

**Republic of Rwanda**



**Ministry of Health**

**Rwanda Malaria and Neglected Tropical  
Diseases Annual Report 2018-2019**



**RWANDA  
BIOMEDICAL  
CENTER**

**A Healthy People. A Wealthy Nation**

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## Foreword

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The Ministry of Health would like to take this occasion to express their deep gratitude and sincere thanks to everyone including all partners and stakeholders who contributed to the compilation of this annual report of the MOPDD in Rwanda.


This Malaria and Neglected Tropical Diseases Report 2018-2019 has been developed based on data generated from the RHMIS and Program data from MOH/RBC. It reflects a comprehensive picture of the prevention, control and management of malaria and NTDs in Rwanda and is structured based on the Extended 2013-2020 Rwanda Malaria National Strategic Plan, the Revised Malaria Contingency Plan 2016-2020 as well as the NTDs Strategic Plan.

Actions needed to control malaria burden in Rwanda require partnership and close collaboration between stakeholders in environmental control programs, as well the strengthening of malaria surveillance systems across all sectors at both national and decentralized levels. These programs must be conducted using an evidence-based package of interventions for prevention, treatment and support for patients, community health workers, and the communities where these strategies are implemented.

I would like to acknowledge the efforts of the dedicated staff in the various institutions of the Government of Rwanda who worked tirelessly to complete this report. We remain entirely grateful to the inputs and support provided by our partners.

Special thanks to the members of the civil society, local and international Non-Governmental, bilateral organizations as well as the Rwandan Government institutions who were heavily involved in the implementation of malaria and NTDs control activities.

I would also like to thank all members of the Technical Working Group that reviewed and validated the content of this report. We thank you all for your support in the fight against Malaria and NTDs in Rwanda.

  
**Dr. Diane GASHUMBA**  
**Minister of Health**



## List of Abbreviations

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ACT	Artemisinin-based Combination Therapy
AL	Artemether Lumefantrine
ANC	Ante-Natal Care
SBCC	Social Behavior Change Communication
CDC	Center for Disease Control
CHW	Community Health Worker
CPDS	Coordinated Procurement and Distribution System
DQA	Data Quality Audit
EPI	Expanded Program on Immunization
EQA	External Quality Assurance
FY	Fiscal Year
GF	Global Fund
GoR	Government of Rwanda
HBM	Home Based Management
HBMA	Home Based Management in Adults
HMIS	Health Management Information System
HSSP IV	Third Health Sector Strategic Plan IV
iCCM	Integrated Community Case Management of Malaria
IRS	Indoor Residual Spraying
ITN	Insecticide Treated Net
IVM	Integrated Vector Management
LLINs	Long-Lasting Insecticide Nets
MCP	Malaria Contingency Plan
MDA	Mass Drug Administration
MIP	Malaria In Pregnancy
MoH	Ministry of Health

MOPDD	Malaria and Other Parasitic Diseases Division
MPPD	Medical Procurement and Provision Division
MSP	Malaria Strategic Plan
MTEF	Mid-Term Expenditure Framework
NRL	National Reference Laboratory
NSP	National Strategic Plan
NTD	Neglected Tropical Diseases
PCR	Polymerase Chain Reaction
PMI	President’s Malaria Initiative
PSM	Procurement and Supply chain Management
QC	Quality Control
QMIA	Quality Management Improvement Approach
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
SBCC	Social Behavior Change Communication
SCH	Schistosomiasis
SOP	Standard Operating Procedure
STH	Soil Transmitted Helminthiasis
TWG	Technical Working Group
UC	Universal Coverage
WHO	World Health Organization

## Executive Summary

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The Extended Malaria Strategic Plan (MSP) 2013-2020 details the interventions and programs that are currently in place for malaria control in Rwanda.

Today, Rwanda has a strong vision of being a country free from malaria as a way of contributing to the well-being of the Rwandan population including reduction of the impact of malaria-related burden of disease. To achieve this requires robust evidence-based efforts and strong collaboration with all relevant stakeholders especially in implementation of appropriate interventions and quality health delivery services.

Following the recent malaria upsurge, the Government of Rwanda and its Partners have been combining efforts in the fight against malaria through different malaria control interventions.

In line with the National Malaria Strategic Plan 2013-2020 goals, all malaria control interventions aim at achieving the following objectives:

**Objective 1:** By 2020, at least 90 % of population at risk will be effectively protected with locally appropriate preventive and vector control interventions.

**Objective 2:** By 2020, all malaria cases will be promptly treated in line with the national guidelines

**Objective 3:** By 2020, all health facilities provide complete reporting to strengthen surveillance, monitoring and evaluation and inform operational research.

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

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

Despite the continued malaria burden increase since 2012 in almost all 30 districts of Rwanda, some good results were registered in the reporting period July 2018-June 2019:

- With the end of this reporting Fiscal Year 2018-2019, malaria incidence in Rwanda reduced from 389 per 1,000 person per year in 2017-2018 to 321 per 1,000 while the Slide Positivity Rate (SPR) was 45% at national level. The SPR being 69% at the community level and 31% at the health facility level.
- Severe malaria cases reduced from 10,748 cases in 2017-2018 to 7,035 cases in 2018-2019, more than a 50% decrease in severe malaria and mortality compared to 2016
- Furthermore, though the total number of malaria cases is still high, the number of deaths due to malaria decreased significantly from 392 in 2017-2018 to 264 in 2018-2019 with a reduced malaria fatality rate from 17 per 100,000 in FY 2015-2016 to 7 per 100,000 in FY 2018-2019 thanks to different strategies put in place especially the adopted scaled up of Home-Based Management (HBM) of fever for adults at community level.



It is important to highlight that during the Fiscal Year 2018-2019; the following interventions were implemented and have contributed to the above results:

- Over this current FY, a total number of 180,023 LLINs were distributed to pregnant women through ANC services while 276,248 LLINs were distributed to children under one out of 340,296 children of nine months attended MR1 (81% of coverage).
- Indoor Residual Spraying (IRS) has been implemented in 10 of 15 high burden malaria districts (Nyagatare, Kirehe, Bugesera, Gatsibo, Ngoma, Kayonza, and Rwamagana in Eastern Province; and Huye, Nyanza, Gisagara in Southern districts) with the total number of 938,407 out of 941,509 structures being sprayed for an overall coverage rate of 99.7%
- Through IRS Coverage, 3,733,375 people were protected. However, the budget constraints did not allow the program to implement all high impact malaria control interventions such as IRS in all 15 priority districts.
- Malaria diagnosis, the proportion of suspected malaria cases that received a parasitological test at public health facilities and in the community (for children under 5 years and adults) was sustained at 99.9 % over the review period. Likewise, the proportion of confirmed malaria cases that received the first line antimalarial treatment was sustained at 100% in 2018-2019.

Regarding Neglected Tropical Diseases (NTDs) control, two rounds of Mass Drug Administration (MDA) targeting Soil Transmitted Helminthiasis (STH) and Schistosomiasis (SCH) in Pre-School and School Age Children countrywide were conducted in the FY 2018-2019 with more than 95% coverage of targeted children.

Four main sources of funds for the Malaria and Other Parasitic Diseases Programs during the last FY 2018-2019 was **79,502,525** USD with the total program budget execution of Global Fund at 57%, 100% for PMI, 95% for the Government of Rwanda, and at 96% for END Fund.

## Introduction

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Malaria is a major public health problem in Rwanda and is considered among the leading causes of morbidity and mortality. Rwanda has made significant strides in controlling the disease through implementation of various control interventions including: mass and routine distribution of long-lasting insecticide nets (LLINs), indoor residual spraying (IRS) in high endemic districts, adoption of mandatory laboratory confirmation prior to the treatment, use of ACTs in the treatment of uncomplicated malaria cases, national scale up of community based management and improvement in routine surveillance, monitoring and evaluation platforms. Despite these successes, Rwanda has seen an increase in malaria morbidity since the end of 2012. This increase in cases is attributable to several factors, including pyrethroid insecticide resistance, non-universal coverage of effective interventions, increase in vector density, climatic abnormalities (temperature and rainfall), environmental modifications and changed in mosquitoes' behavior.

The Extended Rwanda Malaria Strategic Plan (EMSP) 2013-2020 builds on national policies and strategies such as the Third Health Sector Strategic Plan (HSSP III) 2013-2018, as well as the Rwanda Vision 2020 which has the ambition of making Rwanda a lower-middle income country by 2020 and recognizes malaria as a major disease that contributes to health and economic related burden. The vision of the EMSP is for Rwanda to become free from malaria to contribute to socioeconomic development. Reduction of malaria burden will be achieved by strengthening and implementing appropriate control interventions and delivering quality health services. Achievement of Rwanda Malaria Free will require a concerted and collaborative effort between the Government of Rwanda (GoR) and other partners.

Following the rise in malaria cases, a Malaria Contingency Plan (MCP) has been developed and updated in 2017 with the aim of enhancing the implementation of evidence-based interventions to reduce the burden of malaria in the population. These malaria control interventions consist of effective implementation of high impact interventions, including countrywide mass distribution of LLINs to reach universal coverage (1 net for 1.8 people), IRS using an efficacious insecticide in targeted high malaria endemic districts, early diagnosis and treatment at the health facility and community level, environmental management, surveillance/Monitoring and Evaluation and social behavior change communication (SBCC). These interventions need to be implemented simultaneously to have an impact in the reduction of the transmission of malaria and mitigate the severity of the disease.

The following report details malaria control activities implemented over the FYI 2018-2019. These activities have been coordinated by the Malaria and Other Parasitic Diseases Division (MOPDD) of the Rwanda Biomedical Center (RBC) and the Ministry of Health, with support from other RBC and Ministry of Health (MoH) divisions, other GoR institutions, health facilities and community health workers (CHWs) and implementing partners.

## Malaria Program Results per Strategic Plan Framework

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The results and achievements presented in this annual report are in line with the following program objectives:

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

**Objective 2:** By 2020, all malaria cases will be promptly treated in line with the national guidelines

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

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

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

## PART I: MALARIA PREVENTION

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***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 therefore remains one of the priority interventions in Rwanda's Malaria & OPDD response to consolidate gains in malaria control and driving down transmission. A strong integrated vector management program has been implemented with the aim of maintaining the effectiveness of vector control despite the current malaria upsurge and threat of pyrethroid insecticide resistance in Rwanda.

Since 2008, the above core vector-control interventions have been supplemented with other measures including larval source management using bio-larvicides and environmental management, mosquito repellents, fish farming in fishponds and water dams. To ensure a successful and sustainable approach, Mal&OPDD has embarked on Integrated Vector Management approach (IVM) by implementing its five pillars: i) Advocacy and social mobilization, ii) collaboration, iii) capacity building, iv) integrated approach and v) evidence-based decision-making). In order to successfully implement and optimize IVM strategies, MOPDD utilized vector control information including the types of breeding sites, the density of vectors, the species composition and their dynamics, and the biting and resting behavior of mosquitoes; and vector susceptibility to insecticides and the infection rate of mosquitoes by the Plasmodium parasite. The entomological inoculation rates are additional factors that determine the effectiveness of vector control measures.

### **Strategy 1: Maintain Universal Coverage with LLINs**

#### **1. LLIN Procurement and Distribution**

For the period 2018-2019, RBC/MOPDD and partners procured a total number of 7,527,453 LLINs rectangular from Global Funds through RBC/MPPD (1,200,000 Interceptor G2 and 3,627,452 Yahe LN/standard nets) and USAID/PMI through GHSC-PSM (1,523,078 Permanet 3.0/PBO nets and 1,176,922 Olyset/standard nets). RBC/MOPDD prioritized the deployment of Interceptor G2 LLINs in the following four districts of Rusizi, Nyamasheke, Karongi in the western province and Muhanga in the southern province, while PBO LLINs will be deployed in five districts of Nyarugenge, Gasabo, Kicukiro of Kigali city; Rulindo and Gicumbi in Northern province, based upon high malaria infection prevalence rates.

## **2. LLIN Distribution to Pregnant Women and Children Under One Year**

These strategies of LLINs distribution are integrated in antenatal care (ANC) package for maternal health and expanded program in immunization (EPI) services to target pregnant women and children under five years. During this fiscal year, the MOPDD improved the distribution of LLINs to pregnant women changing the distribution to primipara pregnant women attending the first visit of antenatal care to the, “distribution of LLINs to all pregnant women attending the antenatal care first visit” and the official instruction were sent to all health facilities in November 2018.

On a monthly basis, the distribution of LLINs was reported through the national health management information system (HMIS). Over this current FY, a total number of 180,023 LLINs were distributed to pregnant women. For the EPI program, 276,248 LLINs were distributed to children under one out of 340,296 children of nine month attended MR1 (81% of coverage).

## **3. Need Assessment of LLIN by Households**

The collaboration with community Health workers and local authority community LLINs Need assessment were conducted in all 30 districts, this exercise was crucial for the data collection of LLINs need household by household and allows to have the full identification of households and information about LLINs already received by households during different distribution channels. The purpose of this activity was to identify the gap within the community.

