **$ 230,411,850** or **RFW 204,006,652,182.**

Table 4: MSP budget by objectives

Objectives/Strategies	2017-2018	2018-2019	2019-2020	2020-2021	2017-2021 Total Cost	% of Cost per Obj & MSP Total cost
Objective 1: By 2018, at least 90 % of population at risk will be effectively protected with locally appropriate vector control interventions	15,343,312,632	35,329,659,468	17,005,530,041	16,814,594,084	84,493,096,224	41.4%
Objective 2: By 2020, all malaria cases will be treated in line with the national guidelines	14,021,053,578	14,646,580,416	11,928,633,306	9,921,686,170	50,517,953,469	24.8%
Objective 3: By 2020, strengthen surveillance, monitoring and evaluation and operational research	2,721,225,668	1,708,881,901	1,531,961,701	1,856,351,601	7,818,420,871	3.8%
Objective 4: By 2020, effective program management and coordination will be expanded to all levels including multi-sectorial and regional partnerships	13,159,424,675	12,512,743,277	13,054,781,476	12,987,447,546	51,714,396,974	25.3%
Objective 5:By 2020, 90% of the population will have correct knowledge, behaviors and practices towards malaria prevention and control	2,377,241,766	2,356,847,626	2,361,847,626	2,366,847,626	9,462,784,644	4.6%
Grand Total in Local Currency	**47,622,258,319**	**66,554,712,687**	**45,882,754,150**	**43,946,927,026**	**204,006,652,182**	**MSP mean Cost: 40,801,330,436**
Grand Total in $US	**53,786,151**	**75,169,090**	**51,821,498**	**49,635,111**	**230,411,850**	**MSP mean Cost: 46,082,370**
Cost per CAPITA in Local Currency	**3,916**	**5,472**	**3,773**	**3,613**	**16,774**	**MSP mean Cost per Capita: 4,194**
Cost per CAPITA in $US	**4.42**	**6.32**	**4.46**	**4.37**	**19.57**	**MSP mean Cost per Capita: 4.9**

Table 5: MSP by budget categories

Budget by Cost Category	2017-2018	2018-2019	2019-2020	2020-2021	2017-2021 Total Cost	% of MSP Cost
1 Human Resource	309,612,540	323,116,044	323,116,044	323,116,044	1,278,960,672	1%
2 Technical Assistance	4,030,000	4,030,000	4,030,000	4,030,000	16,120,000	0%
3 Training Costs	2,355,723,768	182,572,140	165,419,140	174,572,140	2,878,287,188	1%
4 Medicines and Pharmaceutical products	6,127,511,401	6,123,545,111	5,944,691,034	5,891,819,247	24,087,566,793	12%
5 Health Products and Health Equipment	8,902,658,031	27,861,056,126	9,328,902,213	9,548,068,392	55,640,684,762	27%
6 Procurement and Supply Management (PSM)	3,981,310,403	7,241,660,167	3,946,180,867	3,973,864,197	19,143,015,635	9%
7 Infrastructure and Other Equipment	12,639,649,000	11,917,677,903	12,481,366,927	12,481,366,927	49,520,060,757	24%
8 Communications Materials	2,358,892,471	2,340,675,366	2,345,675,366	2,350,675,366	9,395,918,569	5%
9 Monitoring and Evaluation	5,681,298,472	5,874,677,092	5,491,036,055	5,949,913,992	22,996,925,611	11%
10 Living Support Costs	4,315,906,026	6,415,674,181	4,218,753,162	2,137,943,506	17,088,276,875	8%
11 Planning and Administration	221,179,405	302,367,135	847,777,510	168,478,470	1,539,802,520	1%
12 Overhead Costs	121,683,200	101,483,200	76,183,200	121,683,200	421,032,800	0%
Grand Total in Local Currency	**47,019,454,717**	**68,688,534,465**	**45,173,131,518**	**43,125,531,481**	**204,006,652,181**	**100%**
Grand Total in $US	**53,105,325**	**77,579,099**	**51,020,027**	**48,707,399**	**230,411,850**	

Chapter 7: Monitoring and Evaluation

7.1. Performance framework

The monitoring, evaluation and performance assessment framework to be used in measuring progress in the implementation of the extended MSP and is described in the performance framework and will be further detailed in the revised malaria monitoring and evaluation plan 2018-2020. This will include: tracking progress for the program implementation of the planned interventions and tracking progress in meeting milestones and targets.

The methods for tracking of progress for program actions will be fully detailed for process, input, outcome and impact indicators in the revised M&E Plan. Various sources of information will be used to track progress and achievements. These will include: routine HMIS (morbidity and mortality), the weekly IDSR system (severe malaria), population-based household surveys (DHS and MIS) and other surveys such as health facility surveys on therapeutic efficacy and insecticide resistance and entomological monitoring. Operational research studies will also be undertaken to inform specific technical and intervention areas such as changing vector behaviours implications on malaria control interventions.

In line with the objectives set above the following performance framework has been formulated. In addition, a matrix containing all the indicators and their details has been included in Annex 3.

Table 6: Performance Framework

ITEMS	INDICATORS	BASELINE			ANNUAL TARGETS						
		Value	Year	Source	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Goal	**Impact indicators**										
To reduce malaria incidence from 308/1,000 in 2016 to 198/1,000 by 2020; to reduce malaria deaths by at least 30% of 2016 levels by 2020 and to reduce malaria prevalence by 2020	Annual Parasite Incidence per 1,000 persons	93	2013	HMIS data	93	92	308	281	258.9	217	198
	Inpatient malaria deaths per 1,000 persons per year	3.8	2013	HMIS	3.8	3.3	6.2	5.6	5.1	4.5	4
	Number of confirmed malaria deaths	409	2013	HMIS	434	382	698	646	594	542	490
	Malaria prevalence in U5	1.4	2010	DHS			2				1.5
	Malaria prevalence in PW	0.7	2010	DHS			0.6				0.6
Objective 1:	**Outcome indicators**										
By 2020, 90 % of population at risk will be effectively protected with locally appropriate preventive and vector control interventions based on evidence	Proportion of households with at least one LLIN for 2 people	42.7	2013	DHS/MIS			43		70		80
	Proportion of HH with at least one LLIN	84	2013	DHS/MIS			81		83		84
	Proportion of children under five years old who slept under a LLIN the previous night	74	2013	DHS/MIS			68		70		72
	Proportion of pregnant women, who slept under a LLIN the previous night	74	2013	DHS/MIS			73		74		75
	Proportion of population who slept under a LLIN the previous night	58	2013	DHS/MIS			61		62		64
	Proportion of children under five years old who slept under a LLIN the previous night in household with at least one ITN	80	2013	DHS/MIS			80		81		81
	Proportion of pregnant women, who slept under a LLIN the previous night in household with at least one ITN	86	2013	DHS/MIS			88		88		88
	Proportion of population, who slept under a LLIN the previous night in household with at least one ITN	58	2013	DHS/MIS			74		75		75
	Proportion of structures in targeted areas that received indoor residual spraying (IRS) during the reporting period	98.2	2013	MOPDD report	98	98	98	98	98	98	98
	Proportion of population protected by indoor residual spraying within the last 12 months in targeted districts										