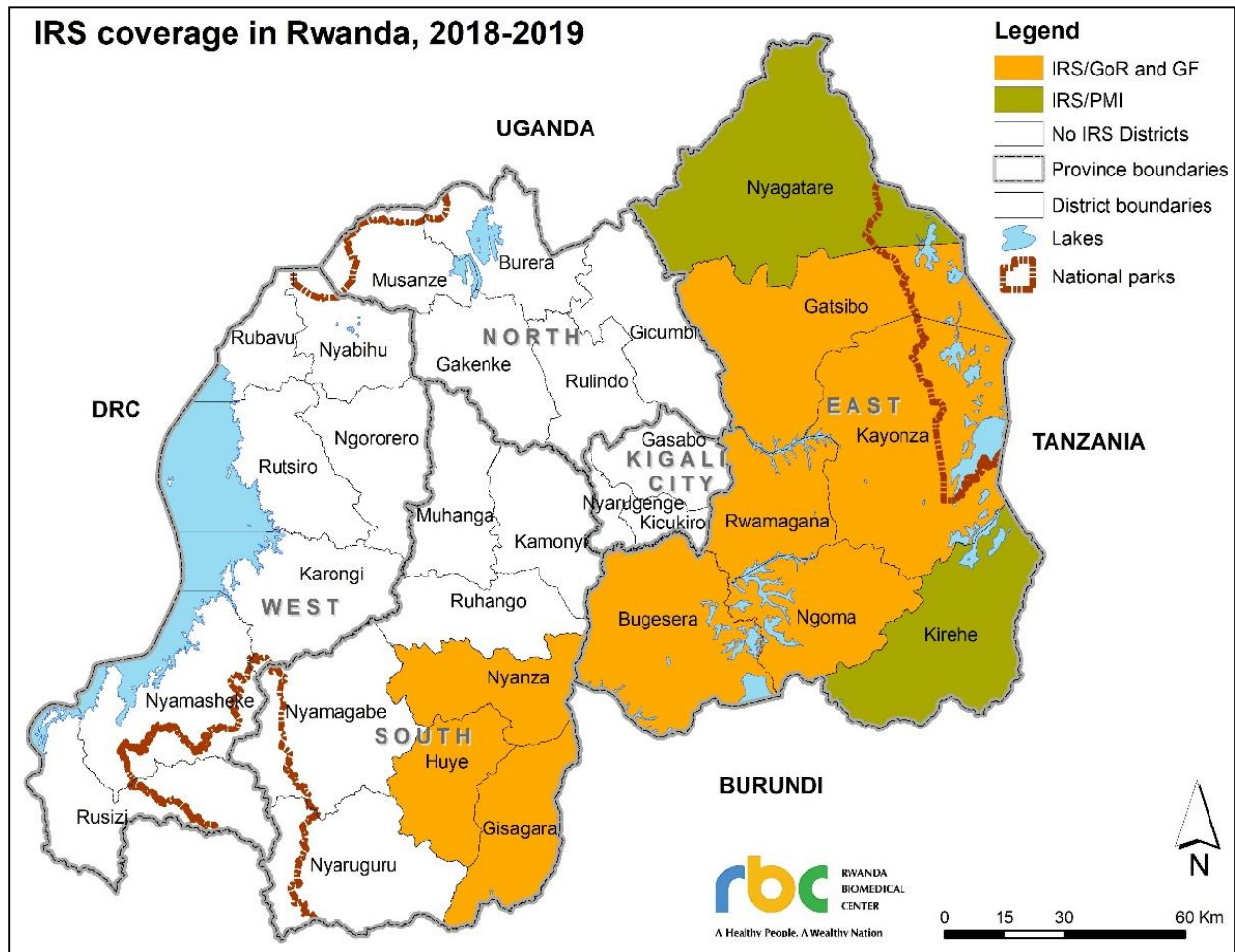
Note that during this exercise the need of 5,705,450 LLINs were identified to be delivered to health centers for the household’s mass distribution during the next FY 2019-2020.

### **Strategy 2: Conduct IRS and other Vector Control Interventions in Targeted Districts**

#### **1. Indoor Residual Spraying**

For the last FY 2018-2019, 15 districts were planned to be sprayed but due to budget constraint, only 10 districts were sprayed. These districts were Nyagatare, Kirehe, Bugesera, Gatsibo, Ngoma, Kayonza, and Rwamagana in Eastern Province; and Huye, Nyanza, Gisagara in Southern districts

**Figure 1: Map with IRS Districts per Source of Funds**



**Table 1: IRS Coverage per Partner and per District, FY2018/2019**

No	District	IRS Month	Year	Structures Found	Structures Sprayed	Coverage rate (%)	Total Pop Protected	Type of Product	Source of Funds
1	Nyagatare	Sept	2018	119,777	119,392	99,7	476,478	Actellic	PMI
2	Kirehe	Sept	2018	88,910	88,634	99,7	355,257	Actellic	PMI
3	Huye	Feb	2019	83,231	83,161	99,9	325,399	Actellic&Bendiocarb	GoR/GF
4	Nyanza	Feb	2019	81,459	80,752	99,1	309,934	Actellic	GoR/GF
5	Gisagara	Feb	2019	85,322	85,273	99,9	347,296	Actellic	GoR/GF
6	Bugesera	Mach	2019	88,751	88,561	99,8	355,905	Actellic	GoR/GF
7	Gatsibo	March-April	2019	119,733	119,609	99,9	473,623	Actellic	GoR/GF
8	Kayonza	May	2019	97,206	97,100	99,9	389,941	Fludora	GoR/GF
9	Rwamagana	May	2019	88,712	88,531	99,8	342,484	Fludora	GoR/GF
10	Ngoma	March-April	2019	88,408	87,394	98,9	357,058	Actellic+Fludora	GoR/GF
<b>Total</b>				<b>941,509</b>	<b>938,407</b>	<b>99,7</b>	<b>3,733,375</b>		

\*In Huye District, one sector: Maraba was sprayed with the stock balance of Bendiocarb remained in previous rounds

\*In Ngoma District: Two sectors of Sake and Gashanda were sprayed using Fludora Fusion

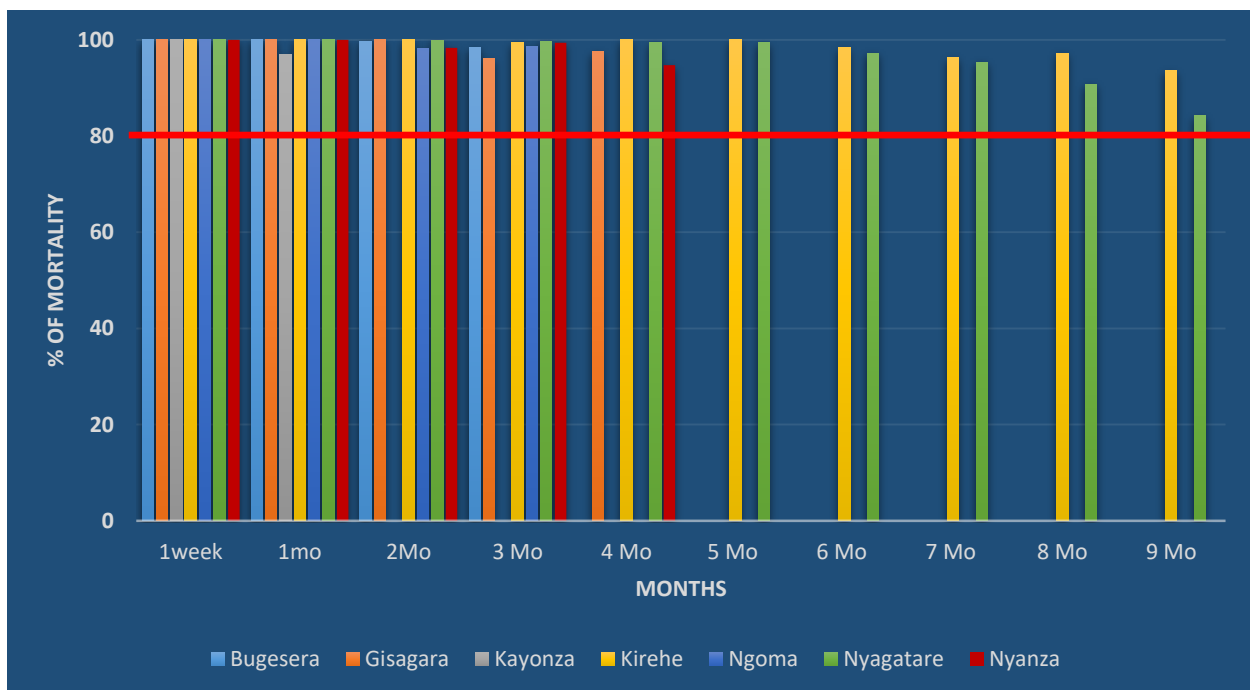
\*The estimated cost of IRS is \$2 million per district per year

## Strategy 2: Conduct Insecticide Resistance Monitoring and Quality Control of IRS

### 1. IRS Quality Control

IRS quality control (wall bioassays) was performed one-week post IRS as well as on a monthly basis to determine the residual efficacy of the insecticide on walls of sprayed houses. The sprayed campaigns were performed in different periods as following: Nyagatare and Kirehe in September 2018, and from January to May 2019, the IRS was carried out as following: Nyanza and Huye in January, Gisagara in February, Bugesera and Gatsibo in March, Ngoma in April, and Kayonza and Rwamagana in May 2019. The IRS quality control was performed in 2 sectors from each of the seven out of the 10 districts. and at each. At each sector, 6 houses (2 plastered non-painted, 2 plastered painted, and 2 mud) were selected for bioassay tests. The susceptible Kisumu strains of *Anopheles gambiae* s.s. reared at the Mal&OPDD/RBC insectary based at national entomology laboratory were used to run appropriate tests. Mosquitoes 3-5 days old were exposed in each wall house at the top, middle and bottom level of the walls. Two replicates for each type of house were applied. Mortality were read after 24 hours of exposure to Actellic and additional reading was performed after 48 hours post exposure for Fludora Fusion 56.25WP. The mortality was calculated for both exposed and control samples.

**Figure 2: Post IRS Wall Bioassays in FY 2018-2019**



The results of the post IRS wall bioassays are shown in figure above. Following the IRS campaign conducted using Organophosphate -Pirimiphos-methyl CS 300 “Actellic” and Fludora Fusion 56.25WP. Until June 2019 post IRS campaign, the results of the wall bioassay were available up to nine months in Nyagatare & Kirehe, four months in Gisagara & Nyanza, three months in



Bugesera & Ngoma and one-month post spraying in Kayonza and the insecticide was still effective at the end of the year in all sprayed districts. Results confirm a residual efficacy of Actellic up to nine months in the context of Rwanda. The monitoring of Fludora Fusion 56.25 WP stills on progress to estimate its residual efficacy post IRS campaign.

## 2. Monitoring of Bionomics of Malaria Vectors in IRS Districts

The entomological monitoring was carried out, from July 2018 to June 2019, in two sites located in each IRS district respectively Nyagatare (Nyagatare & Rukomo), Kirehe (Gatore & Nyamugali), Ngoma (Zaza & Remera) from April 2019 to June 2019 and Bugesera (Nyarugenge & Musenyi) from July 2018 to March 2019. The control district was Ngoma (Remera) from July 2018 to March 2019 then Kamonyi (Musambira) from April 2019 to June 2019. Between July 2018 and June 2019, mosquitoes were collected from indoor and outdoor on a monthly basis for assessment of the following parameters: vector bionomics using human landing catching method and indoor resting behavior of mosquitoes using Pyrethrum Spraying catching method.

- As shown in tables below, during the period of activities, 46,123 mosquitoes (*Culicidae*) were collected out of them, 84.3 were *Culicinae* and 15.6 *Anopheles* mosquitoes. The *Anopheles gambiae* s.l. were the major malaria vectors and representing 71% of the total catches. Other *Anopheles* mosquitoes collected were respectively *An. funestus* 0.1%, 5.4% *An. pharoensis* 5.4%, *An. ziemanni* 3.3%, *An. coustani* 0.1%, *An. maculipalpis* 1% and *An. rufipes* 0.03%. Of the *An. gambiae* s.l. collected, 57.5% caught outside the houses while the 66.3% of other *Anophelinae* mosquitoes were also collected outside the dwellings. All *Anophelinae* collected by PSC were *An. gambiae* s.l.
- The biting rate by *Anopheles gambiae* s.l. varied from 0.5 to 15.8 bites per person per night within sites, with an average of 5.1 bites per person per night. The average biting rate of mosquitoes in general (*Culicidae*) was 46 bites per person per night and ranging from 32 to 65 bites per person per night.
- The total collected mosquitoes through PSC method were 1371 *Anopheles gambiae* s.l. and 3581 *Culicinae* from seven sites. Among *Anopheles gambiae* s.l., 624 were fresh fed, 115 were half-gravid and 24 were gravid. The tables below show that proportion of gravity was 0.2, 1.1 was found in one house and 1 fed is found in one house then 0.13 fed per human host.
- The determination of parity on a sample 1105 *Anopheles gambiae* s.l. dissected and collected from inside and outside in IRS sites and 387 *Anopheles gambiae* s.l. dissected and collected from inside and outside in none IRS sites (control) showed respectively that the parous rates were 26.1% (n=323) in intervention sites and 58.1% (n=227) in none IRS sites. The results showed that the IRS intervention affects the longevity of malaria vectors.
- The entomological inoculation rate (EIR) which is the number of infectious bites per person per unit time was measured and expressed per year. The EIR varied from 0 to 4.5 for *Anophelinae* with the average of 1.4 infectious bites/per/year for the seven sites.

- 123 Anopheles mosquito were tested for blood meal. The results showed that 66.7% were fed on human, 21.1% on bovine, 1.6% on goat, 1.6% both on bovine and goat, 0.8% both on human and goat while 8.1% was unspecified blood source.
- The speciation of Anopheles gambiae sl was performed in the entomology lab to identify siblings of *Anopheles gambiae* complex, 534 samples were analyzed using PCR ID, 32.2% (n=172) samples were found to be *Anopheles gambiae s.s* and 67.8% (n=362) samples were *Anopheles arabiensis*.

The dominant malaria vector recently became *Anopheles arabiensis* in the most entomological monitoring sites within IRS districts.

**Table 2: Distribution of Malaria Vectors/HLC –July 2018 to March 2019**

No	Site name	Anopheles gambiae s.l. / HLC			Other Anopheles / HLC			Culc/HLC	PSC		An	Culc	Culd	Biting behavior %				Biting rate person/night			Inf rate (%) An	EIR An
		In	Out	Total	In	Out	Total		Ag	Culc				Ag. Endo	Ag. Exo	Ao. Endo	Ao. Exo	An	Culc	Culd		
1	Gatore	91	2 42	333	23	337	360	7180	97	345	693	7525	8 218	27,3	72,7	6,4	93,6	6,4	69,7	76,1	0,5	3,21
2	Nyamugali	8	34	42	0	35	35	3790	4	317	77	4107	4 184	19,0	81,0	0,0	100,0	0,7	38,0	38,7	0	0,00
3	Musenyi	70	90	160	115	221	336	4449	148	398	496	4847	5 343	43,8	56,3	34,2	65,8	4,6	44,9	49,5	0	0,00
4	Nyarugenge	165	201	366	24	239	263	3815	114	377	629	4192	4 821	45,1	54,9	9,1	90,9	5,8	38,8	44,6	0	0,00
5	Nyagatare	165	210	375	8	228	236	3068	29	200	611	3268	3 879	44,0	56,0	3,4	96,6	5,7	30,3	35,9	0,8	4,53
6	Rukomo	236	355	591	0	359	359	5254	97	967	950	6221	7 171	39,9	60,1	0,0	100,0	8,8	57,6	66,4	0,2	1,76
7	Remera	191	262	453	46	314	360	2857	336	248	813	3105	3 918	42,2	57,8	12,8	87,2	7,5	28,8	36,3	0,2	1,51
<b>Total</b>		<b>926</b>	<b>1 394</b>	<b>2 320</b>	<b>216</b>	<b>1733</b>	<b>1949</b>	<b>30413</b>	<b>825</b>	<b>2 852</b>	<b>4 269</b>	<b>33265</b>	<b>37 534</b>	<b>39,9</b>	<b>60,1</b>	<b>11,1</b>	<b>88,9</b>	<b>5,6</b>	<b>44,0</b>	<b>49,6</b>	<b>0,2</b>	<b>1,37</b>

**Table 3: Distribution of Malaria Vectors/HLC – April 2019 to June 2019**

No	Site name	Anopheles gambiae s.l. / HLC			Other Anopheles / HLC			Culc /HLC	PSC		An	Culc	Culd	Biting behavior %				Biting rate person/night			Inf rate (%) An	EIR An
		In	Out	Total	In	Out	Total		Ag	Culc				Ag. Endo	Ag. Exo	Ao. Endo	Ao. Exo	An	Cn	Cd		
1	Gatore	55	105	160	7	53	60	858	34	107	220	965	1,185	34,4	65,6	11,7	88,3	6,1	26,8	32,9	0	0
2	Nyamugali	11	20	31	0	5	5	400	0	2	36	402	438	35,5	64,5	0,0	100,0	1,0	11,2	12,2	0	0
3	Remera	6	6	12	20	23	43	791	5	52	55	843	898	50,0	50,0	46,5	53,5	1,5	23,4	24,9	0	0
4	Zaza	54	128	182	4	8	12	251	9	48	194	299	493	29,7	70,3	33,3	66,7	5,4	8,3	13,7	0	0
5	Nyagatare	121	223	344	0	3	3	977	37	48	347	1,025	1,372	35,2	64,8	0,0	100,0	9,6	28,5	38,1	0	0
6	Rukomo	108	135	243	4	1	5	779	47	413	248	1,192	1,440	44,4	55,6	80,0	20,0	6,9	33,1	40,0	0	0
7	Musambira	897	932	1 829	5	14	19	856	414	59	1,848	915	2,763	49,0	51,0	26,3	73,7	51,3	25,4	76,8	0	0
<b>Total</b>		<b>1 252</b>	<b>1 549</b>	<b>2 801</b>	<b>40</b>	<b>107</b>	<b>147</b>	<b>4912</b>	<b>546</b>	<b>729</b>	<b>2,948</b>	<b>5641</b>	<b>8 589</b>	<b>44,7</b>	<b>55,3</b>	<b>27,2</b>	<b>72,8</b>	<b>11,7</b>	<b>22,4</b>	<b>34,1</b>	<b>0</b>	<b>0</b>

**Table 4 : Results of Pyrethrum Spraying Catches: *Anopheles gambiae* s.l–July 2018 to March 2019**

Period	Site	# of houses	# of Occupants	<i>An. gambiae</i> s.l	Abdominal/Blood Digestion stages				Proportion of gravid	<i>An. gambiae</i> s.l. per house	Fed per house	Fed/human host	Culicinae
					UF^	F^	HG^	G^					
July 2018 - March 2019	Gatore	135	574	97	66	16	15	0	48%	0,7	0,2	0,1	345
	Nyamugali	135	540	4	3	0	1	0	100%	0,0	0,0	0,0	317
	Musenyi	135	530	148	67	68	10	3	16%	1,1	0,6	0,2	398
	Nyarugenge	135	604	114	45	45	21	3	35%	0,8	0,5	0,1	377
	Nyagatare	135	627	29	16	9	0	1	10%	0,2	0,1	0,0	200
	Rukomo	135	640	97	44	44	7	2	17%	0,7	0,4	0,1	967
	Remera	135	635	336	159	136	38	3	23%	2,5	1,3	0,3	248
<b>Total</b>		<b>945</b>	<b>4150</b>	<b>825</b>	<b>400</b>	<b>318</b>	<b>92</b>	<b>12</b>	<b>25%</b>	<b>0,9</b>	<b>0,4</b>	<b>0,1</b>	<b>2852</b>

**Table 5: Results of Pyrethrum Spraying Catches: *Anopheles gambiae* s.l–April 2019 to June 2019**

Period	Site	# of houses	# of Occupants	<i>An. gambiae</i> s.l	Abdominal/Blood Digestion stages				Proportion of gravid	<i>An. gambiae</i> s.l. per house	Fed per house	Fed/human host	Culicinae
					UF^	F^	HG^	G^					
April 2019 - June 2019	Gatore	45	173	34	29	4	1	0	20%	0,8	0,1	0,0	107
	Nyamugali	45	245	0	0	0	0	0	0%	0,0	0,0	0,0	2
	Musenyi	45	164	5	1	4	0	0	0%	0,1	0,1	0,0	52
	Nyarugenge	45	174	9	5	1	1	2	75%	0,2	0,1	0,0	48
	Nyagatare	45	219	37	24	8	2	3	38%	0,8	0,3	0,1	48
	Rukomo	45	231	47	17	30	0	0	0%	1,0	0,7	0,1	413
	Remera	45	149	414	129	259	19	7	9%	9,2	6,3	1,9	59
<b>Total</b>		<b>315</b>	<b>1355</b>	<b>546</b>	<b>205</b>	<b>306</b>	<b>23</b>	<b>12</b>	<b>10%</b>	<b>1,7</b>	<b>1,1</b>	<b>0,3</b>	<b>729</b>

Abbreviations: HLC: Human Landing Catching; PSC: Pyrethrum Spray Catch; In: Inside; Out: Outside; An: Anophelines; An.g: *Anopheles gambiae* s.l.; Cn: Culicinae; Cd: Culicidae; Inf: Infectivity; endo: Endophagic; exo: Exophagic, UF<sup>^</sup>: Unfed, FF<sup>^</sup>: Fresh fed, HG<sup>^</sup>: Half gravid, G<sup>^</sup>: Gravid, EIR: Entomological inoculation rate

### 3. Monitoring of Bionomics of Malaria Vectors in 12 Sentinel Sites

Entomological surveillance was carried out over twelve sentinel sites located in different districts according to malaria eco-epidemiology strata (Bungwe and Rwaza in Northern Province, Rukara, Bukora, Mareba and Mimuli in Eastern Province; Busoro, Karambi in Southern Province; Mashasha, Kivumu, Mubuga in Western Province and Kicukiro in Kigali City. . Between July 2018 and June 2019, mosquitoes were collected from indoor and outdoor on a monthly basis for assessment of the following parameters: vector bionomics using human landing catching method, indoor resting behavior of mosquitoes using Pyrethrum Spraying catching method, and monitoring of larval density and occupancy using dipping method.

As shown in table below, during the activity, a total of **96169** mosquitoes(Culicidae) were collected out of them the culicines represent 75.8% and total *Anopheles* mosquitoes 24.2%. The *Anopheles gambiae* s.l. was found as the major malaria vector and representing 83.4% of the total *Anopheles* species (n=23,294). The *anopheles funestus* represent 0.87% of the total catches of *Anopheles* mosquitoes. Over that period, 52% *Anopheles gambiae* s.l. were collected outside and ranging from 34% to 77% per study site (table...). Overall, 56% of *Anopheles funestus* were found feeding outside, and varying from 38% to 76% across the sites.

The biting rate by *Anopheles gambiae* s.l. varied from 0 (Bungwe and Rwaza) to 22 (Mashasha) bites per person per night (bi/p/n), with an average of 3.7 bi/p/n. The average biting rate of mosquitoes in general (*Culicidae*) was 19 and ranging from 4 (Karambi) to 48 (Mashasha) bi/p/n. The entomological inoculation rate (EIR) which is the number of infectious bites per person per unit time was measured and expressed per year. The EIR varied from 0 to 8.7 for *Anopheles gambiae* s.l with the average of 2.8 for the twelve sites. The highest EIR was observed in Mashasha (8.7 infected bites/pers/year), followed by Mubuga (4.7), Rukara(4.1), Busoro(3.7), Mareba (3.7), Kicukiro (3.2) and Mimuli (0.6). This information, particularly at site level should be used to inform the control methods to carry out in specific region.

**Table 6: Monitoring of Bionomics of Malaria Vectors in 12 Sentinel Sites**

No	Site name	<i>Anopheles gambiae s.l.</i>			<i>Anopheles funestus</i>			Total <i>Anopheles</i>	Total <i>Culicidae</i>	Biting behavior, %				Biting rate person/night			Infectivity rate (%) Ag	EIR Ag	Infectivity rate (%) Af	EIR Af
		Inside	Outside	Total	Inside	Outside	Total			Ag. Endo	Ag. Exo	Af. Endo	Af. Exo	Ag	Af	Culicidae				
1	Mimuli	593	307	900	0	0	0	1 003	5 285	66	34	0	0	2	0	12	0,3	0,6	NA	NA
2	Mashasha	4 922	4 461	9 383	18	28	46	9 533	20 793	52	48	0	0	22	0	48	0,4	8,7	0	0
3	Mareba	824	2 343	3 167	0	0	0	4 328	9 570	26	74	NA	NA	7	0	22	0,5	3,7	NA	NA
4	Kicukiro	986	1314	2 300	0	1	1	2 301	19 904	43	57	0	0	5	0	46	0,6	3,2	NA	NA
5	Karambi	47	64	111	0	0	0	124	1 920	42	58	0	0	0	0	4	0,0	0,0	NA	NA
6	Busoro	1 268	1 005	2 273	0	1	1	2 442	13 878	56	44	0	0	5	0	32	0,7	3,7	0	0
7	Bungwe	1	0	1	40	130	170	1121	5 329	100	0	24	76	0	0	12	0,0	0,0	0,0	0
8	Bukora	23	79	102	0	0	0	105	2 985	23	77	NA	NA	0	0	7	0,0	0,0	NA	NA
9	Rwaza	8	8	16	2	2	4	29	3 999	50	50	0	0	0	0	9	0,0	0,0	0,0	0
10	Kivumu	10	21	31	5	3	8	524	7 806	32	68	63	38	0	0	18	0,0	0,0	0,0	0
11	Rukara	290	267	557	6	8	14	594	2 041	52	48	0	0	1	0	5	3,2	4,1	8,3	0,3
12	Mubuga	279	315	594	299	297	596	1190	2 659	47	53	50	50	1	1	6	3,4	4,7	1,5	2,1
<b>Total</b>		<b>9 251</b>	<b>10 184</b>	<b>19 435</b>	<b>370</b>	<b>470</b>	<b>840</b>	<b>23 294</b>	<b>96 169</b>	<b>48</b>	<b>52</b>	<b>44</b>	<b>56</b>	<b>3,7</b>	<b>2</b>	<b>19</b>	<b>0,8</b>	<b>2,8</b>	<b>1,4</b>	<b>2,7</b>

Abbreviations: In: Inside; Out: Outside; An: Anophelines; Ag: *Anopheles gambiae s.l.*; Culc: Culicinae; Culd: Culcidae ; Inf: Infectivity ; endo: endophagic; exo: exophagic, EIR: Entomological inoculation rate

#### 4. Insecticide Resistance Monitoring

The WHO mosquito susceptibility test (cylindrical tube method)<sup>1</sup> was performed to determine resistance to the following seven insecticides belonging to the four classes: Carbamates (Bendiocarb 0.1%); Organophosphates (Fenitrothion 1%, and Pirimiphos methyl 0.25%); Organochlorines (DDT 4%); and Pyrethroids (Permethrin 0.75%, Deltamethrin 0.05%, and Lambdacyalothrin 0.05%).