ITEMS	INDICATORS	BASELINE			ANNUAL TARGETS						
		Value	Year	Source	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Objective 2:	**Outcome indicators**										
By 2020, all malaria cases will be tested with a quality assured diagnostic method and promptly treated in line with the national guidelines	Proportion of suspected malaria cases that receive a parasitological test at public sector health facilities	99	2013	MOPDD report	99	99	99	99	99	99	99
	Proportion of suspected malaria cases that receive a parasitological test at the community level	99	2013	MOPDD report	99	99	99	99	99	99	99
	Proportion of confirmed malaria cases that received first-line antimalarial treatment according to national guidelines at public sector health facilities	96	2010	MHFS		96	98.4		98.5		98.5
	Proportion of confirmed malaria cases that received first-line antimalarial treatment according to national guidelines at the community	90	2013	ICCM EVAL		90	79		82		85
	Percentage of HC that reported no stock out of ACT lasting more than 7 days in the previous month	92	2013	HMIS	93	94	96	98	98	98	98
Objective 3:	**Outcome indicators**										
By 2020, strengthen surveillance, monitoring and evaluation and operational research	Proportion of public health facilities submitting malaria indicators timely	80	2013	DHIS-II			94	94	94	95	95
	Proportion of public health facilities submitting complete report on malaria indicators	90	2013	DHIS-II			98	97	97	98	98
	Proportion of private health facilities submitting complete report on malaria indicators	22	2013	DHIS-II			45	46	47	49	50
Objective 4:	**Outcome indicators**										
By 2020, effective program management and coordination will be expanded to all levels including multi-sectorial and regional partnerships	Number of cross border initiatives set up	NA					0	0	1	1	1
Objective 5:	**Outcome indicators**										
By 2020, 90% of the population will have correct knowledge, behaviours and practices towards malaria prevention and control	Proportion of women who recognize fever as a symptom of malaria	88	2013	MIS			88		90		
	Proportion of women who reported mosquito bites as a cause of malaria	95	2013	MIS			95		95		
	Proportion of the population who recognize signs of malaria	0		KAP/MIS			0		75		
	Proportion of the population who knows the mode of transmission of malaria	0		KAP/MIS			0		75		

7.2. Data management system

Rwanda has made great progress in harmonizing data management across health programs and geographic areas. In addition, it has benefited from investments in information and communications technology (ICT) including the: national data center, the nearly full national coverage of cell phone and internet, as well as the establishment of specific data management and M&E positions at central and peripheral levels (health facilities and community). Most of the Health Sector's routine data collection is currently done via the web-based Rwanda Health Management Information System (R-HMIS) software that is set up in servers hosted at Rwanda's National Data Center. This state-of-the-art facility provides excellent environmental and data security conditions for continuous data entry and use. The DHIS-2 software also ensures secure access to data based on role-based user profiles and secure individual passwords.

From 2008 onwards, Rwanda and its development partners agreed that data collection and reporting activities were becoming a burden on health workers – especially at the service delivery point – and were requiring increasingly specialized skills. As a result, data managers were recruited and trained at each health center and district hospital. This was a strategic decision that helped to improve data quality and is increasing the use of data at the peripheral level. The MOH is now beginning to shift data management tasks back to clinicians – especially for electronic medical records. Ninety-six percent (96%) of all public and faith-based organizations health facilities have at least 3 functional computers. All district hospitals have access to the internet, and among Health centers ninety-three percent (93%) have access to the internet. This has enabled data entry to be fully decentralized to service delivery point. (Source: ICT survey 2014[20]).

7.2.1. Data collection methods and tools

RHMIS currently has reporting module that covers: Health Facility and Community Health Worker Information System (SIScom) to help ensure that data are available at any level of the health system without delays. Malaria data elements are reported by health facilities on monthly basis for monthly analysis at central level.

Most routine data will be collected monthly or quarterly. Surveys such as the Malaria Indicator Survey (MIS) and the Demographic and Health Survey (DHS) and any survey-based indicators will be collected as planned. Standardized checklist will be used to collect data during ongoing monitoring field visits. Geographical Information System (GIS) tools are built into the RHMIS and shall be used to enhance documentation and accountability where applicable. Most of data collection tools and methods have been described above.

[20] Ministry of Health, ICT survey, 2014

7.2.2. Other tools

Survey questionnaires designed and employed from time to time to collect data from beneficiaries/stakeholders are in a structured manner which will be used for Health Facility Surveys, i-CCM survey, KAP survey and Household Surveys.

7.2.3. Routine reporting formats

Routine reporting of data will utilize various formats and will be made as need. This will include:

- Periodic presentations at the ministry of health and other relevant GOR institutions will be undertaken. This will include: sector performance reviews, performance reports, monitoring, supervision, research and evaluations reports. These will also be shared and discussed with the different stakeholders;
- Data from on-going studies will be reviewed and analyzed on once available and published promptly and also shared with partners to inform programing and continued program implementation;
- HMIS data will be reviewed quarterly and where appropriate have meetings with districts and other stakeholders to discuss and if need be, inform interventions at decentralized levels;
- Field visits using checklists will be used from time to time to obtain information that may be required to improve performance or even for obtaining insights and more in-depth investigations.

Data collection and processing is carried out at all levels for different purposes however the following activities are common to all: a. performance data collection (i.e. data on inputs-activities-outputs). b. Processing (aggregation and analysis) of the performance data from various service delivery points c. Ensuring quality of reports. Report writing and dissemination.