Larvae collection from the *Anopheles* genus was conducted using the dipping method as described by the WHO<sup>2</sup>; mosquito larvae were subsequently reared in the locally established insectary in different sites following the standard conditions of temperature (26-28°C) and relative humidity (70-80%). The susceptibility test was conducted on *Anopheles gambiae* s.l aged 3 to 5 days, and fed on glucose.

The mosquitoes were exposed to the standard dose of insecticide for one hour (knock down test) and observed for 24 hour post-exposure for mortality assessment; exposure mortality was calculated as number of dead mosquitoes over total number exposed.

A mortality rate between 98% and 100% is considered to indicate susceptibility; 90-97% mortality suggests possible resistance that needs to be confirmed.

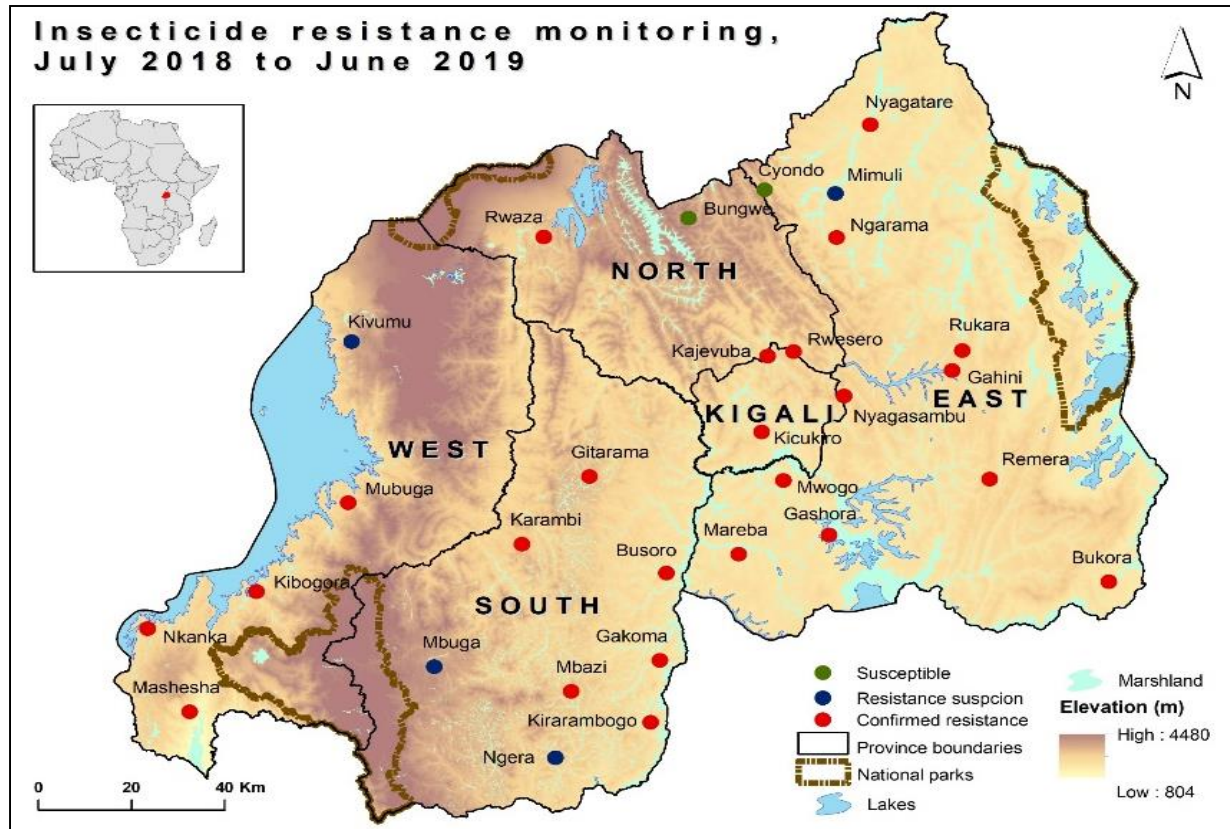
Mortality <90% indicates confirmed resistance. For testing, a minimum of 100 mosquitoes were used in 4 replicates with 20-25 females per tube for each insecticide, each test had a control replicate. In total, the resistance tests were carried out in 30 different sites between July 2018 and June 2019. It was found that resistance status to at least one insecticide was more prevailing in endemic districts of low land areas than in high land (Figure 3).

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<sup>1</sup> WHO (2013). Test procedures for insecticide resistance monitoring in malaria vector mosquitoes

<sup>2</sup> WHO (2013) Malaria entomology and vector control – Learner’s Guide

**Figure 3: Sites for Insecticide Resistance Monitoring**



**Table 7: Results of Resistance Tests for Insecticides Performed 2017-2018**

Susceptibility Status	Tested Product Name													
	<i>Delta.</i> 0.05%		<i>Perm.</i> 0.75%		<i>A-cyhal</i> 0.05%		<i>Pirim.</i> 0.25%		<i>Bend.</i> 0.10%		<i>Fen. 1%</i>		<i>DDT 4%</i>	
	# sites	%	# sites	%	# sites	%	# sites	%	# sites	%	# sites	%	# sites	%
Resist Confirmed	14	47	23	77	23	77	3	10	1	3	0	0	16	53
Resist Suspected	9	30	3	10	1	3	3	10	6	20	1	3	6	20
Susceptibility	7	23	4	13	6	20	24	80	23	77	29	97	8	27

The resistance was observed against different products of the pyrethroid insecticides class where 14 (47%), 23(77%), 23 (77%) of the sites surveyed had confirmed resistance to Deltamethrin, permethrin and Lambda Cyhalothenin respectively. 3 sites (10%) had confirmed resistance to Pirimiphos methyl and 1 site to Bendiocarb, 16 sites(53%) of the sites surveyed had resistance to DDT.



**Table 8: Results of Resistance Tests for Insecticides with (PBO) Performed 2018-2019**

Susceptibility Status	Tested Product Name					
	<i>Delta. 0.05%+PBO</i>		<i>Perm. 0.75%+PBO</i>		<i>A-cyhal 0.05%+PBO</i>	
	# Sites (n=15)	%	# Sites (n=23)	%	# Sites (n=23)	%
Resistance with PBO confirmed	0	0	0	0	1	4
Resist with PBO suspected	1	7	4	17	2	9
Susceptibility restored with PBO	14	93	19	83	19	83

In the twenty-three sites with confirmed resistance to at least 2 products of the pyrethroids class, the use of synergists to boost the toxicity of pyrethroids was evaluated. In those sites, resistance was no longer found in 83% when Permethrin and Lambdacyhalothrin were applied with a synergist and 93% with Deltamethrin. These results suggest a significant role of metabolic mechanisms in mediating pyrethroid resistance in malaria vectors. The addition of PBO to insecticide pyrethroids increase the effectiveness of insecticide in resistance settings.

**Table 9: Results of Resistance Tests for New Insecticides: Clothianidin & Chlorfenapyr, 2018-2019**

Susceptibility Status	Tested Product Name			
	<i>Clothianidin 2%</i>		<i>Chlorfenapyr 200µg</i>	
	# sites (n=13)	%	# sites (n=4)	%
Confirmed Resistance	0	0	0	0
Resistance Suspected	0	0	0	0
Susceptible	13	100	4	100

Starting from January 2019, new insecticides products, Clothianidin of the neonicotinoid class and Chlofenapyr belonging to the pyrrole class have been tested against malaria vectors. Starting from April 2019, Clothianidin combined with Deltamethrin “Fludora Fusion 56.25 WP) is used in IRS intervention and Chlorfenapyr combined with alpha-cypermethrin is planned to be used in the LLINs (Interceptor® G2 nets) which will be distributed in September 2019.

**Table 10: Results of Resistance Tests for Insecticides Performed 2018-2019**

No	Sites	Period	Deltamethrin 0.05%	Permethrin 0.75%	Lambdacyhalothrin 0.05%	Pyrimiphos methyl 0.25%	Bendiocarb 0.1%	Fenitrothion 1%	DDT 4%
1	Mbazi	July 2018	RR	RR	RR	RR	SS	SS	RS
2	Gashora	July 2018	RS	SS	SS	RR	RS	RS	RR
3	Nkanka	July 2018	RR	RR	RR	SS	SS	SS	RR
4	Mimuli	August 2018	RS	RS	RS	RS	SS	SS	RS
5	Nyagatare	August 2018	RS	RR	RR	RS	SS	SS	SS
6	Kibogora	August 2018	RR	RR	RR	RR	SS	SS	RS
7	Cyondo	August 2018	SS	SS	SS	SS	SS	SS	SS
8	Gitarama	August 2018	RS	RR	RR	RS	SS	SS	RR
9	Ngera	September 2018	SS	RS	SS	SS	SS	SS	RS
10	Kivumu	September 2018	SS	SS	SS	SS	SS	SS	RS
11	Mareba	September 2018	SS	RR	RR	SS	SS	SS	SS
12	Bukora	September 2018	RR	RR	RR	SS	SS	SS	RS
13	Mubuga	October 2018	RS	RR	RR	SS	SS	SS	RR
14	Bungwe	October 2018	SS	SS	SS	SS	SS	SS	SS
15	Gahini	November 2018	RR	RR	RR	SS	SS	SS	RR
16	Ngarama	November 2018	SS	RR	RR	SS	SS	SS	SS
17	Remera	December 2018	RR	RR	RR	SS	SS	SS	RR
18	Mwogo	December 2018	RS	RR	RR	SS	SS	SS	RR
19	Gakoma	December 2018	RR	RR	RR	SS	SS	SS	RR
20	Kirarambogo	December 2018	RR	RR	RR	SS	SS	SS	RR
21	Rwesero	March 2019	RR	RR	RR	SS	SS	SS	RR
22	Kajevuba	March 2019	RR	RR	RR	SS	SS	SS	RR
23	Mbuga	May 2019	SS	RS	SS	SS	RS	SS	SS
24	Rwaza	May 2019	RS	RR	RR	SS	RS	SS	RR
25	Mashesha	May 2019	RR	RR	RR	SS	SS	SS	RR
26	Nyagasambu	May 2019	RR	RR	RR	SS	RR	SS	RR
27	Busoro	June 2019	RS	RR	RR	SS	RS	SS	RR
28	Karambi	June 2019	RS	RR	RR	SS	SS	SS	SS
29	Kicukiro	June 2019	RR	RR	RR	SS	RS	SS	RR
30	Rukara	June 2019	RR	RR	RR	SS	RS	SS	SS

SS: Susceptible (98-100%), RS: Resistance Suspicion (90-97%), RR: Confirmed Resistance (<90%).

Λ-cyhal, Lambdacyhalothrin; Perm., Permethrin; Delta., Deltamethrin.; Bend., Bendiocarb.; Fen., Fenitrothion; Pirim.,Pirimiphos methyl or Actellic.

**Table 11: Results of Resistance Tests for Insecticides with (PBO) Performed 2018-2019**

No	Sites	Period	Delta. 0.05%	Perm. 0.75%	Λ-cyhal 0.05%
1	Mbazi	July 2018	SS	SS	SS
2	Nyagatare	August 2018		RS	SS
3	Kibogora	August 2018	SS	SS	SS
4	Gitarama	August 2018	SS	SS	SS
5	Nkanka	July 2018	SS	SS	SS
6	Mareba	September 2018		SS	SS
7	Bukora	September 2018	SS	SS	SS
8	Mubuga	October 2018	SS	SS	SS
9	Gahini	November 2018	SS	SS	SS
10	Ngarama	November 2018		SS	SS
11	Remera	December 2018	SS	SS	SS
12	Mwogo	December 2018	SS	SS	SS
13	Gakoma	December 2018	SS	SS	SS
14	Kirarambogo	December 2018	SS	SS	SS
15	Rwesero	March 2019	RS	RS	RS
16	Kajevuba	March 2019	SS	SS	SS
17	Rwaza	May 2019		SS	
18	Busoro	June 2019		SS	SS
19	Karambi	June 2019		SS	SS
20	Mashesha	May 2019	SS	SS	RS
21	Kicukiro	June 2019		SS	SS
22	Rukara	June 2019	SS	RS	SS
23	Nyagasambu	May 2019		RS	RR

SS: Susceptible, RS: Resistance Suspicion, RR: Confirmed Resistance

PBO: piperonyl butoxide; Λ-cyhal: Lambdacyhalothrin; Perm: Permethrin, Delta: Deltamethrin

## 5. Climate Surveillance

Malaria transmission is predictably high in areas with high temperature ( $\geq 18^{\circ}\text{C}$ ), rainfall ( $> 80$  mm) and relative humidity ( $> 60\%$ )<sup>3</sup> if prevention measures are not optimized. The following data were recorded monthly from ten sentinel sites for malaria surveillance

Table 12: Annual Average Rainfall, Temperature, and Humidity from Ten Meteorological Stations of Entomological Sentinel Sites, 2018-2019

District	Station	Temperature	A.Rainfall	R.Humidity (%)
Kirehe	Bukora	22.0	756.2	68.5
Burera	Bungwe	17.2	1203.8	71.9
Nyanza	Busoro	18.1	1140.7	57.9
Ruhango	Karambi	20.2	992.1	58.2
Rutsiro	Kivumu	17.8	1821.8	71.4
Rusizi	Mashesha	22.2	4864.5	72.2
Nyamagabe	Mbuga	19.0	1107.7	NA
Karongi	Mubuga	20.1	1176.3	63.2
Kayonza	Rukara	21.1	907.8	63.1
Musanze	Rwaza	17.8	1165.0	61.2

This spatial variation of the three climatic variables (temperature, rainfall and R. humidity) is mostly contributing to the distribution of *Anopheles* mosquitoes. Mashesha is the highest warmed ( $22.2^{\circ}\text{C}$ ) with excessively rainy (1784.10 mm) and humidity (72.2%) and contributes over to 64.4 % of all collected *Anopheles* mosquitoes from 12 sites. Hence, malaria transmission should be high in the area with high temperature ( $\geq 18 \leq 35$ ), rainfall ( $> 80$  mm) and R. humidity ( $> 60\%$ )<sup>4</sup> if prevention measures are not optimized.