7.3. Data flow system

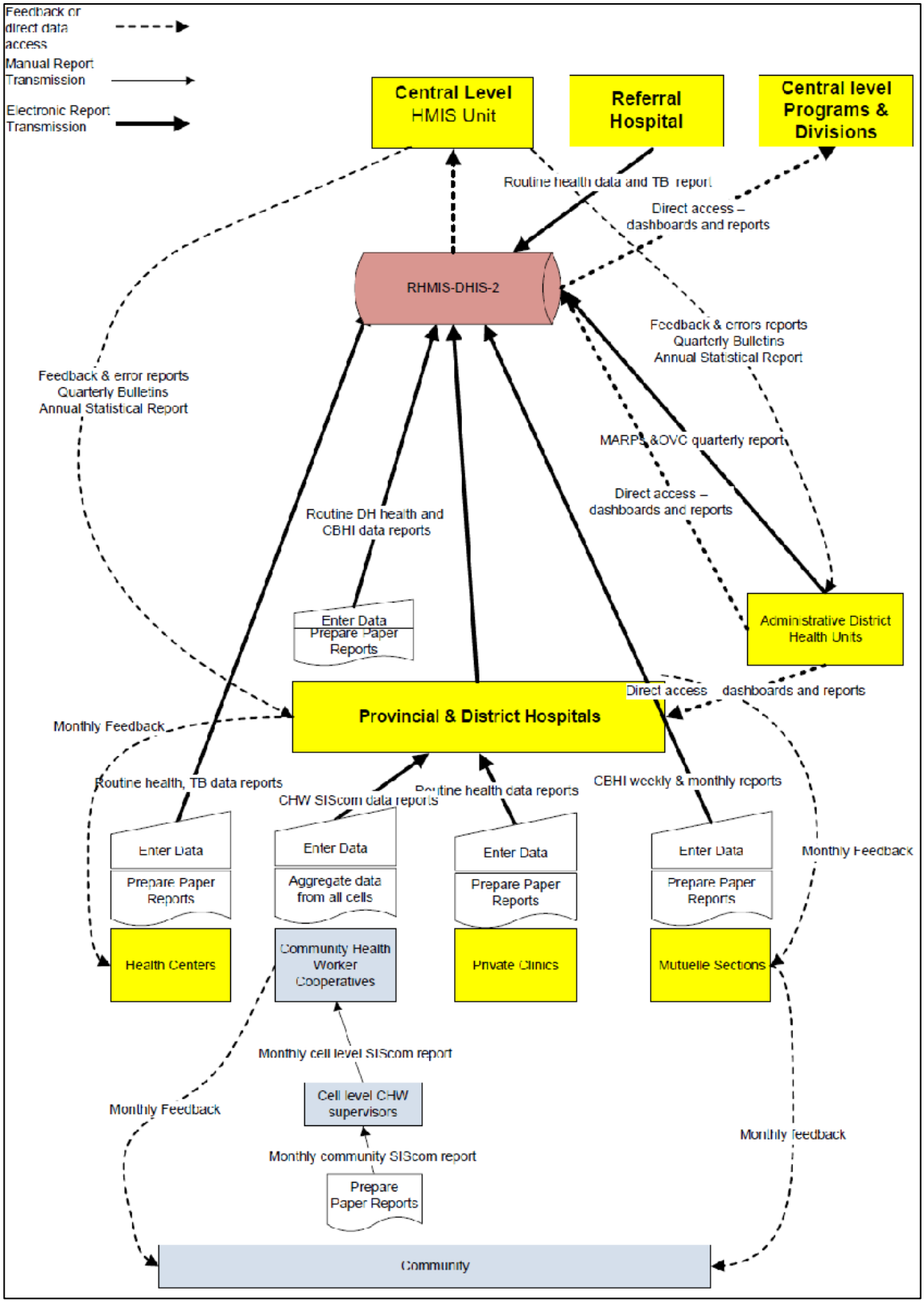
Several levels of data are collected: household, community, health facility, and special studies. At Community level, routine data are collected by Community Health Workers and they report to Health Centers. Data collected from Health posts are currently forwarded to Health Centers, however, as the number of health posts increase they will be reporting directly into the RHMIS. Data collected from Health centers by Data Managers are entered directly into the relevant information systems. Data Managers of District Hospitals and Administrative districts monitor data quality and provide feedback and supervision to Health centers and health posts. Administrative districts report to central level in the Ministry of Health via the Ministry of Local Governance.

Over the past 3 years the Ministry of Health has made significant efforts to encourage the private sector to report in the different routine health information systems. This is an important initiative as the private sector is becoming a much bigger provider of health services to the population. The reporting rate has increased from 30% to nearly 60% in the past year (source: HMIS). HMIS team at MoH coordinates all information systems, helps design feedback reports to lower levels, and provides information access to stakeholders. The team organizes the data quality audit (timeliness, completeness and accuracy) to ensure the reliability of data. RBC and health program staffs are increasingly responsible for checking data

completeness and analyzing data for their programs with technical support from the HMIS team. After analysis, reports are shared by the Ministry of Health and published in the different websites. Data from non-routine surveys are also analyzed and the findings are integrated in the different reports. Most data from population based surveys are collected and reports are made by the National Institute of Statistics Rwanda (NISR) Data collected through health facility surveillance, including the HMIS, are reported quarterly and compiled annually for production of an annual statistical yearbook. Integrated Disease Surveillance and Response data are reported weekly, compiled quarterly and an annual report is produced and those reports are sent to WHO and disseminated.

Key Health indicators are usually published on the MoH website, as well as the annual statistical yearbook. The HMIS unit has begun producing quarterly RHMIS bulletins, and a National Health Data Portal is currently under development that will be used to share sector performance data with stakeholders. Figure 7 shows the data flow process for routine data.

Figure 7: Description of the flow and circuit of Health Information coordination mechanism



7.4. Monitoring and Evaluation

Sound monitoring and evaluation system is coordinated at international level by Roll Back Malaria (RBM)/WHO in order to demonstrate progress in achieving outcomes and impact in malaria control efforts. At national level this is done by the MOH and its implementing agency (RBC). RBC coordinate M&E for health facility and community based interventions including public and private sectors. RBC also coordinates the M&E at central level: research, studies, annual report, etc. RBC is also responsible for providing guidance and capacity level to the lower level. RBC work in close collaboration with government and non-government partners to coordinate and implement M&E activities.

A common, comprehensive and coherent M&E system contributes to more efficient use of data and resources by ensuring that indicators and sampling methodologies are comparable over time and by reducing duplication of efforts. Data generated by a comprehensive M&E system ought to serve the needs of many constituents, including program or project managers, researchers and donors, eliminating the need for each to repeat similar measurements when they might easily use existing data.
M&E plan will also include the disease integration effort being promoted by the MOH.

7.5. Tracking Progress

In order to measure and analyze the success of the MSP interventions in reaching outcomes and targets, a set of annual and periodic indicators have been developed through consultations with all stakeholders. The indicators are important for measuring malaria progress in the health sector's performance and have been informed by the country's long term vision and strategic direction (Vision 2020, SDGs and EDPRS). Malaria Performance Reviews will be undertaken annually as part of the Health Sector Review. Malaria Programme and Mid Term Reviews will be done as part of the WHO recommendations. The annual and periodic performance indicators as well as process indicators will be the basis for assessment. Impact indicators will be measured on annual basis through the HMIS and national surveys carried out every 3-5 years. Outcomes indicators will be measured on annual basis through different source of data such as HMIS, annual surveys and etc.

Every year a malaria action plan will be developed in collaboration with partners and an annual malaria report will be disseminated. Malaria quarterly review meetings will be conducted with partners to evaluate malaria implementation according to the malaria action plan and key performance indicators to be assessed on quarterly basis will be developed every year.