The comparison with average rainfall reported in 2018-2019, showed a substantial increase of rainfall during 2017-2018 in almost sentinel sites, except Mubuga in Karongi district (Table 11).

<sup>3</sup> Ceccato P., Connor S. J., Jeanne I., Thomson M.C. **Application of Geographical Information Systems and Remote Sensing technologies for assessing and monitoring malaria risk.** *Parassitologia* .47.1 (2005), 81-96

## 6. Quality Control and Quality Assurance of Vector Control Products

No	Product type	Product name	Summary results
1	Insecticide wall paint	Inesfly interior wall paint	Mosquito mortality is at 92%, 28 months post painting
2	Mosquito repellents	Nice dream - Candle - Ointment/cream - Spray formulations	i. The cream mosquito repellent was proven to be effective to protect humans against bites from all mosquito species at 100% for five consecutive hours ii. The candle mosquito repellents had an effect to reduce the bites of <i>An. gambiae</i> s.l. from dusk until 24 pm. However, the protection ensured doesn't reach the 100%. iii. The spray formulation provided little to medium protection against <i>An. gambiae</i> s.l. and culicine mosquitoes at the earlier night

### **Strategy 3: Build Capacity for Vector and Entomological Monitoring**

No	Trainings/Workshop	Participants	Period
1	IRS capacity strengthening	From IRS Districts: Gatsibo, Kayonza, Rwamagana, and Ngoma. Participants were staffs from Administrative District, Hospitals, Sectors and Health centers involved in IRS.	June-July 2019
2	Bio-efficacy of plants-based mosquito repellents	MOPDD and NIRDA teams	May 2019

## PART II: MALARIA CASE MANAGEMENT

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### ***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. Regarding diagnosis and treatment, the following activities were implemented through program strategies to improve access to early diagnosis and appropriate case management to reduce malaria morbidity and mortality.

In this FY 2018-2019, Mal&OPD Division in collaboration with partners are supporting the strengthening of diagnostic testing to ensure that all patients with malaria are properly diagnosed and can receive timely and appropriate treatment. All suspected malaria cases are parasitologically confirmed by either RDT or BS, then malaria is categorized either uncomplicated or severe malaria for the purpose of prescribing appropriate treatment.

With the roll out of Home-based Management of Malaria (HBM) to all ages since October 2016, Community Health Workers now well equipped to provide timely treatment in the community for all cases of uncomplicated malaria, preventing severe malaria and death, and limiting malaria transmission.

Malaria diagnosis, the proportion of suspected malaria cases that received a parasitological test at public health facilities and in the community (for children under 5 years and adults) was sustained at 99.9 % over the review period. Likewise, the proportion of confirmed malaria cases that received the first line antimalarial treatment was sustained at 100% in 2018-2019.

The proportion of the population tested for malaria through RDT or slide microscopy (Annual Blood Examination Rate) decreased from 83% in 2017/18 to 71% during the FY 2018-19. The ABER indicates that the endemicity of malaria and the risk of contracting malaria is still high.

### ***Strategy 1: Provide Malaria Diagnosis to all Suspected Malaria Cases at all Levels***

#### **1. Update of Integrated Malaria Control Guidelines**

The Integrated Malaria Control Guidelines 4th edition, 2019 were developed by the malaria TWG and were approved by honorable Minister.

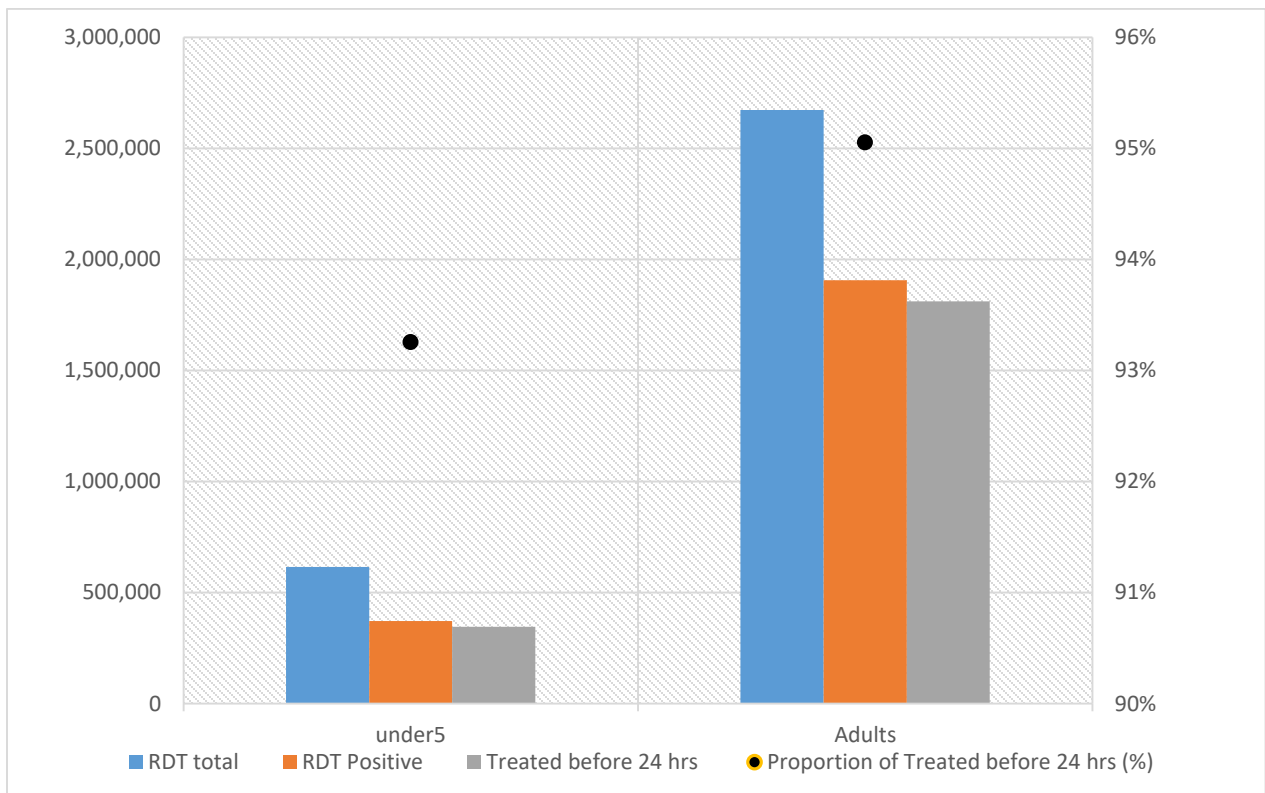
Key changes include the real time notification of severe malaria and stock status by community health workers through Rapid SMS as well as the use of artesunate suppository as pre transfer management of severe cases in under 6 years at community level and the introduction of Fludora Fusion 56.25WP for IRS according to the insecticide resistance management strategy and the LLINs SOPs for quality management.

In order to improve the management of malaria cases in community, different tools and guidelines were produced and distributed in collaboration with MCCH and HIS team, the Integrated Guideline of management of malaria (simple and severe) for community and the code cards for antimalarial stock status and severe malaria notification by CHWs through RapidSMS. With conjunction findings from TIBA, END FUND, MCSP-USAID funded project, 30.000 Community Malaria Management algorithms, 30.000 copies of code cards for severe malaria and antimalarial stock status notification by CHWs were produced and distributed to all Health facilities and CHWs. Additionally, 1680 malaria treatment guidelines algorithm to orient health provider in the diagnosis and the best treatment choice regarding classified malaria cases was produced and distributed to all public health facilities for use.

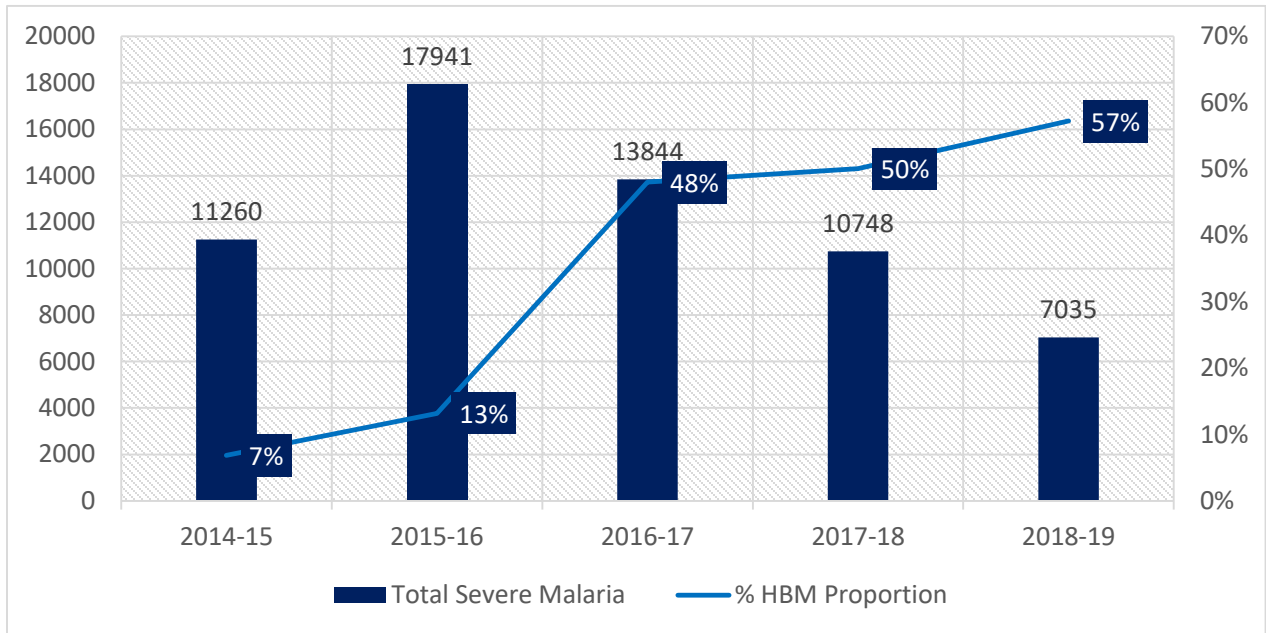
## 2. Case Management of Under 5 Years at Community Level

Since 2016, the community case management in children under five, children above five and adults is implemented countrywide. The figure 4 below shows that 95% of children above five and adults are seeking treatment within 24 hours of signs and symptoms onset at community level compared to 94.13% in 2017-2018.

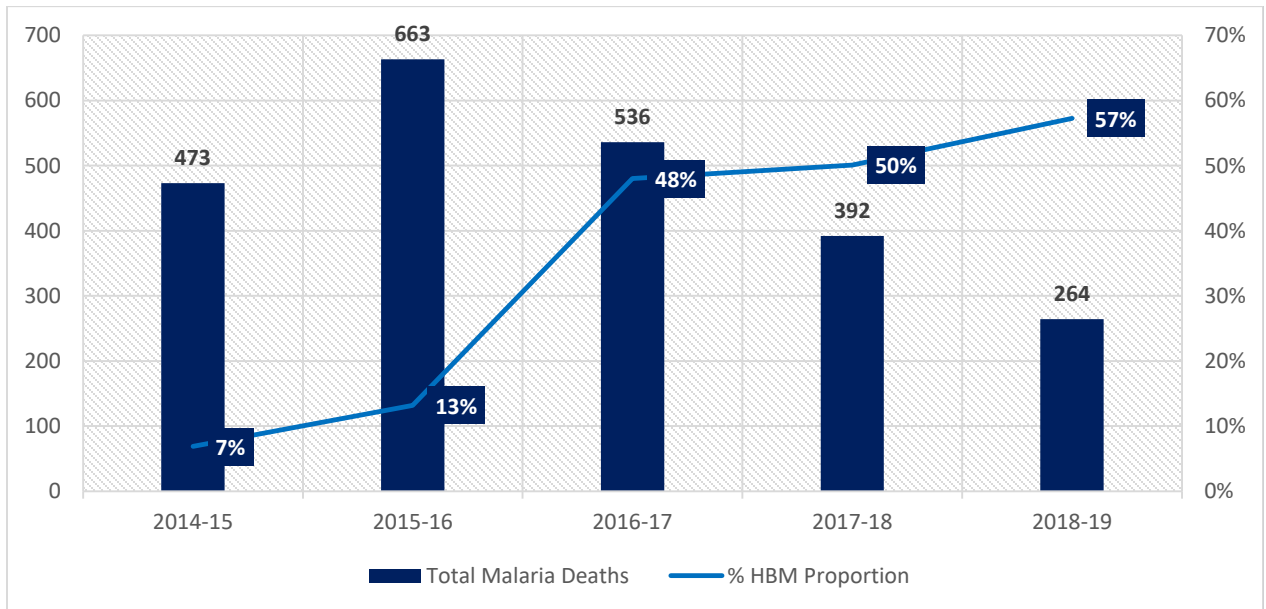
**Figure 4: Community Malaria Case Management in Under 5 YO and Adults, FY2018-2019**



**Figure 5: Severe Malaria Management and Community Case Management Scale Up, 2014-2019**



**Figure 6: Impact of Extended HBM on Malaria Mortality, 2014-2019**



Since 2016, the HBMA was scaled up in all districts and implemented. The above figure shows a steady increase of proportion of children under 5 and above 5 years old and adults who are seeking care in community were from 13% to 57% in 2015-2016 and 2018-2019 respectively. The inverse trends are observed in severe malaria cases (10,748 Severe Malaria cases in FY2017/2018 to 7,035



severe malaria cases in 2018/2019) more than 50% decrease in severe malaria and mortality compared to 2016. The Death due to malaria decreased significantly malaria in District, Provincial and Referral Hospitals with a malaria fatality rate (17/100000 in FY 2015-2016 to 7/100000 in FY 2018-2019) thanks to different strategies put in place especially the adopted scaled up of Home-based management of fever for adults at community level.