Chapter 8: Annexes

Annex 1: The MSP Work Plan

Goal: To reduce malaria deaths by at least 30 % of 2015-2016 level by 2020						
Strategies	**Key Activities**		**Timeline**			
			'17 FY	**'18 FY**	**'19 FY**	**'20 FY**
Objective 1: By 2018, at least 90 % of population at risk will be effectively protected with locally appropriate vector control interventions						
Strategy 1.1: Maintain LLINs universal coverage	1.1.1	Procure LLINs	√	√	√	√
	1.1.2	Data collection of LLINs need at community level by CHWs		√		
	1.1.3	Conduct joint CHWs meetings at decentralized level on the LLINs need assessment tool		√		
	1.1.4	Conduct feedback meetings at District level		√		
	1.1.5	Conduct joint planning meetings with district authorities and local leaders		√		
	1.1.6	Distribute LLINs from the central level to the health center level			√	
	1.1.7	Distribute LLINs from the health center level to the beneficiaries			√	
	1.1.8	Supervision of the LLINs mass campaign distribution			√	
	1.1.9	Evaluation of the LLINs mass distribution campaign			√	
	1.1.10	Develop, multiply and distribute LLINs need assessment tools for Households			√	
	1.1.11	Production of LLINs M&E tools for EPI and ANC routine distribution for PW and NB	√	√	√	√
	1.1.12	Advocate the establishment of a local LLINs factory	√			
	1.1.13	Develop a public-private LLINs procurement and distribution plan	√			
	1.1.14	Monitoring of LLINs availability in the private sector	√			
	1.1.15	Strengthen LLINs QA/QC mechanisms in the public and private sectors	√	√	√	√

Strategy 1.2: Conduct IRS and other innovative interventions in targeted areas	1.2.1	Conduct blanket IRS in targeted high endemic districts in 8 high endemic malaria Districts	√	√	√	√
	1.2.2	Conduct targeted IRS in moderate endemic districts	√	√	√	√
	1.2.3	Evaluate quality and residual efficacy (bioassays, entomological monitoring) in selected districts targeted for IRS	√	√	√	√
	1.2.4	Conduct pilot larviciding interventions in selected areas (urban or localized rural area)	√	√	√	√
	1.2.5	Evaluate larviciding interventions through entomology surveys	√	√	√	√
	1.2.6	Develop the IRS strategic plan	√			
Strategy 1.3: Build sustainable capacity for vector control and entomological surveillance	1.3.1	Organize short term trainings in-out country for MOPDD vector control technical Staff	√	√	√	√
	1.3.2	Support Long term trainings Msc/PhD for vector control or district staffs of RBC/ VC	√	√	√	√
	1.3.3	Organize sensitization for local leaders and health providers on basic entomology/IVM	√	√	√	√
	1.3.4	Organize an annual planning and evaluation meetings of vector control and entomology activities	√	√	√	√
	1.3.5	Organize every year a training for malaria focal points at district level on vector control and entomology techniques	√	√	√	√
	1.3.6	Collaborate with University of Rwanda/College of Medicine and health sciences to introduce medical entomology and vector control in education curricula	√			
	1.3.7	Collaborate with international educational and research institutions on vector control	√	√	√	√
	1.3.8	Support the participation RBC Malaria in International Conferences on Vector Control and Entomology	√	√	√	√
Strategy 1.4: Conduct insecticide resistance management plan	1.4.1	Conduct the review of Insecticide Resistance Management plan	√			
	1.4.2	Conduct annually field surveys of insecticide resistance monitoring	√	√	√	√
	1.4.3	Continue bi-annual surveys for LLINs durability/bioefficacy	√	√	√	√

	1.4.4	Conduct stakeholders meeting to disseminate results from resistance monitoring	√	√	√	√
	1.4.5	Revise and implement the IVM strategy	√			
	1.4.6	Support the national inter-sectorial steering committee ($NISC) and facilitate its meetings	√	√	√	√
	1.4.7	Advocate the integration of vector control within district development plans	√	√	√	√
	1.4.8	Organize routine supervision of sentinel site works for entomology surveillance	√	√	√	√
Objective 2: By 2020, all malaria cases will be treated in line with the national guidelines						
Strategy 2.1: Provide malaria diagnosis to all suspected malaria cases at all levels	2.1.1	Conduct annual quantification meeting of lab commodities and medicines	√	√	√	√
	2.1.2	Procure tests and microscopy commodities at HFs : slides, safety boxes, microscopes, RDTs, giemsa, immersion oil	√	√	√	√
	2.1.3	Procure tests and microscopy commodities at community: slides, safety boxes, RDTs, thermometers	√	√	√	√
	2.1.4	Conduct quarterly monitoring the distribution of commodities at all levels by DP and central level	√	√	√	√
	2.1.5	Conduct test at Community, HF, and Districts and referral Hospitals	√	√	√	√
	2.1.6	Procure reporting tools (registers) and ordinograms	√	√	√	√
	2.1.7	Procure registers, pens, stock cards	√	√	√	√
	2.1.8	Procure cupboards, rain coats ,boots, torches, umbrella		√		
	2.1.9	Distribute registers, pens, stock cards, cupboards, rain coats, boots, torches, umbrella,		√		
	2.1.10	Conduct a TOT training of lab technicians on RDT and blood smear testing	√			√
	2.1.11	Conduct training of CHWs in RDTs and blood smear testing	√			√
	2.1.12	Conduct training to HPs(HCs, DHs, and provincial and Referral laboratory technicians in RDTs and blood smear testing (identification of species)	√			

	2.1.13	Procure commodities for molecular diagnosis	√	√	√	√
	2.1.14	Conduct molecular diagnosis (Malaria PCR) at NRL	√	√	√	√
Strategy 2.2: Provide prompt and correct treatment to uncomplicated malaria cases at all levels	2.2.1	Revise the guidelines on malaria case management	√			
	2.2.2	Train CHWs on malaria guidelines,	√			
	2.2.3	Train health providers HCs, DHs, provincial and Referral Hospitals, , District Pharmacies	√			
	2.2.4	Conduct training of health providers in private sector on malaria treatment guidelines	√			
	2.2.5	Produce and distribute guidelines to all levels	√			
	2.2.6	Conduct annual quantification of antimalarial drugs and other commodities for simple malaria cases in private and public sector	√	√	√	√
	2.2.7	Conduct bi annual quantification of antimalarial drugs and other commodities for simple malaria case in private and public sector	√	√	√	√
	2.2.8	Conduct quarterly supply plan review of antimalarial drugs and other commodities for simple malaria case in private and public sector	√	√	√	√
	2.2.9	Monitoring the distribution of antimalarial medicines and commodities by DP and central level	√	√	√	√
	2.2.10	Procure malaria medicines	√	√	√	√
	2.2.11	Conduct quarterly meeting with District pharmacies on malaria supply chain management	√	√	√	√
	2.2.12	Conduct workshop to Medical(residentsInternal Medicine and Pediatric) and Nursing schools in final years on updated malaria case management guidelines	√	√	√	√
	2.2.13	Conduct quarterly internal and external assessment of malaria case management at all levels	√	√	√	√
	2.2.14	Elaborate system for routine supervision of private sector on malaria case management and supply chain management	√	√	√	√

	2.2.15	Conduct quarterly supervision of supply chain management and malaria control activities implementation in private sector	√	√	√	√
	2.2.16	Provide incentives to CHWs for sustaining the management of malaria cases at community level	√	√	√	√
Strategy 2.3: Strengthen prompt access to treatment of severe malaria	2.3.1	Conduct weekly data verification of severe malaria cases and malaria deaths on site	√	√	√	√
	2.3.2	Conduct quarterly QC for malaria diagnosis in private sector	√	√	√	√
	2.3.3	Conduct quarterly DQA in private sector	√	√	√	√
Strategy 2.4: Strengthen quality assurance and control of all malaria consumables and commodities	2.4.1	Conduct monthly internal and external quality control of Blood Smear and control system for diagnosis of malaria at all levels	√	√	√	√
	2.4.2	Conduct bi-annual external quality control of antimalarial drugs and laboratory reagents (GIEMSA, immersion oil) at arrival at MPPD before and at site after distribution.	√	√	√	√
	2.4.3	Conduct annual external quality control of RDTs and control system for diagnosis of malaria	√	√	√	√
	2.4.4	Conduct annual training of lab technicians on QA/QC and accreditation (WHO guidance)	√	√	√	√
Objective 3: By 2020, strengthen surveillance, monitoring and evaluation and operational research						
Strategy 3.1:Strengthen the HMIS and SISCom	3.1.1	Continue monthly analysis of HMIS and SISCom data	√	√	√	√
	3.1.2	Conduct monthly HMIS data analysis and report of to inform the programming	√	√	√	√
	3.1.3	Revise data elements in the DIHS-2	√	√	√	√
	3.1.4	Implement standardized medical death certificate of cause of death ICD 10 in health facilities	√	√	√	√
Strategy 3.2:Strengthen reporting for severe malaria and malaria	3.2.1	Elaborate the notification system for severe malaria	√			
	3.2.2	Elaborate the SMS Alert system for severe malaria cases & death	√			

deaths from monthly to real time reporting	3.2.3	Implementation and follow up of SMS alert system for severe malaria cases and deaths	√	√	√	√
	3.2.4	Conduct training of Health providers (CHWs, HCs, Hospitals)on notification and SMS alerts on death & severe malaria	√			
	3.2.5	Install a free call line at MOPDD	√			
Strategy 3.3: Improve reporting from the private health sector	3.3.1	Conduct meetings with Directors of private sector facilities on data reporting	√	√	√	√
	3.3.2	Strengthen private sector (including health posts) reporting into HMIS	√	√	√	√
Strategy 3.4:Strengthen surveillance, monitoring and evaluation	3.4.1	Conduct regular supervision at decentralized level (Public and Private)	√	√	√	√
	3.4.2	Conduct regular SMEOR SUB-TWG meetings	√	√	√	√
	3.4.3	Conduct regular malaria data quality audit	√	√	√	√
	3.4.4	Develop/update stratification map (epidemiological zones) based on HMIS and SIS-Com and other various data source	√	√	√	√
	3.4.5	Conduct the MIS	√			
	3.4.6	Conduct the DHS				√
	3.4.7	Conduct the HFS		√		
	3.4.8	Conduct the i-CCM evaluation			√	
	3.4.9	Conduct the insecticide resistance monitoring	√	√	√	√
	3.4.10	Conduct the LLINs durability	√	√	√	√
	3.4.11	Conduct the therapeutic efficacy survey	√	√	√	√
Strategy 3.5: Capacity building in data analysis and use at all levels	3.5.1	Organize Quarterly meeting to discuss data quality and use	√	√	√	√
	3.5.2	Conduct Training and refresher training course for data management National M&E team in Data Management,	√			√

		survey methodology, reporting and project Monitoring and Evaluation				
	3.5.3	Conduct Training for health workers in public and private health facilities at all level in record keeping, data analysis and reporting	√			√
Strategy 3.6: Develop and implement an operational research agenda for malaria	3.6.1	Establish strong collaboration initiative with local and international research institutions	√	√	√	√
	3.6.2	Define a malaria operational research agenda	√	√	√	√
	3.6.3	Mobilize required resources for research	√	√	√	√
	3.6.4	Provide a forum for research results dissemination	√	√	√	√
	3.6.5	Develop and implement a OR on the factors associated to the malaria increase	√	√	√	√
	3.6.6	Implement the IST survey	√	√		
Objective 4: By 2020, effective program management and coordination will be expanded to all levels including multi-sectorial and regional partnerships						
Strategy 4.1: Mobilize financial resources for malaria control	4.1.1	Produce a costed investment case for maintaining government resources into malaria	√	√	√	√
	4.1.2	Produce a private public partnership concept for supporting the investment case for malaria in Rwanda	√	√	√	√
	4.1.3	Prepare funding proposals to international funding mechanisms/agencies	√	√	√	√
Strategy 4.2: Conduct coordination and planning sessions for the malaria program and key stakeholders	4.2.1	Conduct regular planning meetings of the program and stakeholders	√	√	√	√
	4.2.2	Develop annual work plan	√	√	√	√
	4.2.3	Conduct a Malaria Program Review	√	√	√	√
	4.2.4	Conduct annual review and planning meetings	√	√	√	√
	4.2.5	Conduct monthly meetings for the programme	√	√	√	√
	4.2.6	Conduct mid-term reviews of the strategic plan	√	√	√	√
	4.2.7	Conduct regular multi-sectoral meetings and reviews	√	√	√	√

	4.2.8	Conduct malaria TWG	√	√	√	√
	4.2.9	Support malaria activities implementation through RHSS	√	√	√	√
Strategy 4.3: Strengthen human resources, material capacity of the malaria programme	4.3.1	Pay staff salaries	√	√	√	√
	4.3.2	Participate in international meetings and workshops	√	√	√	√
	4.3.3	Provide tuitions fees for MSc and PhD for staff	√	√	√	√
	4.3.4	Procure equipment (laptops, desktop, printers, LCD)	√	√	√	√
	4.3.5	Provide running cost to the Division	√	√	√	√
Strategy 4.4: Advocate for concerted inter country efforts against malaria	4.4.1	Prepare a concept note for regional malaria control under EAC	√			
	4.4.2	Conduct meetings to prepare a concept paper for cross border collaboration	√			
	4.4.3	Advocate for malaria to become a routine agenda item at all EAC head of states meetings	√	√	√	√
	4.4.4	Develop, with other East African Countries, a cross border strategy to accelerate malaria control and pre-elimination in the region.	√	√	√	√
	4.4.5	Set up a cross border initiative with one country ($low hanging fruit) as a demonstration	√	√	√	√
	4.4.6	Conduct cross border initiative meetings including target	√	√	√	√
	4.4.7	Study tour/field visits for planning cross border interventions	√	√	√	√
	4.4.8	Conduct joint malaria interventions with cross borders countries		√	√	√
Objective 5:By 2020, 75% of the population will have correct knowledge, behaviors and practices towards malaria prevention and control						
Strategy 5.1:Develop the malaria advocacy, communication and social mobilization strategy	5.1.1	Develop the 2017-2020 SBCC strategy	√			
	5.1.2	Disseminate the updated SBCC Strategy	√	√	√	√
	5.1.3	Produce and distribute the updated SBCC strategy	√			