**Strategy 3: Strengthen Prompt Access to Treatment of Severe Malaria**

**1. Strengthening of Community Case Management through Capacity Building**

In FY 2018-2019, the Mal & OPDD with its partners has implemented the system of notification of severe malaria cases by CHWs using RapidSMS system. CEHO and CHWs were trained on malaria management, Real time notification on Severe Malaria and Malaria Commodities Stock Management through RapidSMS.

In addition, Mal &OPDD in collaboration with MCSP supported the capacity building of Lab Technicians through the PMI-supported Antimalarial Resistance Monitoring in Africa (PARMA) as shown in the below.

**Table 13: Training of CHWs and Health Providers in Malaria Case Management**

N/S	TOPIC	TARGET GROUP	ACHIEVEMENT
1	Integrated Cascade training of CHWs on Severe Malaria, risk of stock out and Stock out Notification	Head of HC, Data manager and CEHOs	502 HC countrywide trained
		Binomes and ASM	42,049 CHWs from 30 districts
2	PCR Analysis of the Rwanda Artemether Lumefantrine efficacy study	Two NRL Laboratory Technicians	2 PARMA Rotators trained
3	Malaria Microscopy Diagnosis and Species Identification	HC Laboratory technicians	75 Lab Technicians from 75 HC of Nyanza, Mibirizi, Gihundwe, Kabgayi, Gitwe, Muhima and Rwamagana, Ruhango Hospitals
		DH & PH Laboratory technicians	51 Lab Technicians countrywide
4	Training on quantification of malaria commodities	MOPDD, MPPD, TBC...	55 Staffs were trained
5	Training on iCCM and HBMA	Community and Environmental Health Officer	221 CEHOs from 13Districts (Ruhango, Rusizi, Rutsiro, Bugesera, Ngororero, Karongi, Gakenke, Kayonza, Nyaruguru, Huye, Nyamagabe, Rubavu, Nyabihu) were trained.

## **2. Formative Supervision and Malaria Death Audits Visits**

Routine formative supervisions and malaria death audits are conducted by MOPDD Staff as a part of ongoing monitoring, evaluation, and quality assurance efforts in collaboration with district hospital teams.

In this reporting period, the following district hospitals were visited : Bushenge Ph, Butaro DH, Byumba DH, Gahini DH, Gakoma DH, Gihundwe DH, Gisenyi DH, Gitwe DH, Kabaya DH, Kabgayi DH, Kaduha DH, Kibagabaga DH, Kibilizi DH, Kibogora DH, Kibungo RH, Kibuye RH, Kigeme DH, Kirinda DH, Kiziguro DH, Masaka DH, Mibilizi DH, Mugonero DH, Muhima DH, Muhororo DH, Munini DH, Murunda DH, Nyagatare DH, Nyamata DH, Nyanza DH, Remera Rukoma DH, Ruhango Ph, Ruhengeri RH, Ruli DH, Rutongo DH, Rwamagana Ph, Rwinkwavu DH, Shyira DH

These regular death audits visits have greatly contributed to a decrease in malaria related deaths and improved quality of severe case management.

However, there is still a need to educate community for early treatment and regularly support all health care providers in all districts for a proper management of malaria cases and early consultation either CHWs or nearest Health Facility.

### **Strategy 4: Strengthen Quality Assurance and Control of Malaria 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 ensures 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.

#### **1. Quality Control of Blood Smears at District Hospitals RDTs**

The NRL has established the Laboratory Malaria Diagnosis External Quality Assurance (EQA) program to ensure the quality of malaria diagnosis in the national laboratory network. In addition to routine laboratory quality assurance processes, EQA includes blinded slide retesting, proficiency testing, and on-site supervision.

Quarterly evaluation of the quality of thick and thin smear practices, Giemsa staining, and microscopy results are enforced in health facilities in Rwanda. Health center practices are supervised by the district hospital, and district hospitals are supervised by the NRL.

Among the 42 district hospitals in which EQA/QC of blood smears was conducted during the FY 2016-2017, 2017-2018-2018-2019, EQA/QC was noted compared to the previous fiscal year with a decrease in overall discordance from 4.12% to 1.36% to 1.64% which remain below the cut off 5% acceptable range.

The malaria program will continue to work closely with NRL to correct reported discrepancies in district hospitals through formative and refresher training during the next fiscal year 2019-2020.

## 2. Quantification of Malaria Commodities

The objective of good procurement and supply chain management (PSM) is to ensure that malaria commodities are available at all levels of the supply chain and the stock level is always between the minimum and maximum levels.

In this fiscal year 2018-2019 the Division in collaboration with all partners has managed to keep the stock available on the desired stock level in general thanks to the new strategy of regular supply plan reviews, use of appropriate quantification tools and willing of partners to support the entire process. Several quantification reviews took place over the reporting period to adjust the real need in malaria commodities. All needs identified during the quantification exercise and supply plan reviews were procured (as per the table below) by the Government of Rwanda, Global Fund and partner of the RBC, the GHSC-PSM Project and distributed to all levels (District Pharmacies, Health facilities and Community) for use.

**Table 14: List and Quantities of Malaria Commodities Procured in FY2018/2019**

<b>Product</b>	<b>Quantity Procured</b>	<b>Source of Funds</b>
Artemether-Lumefantrine 1x6, Blisters	726,138	GF
Artemether-Lumefantrine 2x6, Blisters	811,073	GF
Artemether-Lumefantrine 2x6, Blisters	368,120	PMI
Artemether-Lumefantrine 3x6, Blisters	1,033,168	GF
Artemether-Lumefantrine 3x6, Blisters	211,542	PMI
Artemether-Lumefantrine 4x6, Blisters	1,700,767	GF
Artemether-Lumefantrine 4x6, Blisters	1,192,612	PMI
Artesunate 60mg/MI Vials	52,829	GOR
Malaria RDTs	7,127,932	GF
Quinine 300mg Tablets	1,170,900	GOR
Quinine 300mg/MI, 2ml Ampoules	80,060	GOR

## PART III : MALARIA SURVEILLANCE AND EPIDEMIOLOGY

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### **Objective 3: By 2020, All Health Facilities Will Provide Complete Reporting to Strengthen Surveillance, Monitoring and Evaluation and Operational Research**

Today, malaria remains a major public health challenge in Rwanda, with the entire population at risk. From 2013, malaria morbidity has been increasing in Rwanda despite efforts deployed in malaria control activities.

Following this upsurge of malaria, the Government of Rwanda has put in place the national Malaria contingency plan in 2016 to ensure all key stakeholders play their roles in malaria control.

Key malaria control interventions currently in place include IRS, LLINs Distribution, Community case management, introduction of new vector control tools and multi-sectoral collaboration in malaria response.

In line with effective monitoring of national malaria control interventions, the Ministry of health regularly collects malaria data from all public health facilities through the Rwanda Health Management Information System (HMIS) and from community through SISCom.

Data are used to inform the program and guide decision making at all levels.

In addition, operational research such as Surveillance of antimalarial drug efficacy and drug resistance, Entomological surveillance and vector control monitoring and other studies are conducted on regular basis to support evidence decision making to fight against malaria.

#### **Strategy 1: Strengthen Malaria Reporting from Monthly to Real Time Notification**

Since September 2018, in order to strengthen the treatment of malaria at community level, RapidSMS notification was introduced for tracking stock-outs and community-based drugs replenishments at real time and this, to prevent community health workers to spend a long time without drugs.

Through the same system, community health workers notify severe malaria cases received to the health centers and the hospital to enable them to follow up and to intervene in a timely manner in order to prevent deaths due to Malaria.

#### **Strategy 2: Strengthen Malaria Epidemiology, Surveillance, Monitoring and Evaluation**

For the proper and effective use of data to guide decision making, the Malaria Program regularly collects data from HMIS and SISCOM and generate key malaria epidemiological data as follows. The table below summarizes the key malaria indicators for the period 2018-19 and performance compared to previous period:

**Table 15: Key Malaria Program Indicators**

No	Indicators	2016/17	2017/18	2018/19
1	Malaria Incidence per 1,000 persons per year	418	389	321
2	Slide Positivity Rate (%)	51%	47 %	45%
3	Uncomplicated Malaria Cases	4,833,895	4,658,518	3,969,881
4	Severe Malaria Cases	14,033	10,894	7,035
5	Malaria Deaths	536	392	264
6	Case Fatality Rate (per 100,000 Malaria cases)	11	8	7
7	Proportion of malaria cases treated at community level (HBM)	48%	50%	57%

#### Key Malaria Program Successes

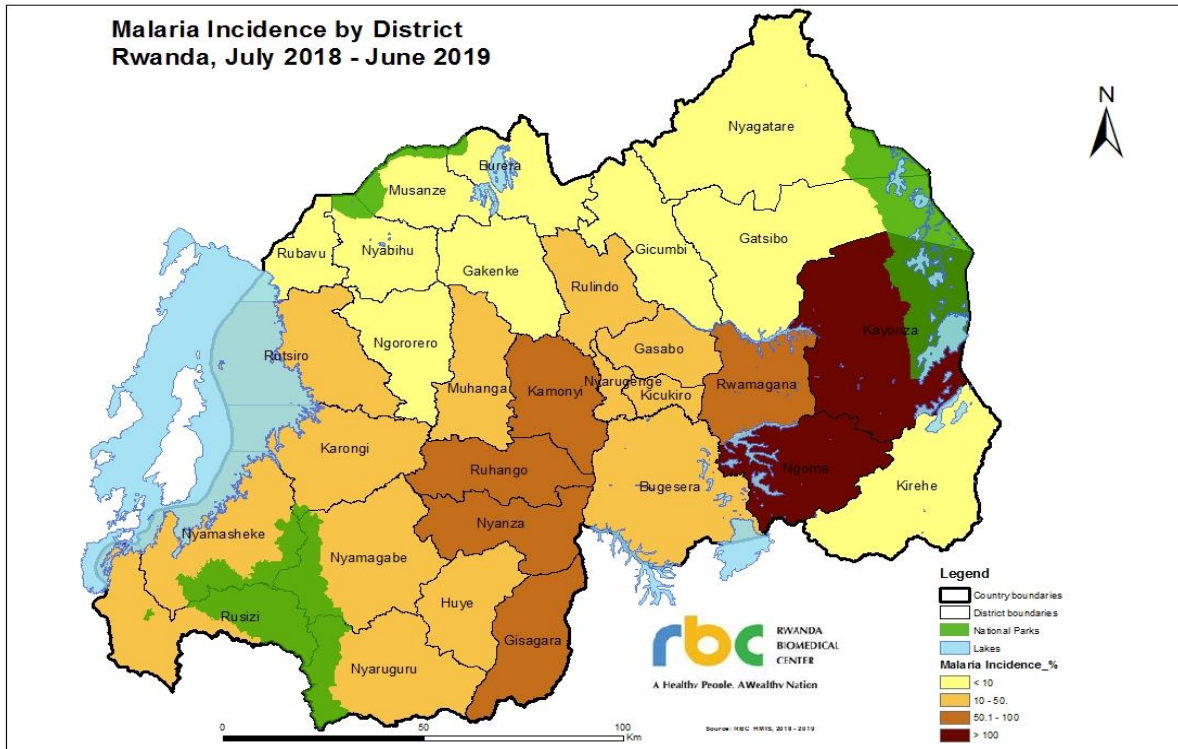
- 17% Reduction of in Malaria Incidence from 2017/18 to 2018/2019 and 23.2% from 2016/2017 to 2018/2019
- 15% Reduction in Un-complicated Malaria Cases from 2017/18 to 2018/19 and 17.9% from 2016/2017 to 2018/2019
- 35% Reduction in Severe Malaria Cases from 2017/18 to 2018/19 and 49.9% from 2016/2017 to 2017/2019
- 33% Reduction in Malaria Deaths from 2017/18 to 2018/19 and 51% reduction from 2016/17 to 2018-2019
- Today, 57% of all malaria cases are being treated at Community Level by CHWs