Strategy 5.2: Develop integrated messages towards malaria prevention and control	5.2.1	Review existing messages and develop new ones on malaria prevention and control	√	√	√	√
	5.2.2					
Strategy 5.3:Advocate for high level support from various stakeholders to sustain malaria prevention and control interventions including social marketing	5.3.1	Organize high level meetings with policymakers, Donors, civil society organizations and private sector representatives for advocacy to enhance ownership and seek support for malaria prevention and control interventions.	√	√	√	√
	5.3.2	Conduct advocacy meetings with decentralized authorities, private sector representatives, civil society organizations on malaria prevention and control	√	√	√	√
	5.3.3	Conduct community mobilization for malaria prevention and control during campaigns such as: IRS, LLIN's, mosquito repellants and world malaria day	√	√	√	√
Strategy 5.4: Mobilize communities to own and actively participate in malaria prevention and control interventions	5.4.1	Organize and conduct sensitization activities in communities to enhance participation/involvement of community members to prevent and control malaria	√	√	√	√
	5.4.2	Conduct outreach activities	√	√	√	√
	5.4.3	Community mobilization on malaria prevention through Umuganda	√	√	√	√
	5.4.4	Conduct mas media engagement on malaria prevention and control	√	√	√	√
	5.4.5	Publish malaria prevention messages in print and online media	√	√	√	√

Annex 2: MSP budget by strategies

Objectives/Strategies	2017-2018	2018-2019	2019-2020	2020-2021	2017-2021 Total Cost	% of Cost per Obj & MSP Total cost
Objective 1: By 2018, at least 90 % of population at risk will be effectively protected with locally appropriate vector control interventions	**15,343,312,632**	**35,329,659,468**	**17,005,530,041**	**16,814,594,084**	**84,493,096,224**	**41.4%**
Strategy 1.1: Maintain LLINs universal coverage	2,986,549,464	22,307,082,761	3,716,152,369	3,224,829,683	32,234,614,276	38.2%
Strategy 1.2: Conduct IRS and other innovative interventions in targeted areas	11,992,244,548	12,648,878,897	12,932,832,862	13,223,470,501	50,797,426,808	60.1%
Strategy 1.3: Build sustainable capacity for vector control and entomological surveillance	99,290,360	116,443,360	99,290,360	107,199,340	422,223,420	0.5%
Strategy 1.4: Conduct insecticide resistance management plan	265,228,260	257,254,450	257,254,450	259,094,560	1,038,831,720	1.2%
Objective 2: By 2020, all malaria cases will be treated in line with the national guidelines	**14,021,053,578**	**14,646,580,416**	**11,928,633,306**	**9,921,686,170**	**50,517,953,469**	**24.8%**
Strategy 2.1: Provide malaria diagnosis to all suspected malaria cases at all levels	6,871,992,882	8,717,123,682	6,269,256,407	6,512,279,276	28,370,652,248	56.2%
Strategy 2.2: Provide prompt and correct treatment to uncomplicated malaria cases at all levels	6,699,855,626	5,661,256,574	5,391,176,738	3,141,206,733	20,893,495,671	41.4%
Strategy 2.3: Strengthen prompt access to treatment of severe malaria	161,913,760	161,913,760	161,913,760	161,913,760	647,655,040	1.3%
Strategy 2.4: Strengthen quality assurance and control of all malaria consumables and commodities	287,291,310	106,286,400	106,286,400	106,286,400	606,150,510	1.2%
Objective 3: By 2020, strengthen surveillance, monitoring and evaluation and operational research	**2,721,225,668**	**1,708,881,901**	**1,531,961,701**	**1,856,351,601**	**7,818,420,871**	**3.8%**
Strategy 3.1:Strengthen the HMIS and SISCom	983,300	955,500	955,500	955,500	3,849,800	0.0%

Objectives/Strategies	2017-2018	2018-2019	2019-2020	2020-2021	2017-2021 Total Cost	% of Cost per Obj & MSP Total cost
Strategy 3.2:Strengthen reporting for severe malaria and malaria deaths from monthly to real time reporting	658,561,087	15,264,820	15,264,820	15,264,820	704,355,547	9.0%
Strategy 3.3: Improve reporting from the private health sector	27,719,636	27,719,636	27,719,636	27,719,636	110,878,544	1.4%
Strategy 3.4:Strengthen surveillance, monitoring and evaluation	1,062,041,780	854,222,080	757,901,880	1,082,291,780	3,756,457,520	48.0%
Strategy 3.5: Capacity building in data analysis and use at all levels	714,971,340	714,971,340	714,971,340	714,971,340	2,859,885,360	36.6%
Strategy 3.6: Develop and implement an operational research agenda for malaria	256,948,525	95,748,525	15,148,525	15,148,525	382,994,100	4.9%
Objective 4: By 2020, effective program management and coordination will be expanded to all levels including multi-sectorial and regional partnerships	**13,159,424,675**	**12,512,743,277**	**13,054,781,476**	**12,987,447,546**	**51,714,396,974**	**25.3%**
Strategy 4.1: Mobilize financial resources for malaria control	12,267,400	12,267,400	12,267,400	12,267,400	49,069,600	0.1%
Strategy 4.2: Conduct coordination and planning sessions for the malaria program and key stakeholders	12,672,941,155	12,068,439,653	12,610,477,852	12,515,610,502	49,867,469,162	96.4%
Strategy 4.3: Strengthen human resources, material capacity of the malaria programme	446,066,140	414,069,644	414,069,644	459,569,644	1,733,775,072	3.4%
Strategy 4.4: Advocate for concerted inter country efforts against malaria	28,149,980	17,966,580	17,966,580	-	64,083,140	0.1%
Objective 5:By 2020, 90% of the population will have correct knowledge, behaviors and practices towards malaria prevention and control	**2,377,241,766**	**2,356,847,626**	**2,361,847,626**	**2,366,847,626**	**9,462,784,644**	**4.6%**
Strategy 5.1:Develop the malaria advocacy, communication and social mobilization strategy	25,394,140	-	-	-	25,394,140	0.3%
Strategy 5.2: Develop integrated messages towards malaria prevention and control	3,732,060	3,732,060	3,732,060	3,732,060	14,928,240	0.2%

Objectives/Strategies	2017-2018	2018-2019	2019-2020	2020-2021	2017-2021 Total Cost	% of Cost per Obj & MSP Total cost
Strategy 5.3:Advocate for high level support from various stakeholders to sustain malaria prevention and control interventions including social marketing	108,851,750	108,851,750	108,851,750	108,851,750	435,407,000	4.6%
Strategy 5.4: Mobilize communities to own and actively participate in malaria prevention and control interventions	2,239,263,816	2,244,263,816	2,249,263,816	2,254,263,816	8,987,055,264	95.0%
Grand Total in Local Currency	**47,622,258,319**	**66,554,712,687**	**45,882,754,150**	**43,946,927,026**	**204,006,652,182**	**MSP mean Cost: 40,801,330,436**
Grand Total in $US	**53,786,151**	**75,169,090**	**51,821,498**	**49,635,111**	**230,411,850**	**MSP mean Cost: 46,082,370**
Cost per CAPITA in Local Currency	**3,916**	**5,472**	**3,773**	**3,613**	**16,774**	**MSP mean Cost per Capita: 4,194**
Cost per CAPITA in $US	**4.42**	**6.32**	**4.46**	**4.37**	**19.57**	**MSP mean Cost per Capita: 4.9**

Annex 3: Monitoring & Evaluation Matrix

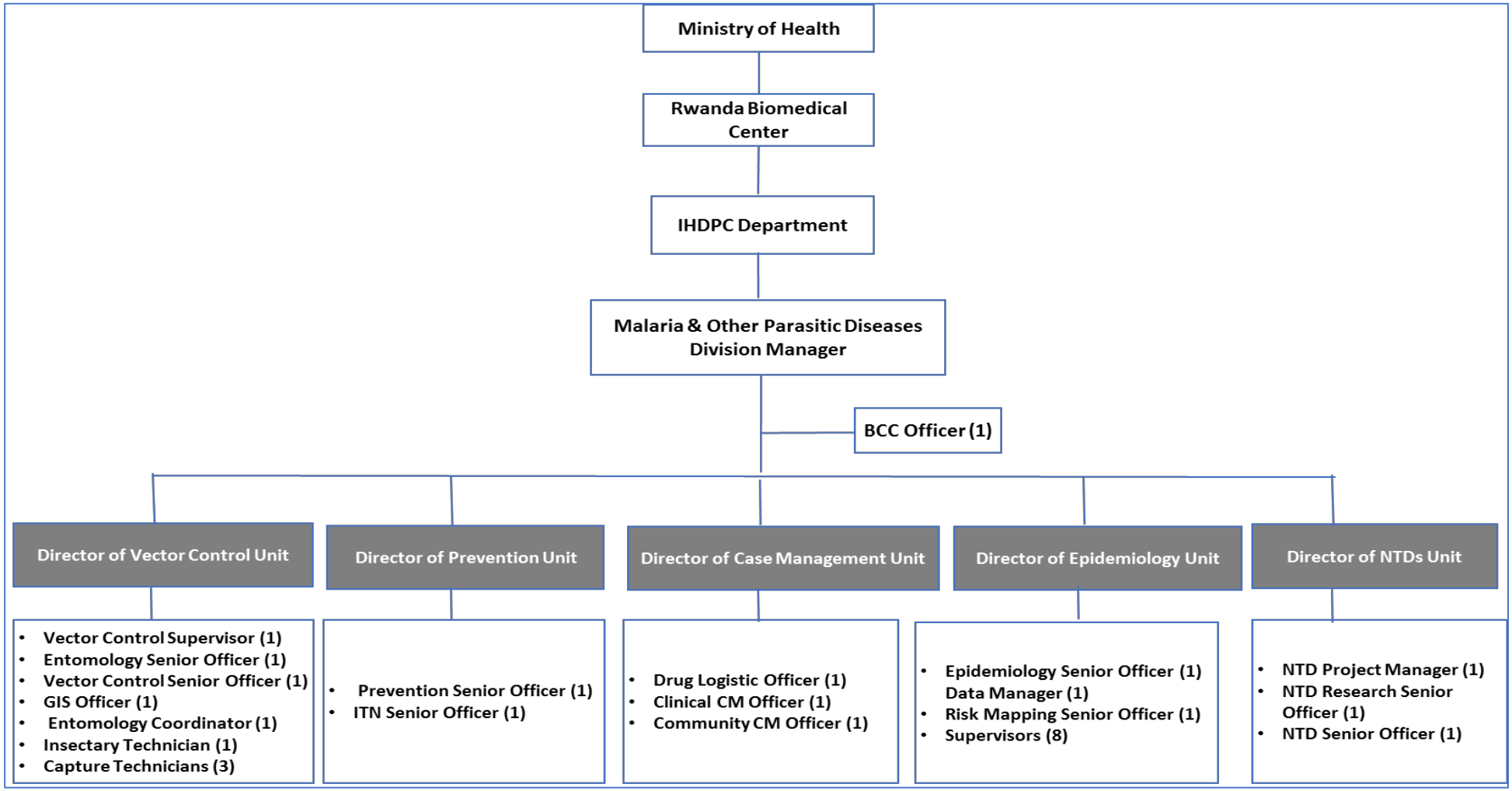
Item	Indicator Name	Operational definition	Indicator Type	Data Source	Frequency of reporting	Responsible	Baseline	Targets		
								2017-2018	2018-2019	2019-2020
Goal: To reduce malaria incidence from 308/1,000 in 2016 to 198/1,000 by 2020; to reduce malaria deaths by at least 30% of 2016 levels by 2020 and to reduce malaria prevalence by 2020	1.Annual Parasite Incidence per 1,000 persons	N: No of new confirmed malaria cases (all ages) reported through HMIS/SICOM D: Total Population	Impact	HMIS	Annually	MOPDD/RBC	308/1000 (HMIS2015-16)	413/1000	383/1000	354/1000
	2.Inpatient malaria deaths per 1,000 persons per year	N: No of Inpatient malaria deaths reported by MIS D: Total number of persons	Impact	HMIS	Annually	MOPDD/RBC	62 /1000 ((HMIS2015-16)	51/1000	45/1000	40/1000
	3.Number of confirmed malaria deaths	N: No of confirmed malaria deaths reported by DH&RH through HMIS	Impact	HMIS	Annually	MOPDD/RBC	698 (HMIS2015-16)	594	542	490
	4.Malaria prevalence in U5	N: No of U5s who had fever/malaria during the last two weeks D: Total number of Under of Under five in HH surveyed	Impact	DHS	Annually	MOPDD/RBC	2% (DHS2014-15)	NA	NA	1.5%
	5. Malaria prevalence in Pregnant Women	N: No of Pregnant Women who had fever/malaria in last two weeks D:No of Pregnant Women in the HH surveyed	Impact	DHS	Annually	MOPDD/RBC	0.6 % (DHS2014-15)	NA	NA	0.5%
Objective 1: By 2020, 90 % of population at risk will be effectively protected with locally appropriate preventive and vector control interventions based on evidence	1.Proportion of households with at least one LLIN for 2 people	N: No of households with at least one LLINs for 2 people in the HH surveyed D: No of household surveyed	Outcome	MIS/DHS	MIS –Bi-annually DHS-every five years	MOPDD, NISR	43% (DHS-2014-15)	44%	NA	45%
	2.Proportion of HH with at least one LLIN	N: No of Households with at least one LLIN in the HH surveyed D: No of household surveyed	Outcome	MIS/DHS	MIS is conducted every 2 years and DHS every five years	MOPDD, NISR	81 % (DHS-2014-15)	83%	NA	84%
	3.Proportion of children under five years old who slept under a LLIN the previous night	N: No of children under five years old who slept under a LLIN the previous night in the HH surveyed D: No of household surveyed	Outcome	MIS/DHS	MIS is conducted every 2 years and DHS every five years	MOPDD, NISR	68 % (DHS-2014-15)	70%	NA	72%
	4.Proportion of pregnant women, who slept under a LLIN the previous night	N: No of Pregnant women who slept under a LLIN the previous night in the HH surveyed D: No of pregnant women in the household surveyed	Outcome	MIS/DHS	MIS is conducted every 2 years and DHS every five years	MOPDD, NISR	73 % (DHS-2014-15)	74%	NA	75%