### 1. Malaria Incidence

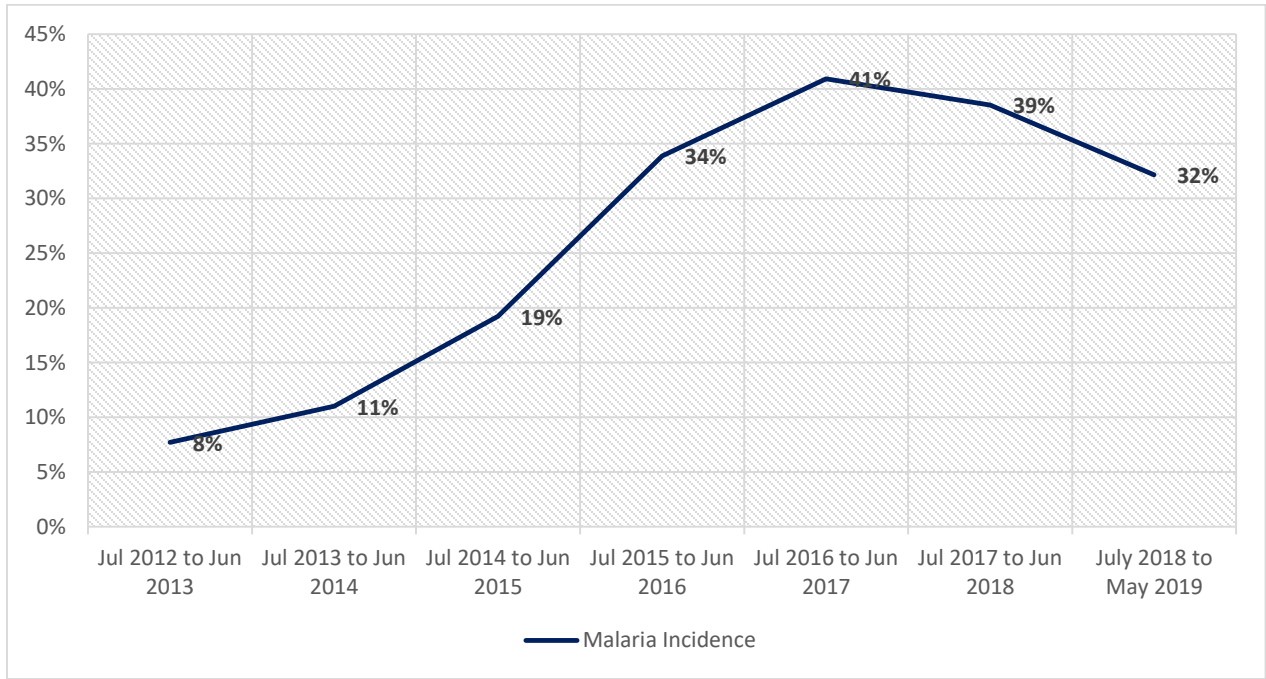
Malaria incidence has been calculated to the projected general population of 12,374,398 for 2019. Data shows that the national malaria incidence in Rwanda reduced from 418 cases per 1,000-person year in 2016-2017 to 321 cases per 1,000-person year FY 2018-2019.

This malaria incidence varies from <100% in Burera, Gakenke, Gicumbi, Musanze, Ngororero, Nyabihu, Rubavu, Rutsiro, Nyagatare, Kirehe and Gatsibo district to greater than 300% in Bugesera, Gisagara, Huye, Kamonyi, Kayonza, Ngoma, Nyamasheke, Nyanza, Ruhango, Rusizi and Rwamagana.

**Figure 7: Malaria Incidence (%) by District in the FY 2018-19**



**Figure 8: Trends in Malaria Incidence per 100 Persons Year, July 2012-June 2019**



## 2. Malaria Morbidity

In the FY2018-2019, 22 % of all of individuals attending outpatient’s consultation in health facilities presented with malaria compared to 30% in 2017-2018. The proportional morbidity of malaria varies across districts from 1% in Nyabihu, Musanze, and Burera districts to 53 % in Ngoma and Kayonza districts.

The District of Bugesera, which during the last year had 70% of malaria morbidity proportion, recorded a reduction to 22% mainly due to sustained IRS.

## 3. Malaria Test Positivity Rate

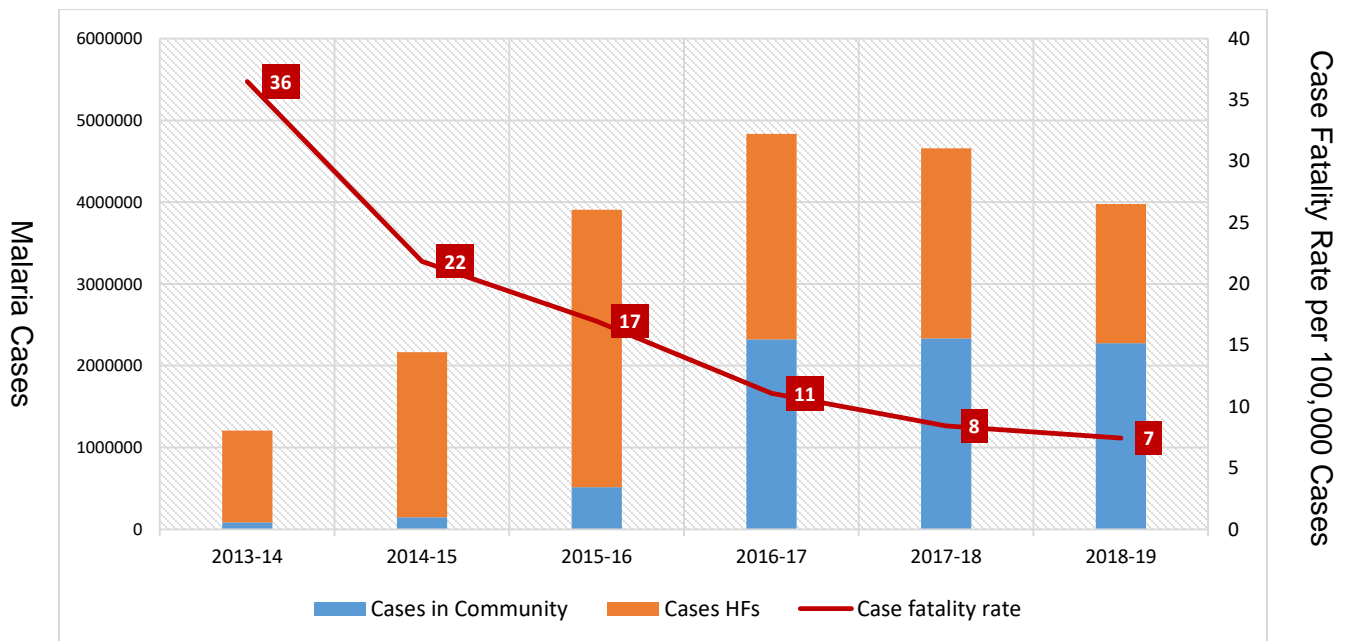
In this FY2018-2019, a total of 8,784,690 malaria tests were performed to people suspected with malaria (5,497,057 tested at Health facility and 3,287,633 at community level respectively) from which 3,986,151 were tested positive (Slide Positivity Rate of 45% at national level). The Slide Positivity Rate being 69% at community level and 31% at health facility level.

## 4. Uncomplicated Malaria Cases

From July 2018 to June 2019, a total of 3,969,881 uncomplicated malaria cases were reported (a decrease by 14.6% compared to the FY 2017/ 2018) with 73% of all national burden registered in Top 10 Districts.

In general, children under 5 years’ account for 13,3 % of all malaria cases and Malaria deaths for under 5 Years account for 2,3% of all Malaria deaths. The case fatality rate has decreased from 22 per 100,000 in 2014-2015 to 7 per 100,000 in 2018-2019 due to early diagnosis and treatment at community level.

**Figure 9: Malaria Cases per Level of Services Delivery and Cases Fatality Rate, 2013-2019**



## 5. Severe Malaria Cases

Over the reporting period, 7,035 cases of severe malaria were reported at the facility level. This is a 35% decrease compared with the number of severe malaria cases reported from July 2017-2018 (10,748 severe cases). This indicates that interventions such as early diagnosis and treatment have been successful in decreasing the number of severe cases and consequently the number of malaria deaths.

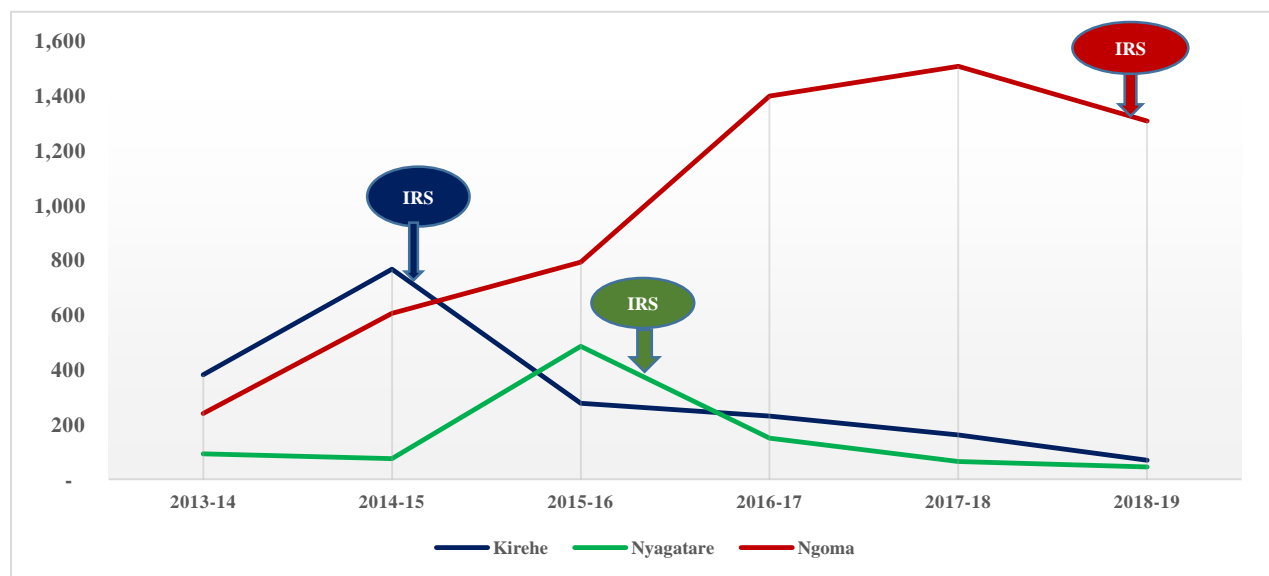
## 6. Malaria Mortality

Over the FY 2018-2019, 264 malaria deaths were recorded following hospitalization for severe malaria compared to 392 deaths in the FY 2017-2018. The decrease in malaria deaths may be a result of the malaria HBM interventions and the free treatment of malaria for Category I and II of Ubudehe.

In the FY 2018-2019, the proportional mortality due to malaria represented 2.6 % of all deaths with the highest rate in Gisagara District (10%) and the only Top Ten districts representing 67% of Malaria deaths countrywide.

## 7. Impact of Sustained Indoor Residual Spraying in Targeted Districts

**Figure 10: Impact of Sustained IRS in Kirehe & Nyagatare: Malaria Incidence per 1,000 Person Years 2013-2019**



The above graph shows the effectiveness of sustained IRS interventions in Nyagatare and Kirehe districts compared to Ngoma district where IRS was not yet implemented. In Kirehe district the Incidence drops from 381 to 69 per 1,000 persons from FY 2013-2014 to 2018-2019, however, for



the same period in Ngoma district where IRS intervention was not yet implemented, the incidence increased from 240 to 1,308 per 1,000 persons per year.

## **8. Strengthening Health Information System**

With the objective of strengthening the Health Information System to track malaria cases and reduce malaria deaths, different interventions have been implemented. The reporting rate is on 98.8% in public health facilities and the timeliness for his year is on 95%.

- RapidSMS Real time Notification of Severe Malaria and Stock Status at community level for continuous malaria treatment at community level and proper severe malaria care and treatment. Severe malaria received in the community must be notified directly by community health workers to the health centers and the hospital to enable them to follow up and to intervene in a timely manner to prevent deaths due to Malaria.
- MOPDD in Collaboration with PMEBS Division have created Dashboards to track data quality issues. Those dashboards are used on monthly basis to check the consistence between number of cases treated, blood smears or RDT positives and malaria drugs dispensed.
- Staff from MOPDD have been trained to the use of WHO data quality tool to check malaria reported in terms of consistency between related data elements and over time.
- During this year, supportive supervision was done in all 43 districts by MOPDD staff for capacity building and technical support to health facility data managers, health care providers and to Community Health Workers Officers at DHs and HCs to improve data quality, data analysis, reporting and data use.
- Data quality Assessment are organized by MOPDD on quarterly basis where reported data are compared to data into source documents (registers, patients files, stock cards...) for a specific period of time. After the completion of this exercise in hospital and some health centers for its catchment area, a feedback meeting is organized.
- MOPDD staff participated in ISS/DQA that is organized by PMBS Division during April and May 2019. Normally, it is conducted twice a year and all the forty-three Public Hospitals were assessed during this ISS/DQA. This exercise was conducted in 36 District Hospitals, 4 Provincial Hospitals, 3 Referral Hospitals, 90 Health center selected randomly and two Community Health Workers (CHWs) “Binome” and “Agent de Santé Maternelle” (ASM) in each village of the sampled HC were supervised.

## **Strategy 6: Develop and Implement an Operational Research Agenda for Malaria**

In line with improving the quality of malaria related services, the malaria program has conducted two main activities including Therapeutic Efficacy Study, and

### **1. Therapeutic Efficacy Study**

Monitoring the efficacy of antimalarial medicines is a key component of malaria control. WHO recommends that national malaria control programs adopt antimalarial medicines with a parasitological cure rate of more than 95% and medicines should then be monitored at least once every 24 months at established sentinel sites. Protecting the efficacy of ACTs as the current first-line treatment for *P. falciparum* malaria is now among the top global public health priorities. In Rwanda, the drug efficacy study conducted 2018 studying AL efficacy, showed a high level of efficacy with PCR corrected cure rates at 28 days at 96% among the three study ALN remains effective in its implementation in Rwanda, there were no cases of Early Treatment Failure in the study.