Item	Indicator Name	Operational definition	Indicator Type	Data Source	Frequency of reporting	Responsible	Baseline	Targets		
								2017-2018	2018-2019	2019-2020
	5.Proportion of population who slept under a LLIN the previous night	N: No of persons who slept under a LLIN the previous night in the HH surveyed D: No of persons in the household surveyed	Outcome	MIS/DHS	MIS is conducted every 2 years and DHS every five years	MOPDD, NISR	61% (DHS-2014-15)	62%	NA	64%
	6.Proportion of children under five years old who slept under a LLIN the previous night in household with at least one LLINs	N: No of Under Five-year-old who had slept under LLIN the previous night in the HH with at least one LLIN D: No of children under five years old with at least one LLIN in HH surveyed	Outcome	MIS/DHS	MIS is conducted every 2 years and DHS every five years	MOPDD, NISR	80% (DHS-2014-15)	81%	NA	81%
	7.Proportion of pregnant women, who slept under a LLIN the previous night in household with at least one ITN	N: No of pregnant women who slept under a LLINs the previous night in the households surveyed with at least one ITN D: No of pregnant women in the HH surveyed	Outcome	MIS/DHS	MIS is conducted every 2 years and DHS every five years	MOPDD, NISR	88% (DHS-2014-15)	88%	NA	88%
	8.Proportion of population, who slept under a LLIN the previous night in household with at least one ITN	N: No of persons who slept under a LLIN the previous night in the HH surveyed with at least one LLINs D: No of persons with at least one LLIN in the HH surveyed	Outcome	MIS/DHS	MIS is conducted every 2 years and DHS every five years	MOPDD, NISR	74% (DHS-2014-15)	75	NA	75
	Proportion of structures in targeted areas that received indoor residual spraying (IRS) during the reporting period	N: No of sprayed structures in targeted Districts D:Number of structure targeted/enumerated	Output	MOPDD – Activity Report	Annually	MOPDD	98% (IRS 2015-16)	98%	98%	98%
	Proportion of population protected by indoor residual spraying within the last 12 months in targeted districts	N: No of residents in sprayed rooms/household in targeted areas/districts D: Total population in targeted areas/districts	Output	MOPDD – Activity Report	Annually	MOPDD	98% (IRS 2015-16)	98%	98%	98%
Objective 2: By 2020, all malaria cases will be tested with a quality assured diagnostic method and promptly treated in line with	Proportion of suspected malaria cases that receive a parasitological test at public sector health facilities	**N**: No of suspected malaria cases tested at health facility **D**: No of suspected malaria cases received/recorded at health	Output	HMIS	Annually	MOPDD	99% (HMIS 2015-16)	99%	99%	99%
	Proportion of suspected malaria cases that receive a parasitological	**N**: No of suspected malaria cases tested at community level	Output	HMIS	Annually	MOPDD	99% (HMIS 2015-16)	99%	99%	99%

Item	Indicator Name	Operational definition	Indicator Type	Data Source	Frequency of reporting	Responsible	Baseline	Targets		
								2017-2018	2018-2019	2019-2020
the national guidelines	test at the community level	**D**: No of suspected malaria cases received/recorded at community level								
	Proportion of confirmed malaria cases that received first-line antimalarial treatment according to national guidelines at public sector health facilities	**N**: No of confirmed malaria cases that received first line antimalarial treatment according to the national guidelines at public sector health sector **D**: No of confirmed malaria cases reported during the health facility survey at HFs	Output	HFs Survey	Every two years	MOPDD	98.4% (HFs 2016)	98.5%	NA	98.5%
	Proportion of confirmed malaria cases that received first-line antimalarial treatment according to national guidelines at the community	**N**: No of confirmed malaria cases that received first line antimalarial treatment according to the national guidelines at community level **D:** No of confirmed malaria cases reported during the health facility survey at Community level	Output	iCCM	Every two years	MOPDD	79% (HMIS2015-16)	82%	NA	85%
	Percentage of HC that reported no stock out of ACT lasting more than 7 days in the previous month	**N:** No of HC that reported no stock out of ACT lasting more than 7 days in the previous month **D**: All HC (which reported)	Output	DHIS2	Annually	MOPDD	96% (HMIS2015-16)	98%	98%	98%
Objective 3: By 2020, strengthen surveillance, monitoring and evaluation and operational research	Proportion of public health facilities submitting malaria indicators timely	N: Number of public health facilities submitting malaria indicators timely D:All public health facilities	Output	DHIS-II	Annually	MOPDD	94% ((2015-16)	94%	95%	95%
	Proportion of public health facilities submitting complete report on malaria indicators	N: Number of public health facilities submitting complete D:All public health facilities (which reported)	Output	DHIS-II	Annually	MOPDD	98% (2015-16)	97%	98%	98%
	Proportion of private health facilities submitting complete report on malaria indicators	N: Number of private health facilities submitting malaria complete report D:All public health facilities (which reported)	Output	DHIS-II	Annually	MOPDD	45% (2015-16)	47%	49%	50%
Objective 4: By 2020, effective program management and coordination will be expanded to all levels including	Number of cross border initiatives set up	Number of cross border initiatives set up	Output	MOPDD Annual Report	Annual report	MOPDD	0	1	1	1
	Number of annual meeting with strong recommendations	Number of annual meeting with strong recommendations	Output	MOPDD	Annual report	MOPDD	0	1	1	1

Item	Indicator Name	Operational definition	Indicator Type	Data Source	Frequency of reporting	Responsible	Baseline	Targets		
								2017-2018	2018-2019	2019-2020
multi-sectorial and regional partnerships	organized with Rwanda participation	organized with Rwanda participation								
Objective5: By 2020, 90% of the population will have correct knowledge, behaviors and practices towards malaria prevention and control	Proportion of women who recognize fever as a symptom of malaria	N; No of women who recognize fever as a symptom of malaria D: Number of women surveyed	Output	MIS, KAP Survey	Every two years (MIS)	MOPDD	88% (MIS2013)	90%	NA	90%
	Proportion of women who reported mosquito bites as a cause of malaria	N; No of women who recognize fever as a symptom of malaria	Output	MIS, KAP Survey	Every two years (MIS)	MOPDD	95% (MIS 2013)	95%	NA	95%
	Proportion of the population who recognize signs of malaria	D: Number of women surveyed	Output	MIS, KAP Survey	Every two years (MIS)	MOPDD	Not Yet assessed	75%	NA	75%
	Proportion of the population who knows the mode of transmission of malaria	N: Number of persons who knows the mode of transmission of malaria D:No of persons surveyed	Output	MIS, KAP Survey	Every two years (MIS)	MOPDD	NA(Not assessed)	75%	NA	75%

Annex 4: Mal &OPDD Organization Chart



Annex 5: Dissemination plan

		2017-2018				2018-2019				2019-2020			
	Activities	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Quarterly surveillance reports												
2	Annual Reports												
3	Mid-term review report												
4	End-term review report												
5	Annual malaria surveillance report												
6	Monthly malaria surveillance report												
7	Two malaria papers published												
8	Submit World Malaria Report data												
9	Submit Survey Reports												
10	Malaria Impact Evaluation Report												
11	IRS Report												
12	Entomological report												
13	Auditing Report												
14	Quarterly financial report												