Deep analysis of resistance markers as this round successful sequencing revealed 19 Pfk13 drug resistance mutation data is planned to be conducted in the next fiscal year 2019-2020 and the next round 2020 monitoring protocol will be prepared.

### **2. The Intermittent Screening and Treatment (IST) of Malaria in Pregnancy Study**

The Government of Rwanda wanted to determine whether the IST approach is an effective, and assigned MSCP to support MOPDD/RBC in assessing if it was feasible and appropriate as a malaria in pregnancy (MIP) intervention for the national malaria strategy. Data collection in 14 study sites in Huye and Kamonyi districts was initiated in September 2016 and completed in July 2018. At the conclusion of the study, findings showed that the prevalence of malaria among study women in intervention sites measured by RDT during the first antenatal care visit was 10.6% and women in the ISTp group were not significantly less likely to have malaria at delivery, measured by either RDT or PCR, when compared to women who received routine antenatal care

There was no difference in the proportion of low birth weight infants or preterm deliveries between the arms. Based on results of the study “Effectiveness of intermittent screening and treatment of malaria in pregnancy (ISTp) on maternal and birth outcomes in selected districts in Rwanda”, ISTp should not be adopted into ANC protocols for Rwanda.

### **3. Other Ongoing Research Proposals**

The following research projects were presented at the National Ethic Committee for approval.

- Evaluation of the impact of coils and lotion mosquito repellents used in combination with LLINs on the prevention of malaria vector transmission in high and low malaria endemicity areas, Rwanda. The protocol was developed in collaboration with MOPDD, SFH, and SC Johnson
- Estimating the Malaria Prevention Impact of New Nets: Observational Analyses to Evaluate the Evidence Generated During Piloted New Nets Distribution In Rwanda, Entomology component
- Assessing the Durability of Long Lasting Insecticidal Treated Nets (LLINs) Post Mass Distribution in Rwanda

## PART IV: PROGRAM COORDINATION AND MANAGEMENT

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### **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 has put more efforts to develop and strengthen collaborative and partnership initiatives to accelerate malaria prevention and control in Rwanda and the region. The following are the strategies used to achieve the above objective.

#### ***Strategy 4: Advocate for Concerted Inter-country Efforts against Malaria***

In FY 2018/2019, the Rwanda Ministry of Health in collaboration with WHO, EAC with financial support from SFH Rwanda organized the first meeting on Cross-border malaria initiatives. The meeting was held in Kigali from 22<sup>nd</sup> to 24<sup>th</sup> April 2019 and involved the Eastern African Community Partner States, Democratic Republic of Congo (DRC) National Malaria Control Programs Representatives, Country WHO representative, Presidential Malaria Initiative (PMI) from each country, Representative of Roll Back Malaria (RBM), representative of African Leaders Malaria Alliance (ALMA), representative of Society for Family Health, and EAC Secretariat as shown in the following table.

<b>Country/ Organization</b>	<b>Definition</b>	<b>Attended</b>
East Africa Community	By expertise	2
Ministry of Health	3 persons per country	20
MOH Rwanda (Hosting)	Group Facilitators	4
WHO/National Program Officers Malaria	One per country	7
WHO/AFRO staff	By Expertise	4
PMI	One per country	3
Society for Family Health (SFH), Rwanda and SC Johnson	Financial and technical support	4
RBM Partnership Staff	By Expertise	1
ALMA Staff	By Expertise	2
<b>Total</b>		<b>46</b>

**Photo: Participants to the Great Lakes Malaria Initiatives Meeting, Kigali (April, 2019)**



### **Key Recommendations from the Meeting**

1. Consensus was reached on naming the initiative as “The Great Lakes Malaria Initiative” (GLMI)
2. Finalize the GLMI Collaboration Framework
3. Maintain a political momentum with a focus on cross border malaria initiative Country ownership and leadership
4. Development of a Great Lakes Malaria Initiative Strategic Plan
5. Strengthen mechanism for Information Sharing across the Region
6. Synchronize operations implementation at border districts
7. Harmonization of Operational Research Protocols and effective results sharing

## PART V: SOCIAL BEHAVIOR CHANGE COMMUNICATION

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### **Objective 5: By 2020, 75% of the Population Will Have Correct Practices and Behaviors Towards Malaria Control**

The malaria Social Behavior Change and Communication (SBCC) interventions were conducted with the aim of increasing the community awareness in malaria control in Rwanda.

#### ***Strategy 1: Develop the Malaria Advocacy, Communication and Social Mobilization Strategy***

In this reporting period of FY2018-2019, a number of mass communication activities such as advocacy, mass media campaigns (Radio and TV programs), Urunana Radio Drama, malaria documentary film, community mobilization during Mother and Child Health or IRS campaigns, and community outreach campaigns or community work organized countrywide by Malaria Program in collaboration with its key partners (SFH Rwanda, Urunana, etc.).

The awareness messages focused on malaria control and prevention in Rwanda and created the awareness on behavior change and social norms including sleeping under LLINs, environmental hygiene to destroy the mosquitoes breeding sites and early diagnosis and treatment of malaria at Community of Health Facilities.

- Production and airing of radio spots
- Production and airing of weekly malaria talk shows and dramas (radio)
- Urunana radio drama
- Production and airing of TV spots
- Production of documentary film
- Develop a booklet with malaria messages

Society for Family Health (SFH) Rwanda being one of the leading local Social Marketing and behavior change communication (BCC) Organization that specializes in innovative business approaches to empower vulnerable people to adopt healthier solutions, its major interventions are centered on promotion of behavior change practices through improved communication techniques and social marketing of health products and services related to HIV/AIDS, Malaria, Family Planning, Water, Sanitation and Hygiene (WASH) and Nutrition.

In this reporting period, SFH Rwanda through Rwanda Social Marketing program (RSMP) intervention implemented audience focused targeted social behavior change communication using community level and mass media interventions. Community level interventions such as drama and mobile video shows were conducted to increase the appropriate and consistent use of Long- Lasting Insecticide treated Nets (LLINs), early treatment of malaria at the first signs and maintenance of good environmental hygiene (Clearing mosquito breeding places). These community level events were conducted in malaria high burdened districts of Bugesera, Karongi, Huye, Nyamasheke, Gisagara, Nyanza, Nyagatare, Gatsibo, Kirehe, Ngoma.

## PART VI: NEGLECTED TROPICAL DISEASES & OTHER PARASITIC DISEASES

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### 1. National NTD Strategic Plan 2019-2024 and National NTDs Guidelines

In collaboration with WHO and other Stakeholders, National NTD Strategic Plan 2019-2024 and National NTD&OPDs Guidelines were developed and approved the Ministry of Health in alignment to the HSSP IV 2018-2024.

In this reporting period, the National NTDs Strategic Plan was disseminated to all key Government institutions and other partners for implementation.

### 2. NTDs Preventive Chemotherapy or Mass Drug Administration (MDA)

For FY2018/2019, two rounds of Mass Drug Administration (MDA) for STH and Schistosomiasis were implemented in integration with the Maternal and Child Health Week.

**Table 16: Results of the First Round of MDA (MBZ/ALB), October 2018**

Medicines	Targets		Number Reached	Coverage (%)
Mebendazole (MBZ)	1-4 Years	1,421,011	1,460,923	103
Albendazole (ALB)	5-15 Years	3 500 415	3,599,111	103
Total MBZ or ALB	1-15 Years	4,921,426	5,060,034	103

**Table 17: Results of the Second First Round of MDA (MBZ/ALB&PZQ), April 2019**

Medicines	Targets		Number Reached	Coverage (%)
MBZ	1-4 Years	1,456,579	1,252,920	86
ALB	5-15 Years	3,578,663	3,498,620	98
Total MBZ or ALB	1-15 Years	5,035,241	4,751,540	94
Praziquantel	5-15 Years	1,139 030	1,102,821	97

**Table 18: Results of Adult MDA in Gisagara District (ALB&PZQ) Coverage in September 2018**

Medicines	Targets		Number Reached	Coverage (%)
Albendazole (ALB)	Adults	144,421	147,965	102
Praziquantel	Adults	144,421	144,247	100

### 3. NTDs Surveillance Activities

Health Facility sentinel-based surveillance activities of Human African Trypanosomiasis, STH and Schistosomiasis were conducted in 2018/2019 FY.

- For Trypanosomiasis, no positive case yet found since the start of active and passive surveillance in 2016. In collaboration with key stakeholders in Trypanosomiasis surveillance, the program is planning to prepare the application dossier for validation of elimination by World Health Organization during the FY2019/2020.
- For STH and Schistosomiasis, the supervision for monitoring and evaluation of the surveillance activities was conducted in June 2019 and final report will be finalized in the first quarter of FY2019/2020



## PART VII: FINANCING THE MALARIA AND NTD PROGRAMS

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### 1. Introduction

The financing of Malaria Strategic Plan becomes increasingly a high priority for the GoR. The MSP is funded by the Government of Rwanda, the Global Fund for HIV & AIDS, TB and Malaria Results Based Financing (GF), the US President’s Malaria Initiative, END Fund and WHO.

Through SMART FMIS (Integrated Financial Management Information System), data of the actual financial report were generated given that HRTT captured so far budget and expenditures of the reporting period. To facilitate the collection of financial information for this year’s report, a separate data collection process was adopted using for Global Fund grant and Government contribution; and directly from in country office for PMI.

### 2. Public and External Funding Sources for Malaria Program

Below a summarized table illustrates the malaria budget by source of funding with: PMI followed by GoR, Global Fund and END FUND for Fiscal year 2018/2019. The current total expenditures are amounting to USD 62,997,924 which represents 79% of total budget of USD 79,785,653.

**Table 19: Malaria Budget and Expenditures by Source of Funds, FY2018-2019**

Funding Sources	Total Budget	Expenditures	Budget Execution Rate
GLOBAL FUND	36,063,333	20,556,284	57%
PMI	18,000,000	18,000,000	100%
GoR	25,406,124	24,151,696	95%
END Fund	316,196	289,944	92%
<b>TOTAL</b>	<b>79,785,653</b>	<b>62,997,924</b>	<b>79%</b>

### 3. Government Expenditures by MTEF Chapter for Fiscal year 2018-2019

The total GoR contribution to malaria expenditures is USD 25,406,124 from this budget the total expenditures is USD 24,151,696 represents 95% of total budget.

As shown in Table below, of the total expenditure was allocated to the Compensation of employees MTEF Chapter, which was executed at 99%. The other expenditures MTEF Chapter was executed at 91%:

**Table 20: Government Expenditures by MTEF Chapter for Fiscal Year 2018-2019**

MTEF Chapter	Budget (USD)	Expenditures Budget (USD)	Variance in USD	Budget Execution Rate (%)
21 Compensation of employees	11,945,904	11,856,075	89,829	99%
28 Other expenditures	13,460,220	12,295,621	1,164,599	91%
<b>Grand Total</b>	<b>25,406,124</b>	<b>24,151,696</b>	<b>1,254,428</b>	<b>95%</b>

#### 4. Global Fund contribution to Malaria Program

The Global Fund contribution for the FY2018–2019 was USD 36,063,333. From this budget, a total amount of USD 20,556,284 was spent, the variance of USD 15,507,049 is committed to pay 80% of LLINs contracted amount after delivery (12,393,123USD), supervision of LLINs distribution for central and decentralized level and IRS supervision and operational costs (705,200USD) in the next Fiscal Year 2019/2020.

**Table 21: Global Fund Expenditures by NSP Budget Categories for July 2018 to June 2019**

Budget categories	Budget in USD	Expenditures in USD	Variance in USD	Budget Execution Rate in %
1 Human Resource	413,041	400,782	12,259	97%
12 Overhead Costs	91,179	77,385	13,793	85%
4 Medicines and Pharmaceutical products	1,673,245	1,175,112	498,133	70%
5 Health Products and Health Equipment	28,178,719	15,785,596	12,393,123	56%
6 Procurement and Supply Management (PSM)	3,039,101	1,154,561	1,884,540	38%
9 Monitoring and Evaluation	2,668,049	1,962,849	705,200	74%
<b>Grand Total</b>	<b>36,063,333</b>	<b>20,556,284</b>	<b>15,507,049</b>	<b>57%</b>

#### 5. PMI Expenditures for the Fiscal Year 2018-2019

The PMI contribution for malaria expenditures went specifically to malaria preventive intervention and to malaria case management interventions. The budget for preventive interventions was spent

mainly on the procurement of LLINs and IRS. The total budget of USD 18,000,000 was executed at 100%.

**Table 22: END FUND Expenditures by Cost Category for the Fiscal Year 2018-2019**

<b>Activity</b>	<b>Budget in USD</b>	<b>Expenditures in USD</b>	<b>Variance in USD</b>	<b>Budget Execution Rate in %</b>
Conduct KAP survey for community Health Workers	572	572	0	100%
Conduct training of CHWs on NTDs (prevention and MDA)	6,528	6,528	-	100%
Organize twice a year mass drug administration of deworming medicines in children from 1 to 15 years old	309,096	282,844	26,252	92%
<b>TOTAL</b>	<b>316,196</b>	<b>289,944</b>	<b>26,252</b>	<b>92%</b>

The budget of END FUND was executed at the 92% according to the contribution of all partners.

## 6. Conclusion

The overall Malaria Budget execution for Fiscal year 2018-2019 is at 79%. Unused budget is committed for LLINs already procured for the next mass and routine distribution and Indoor Residual Spraying in high endemic districts planned in Fiscal Year 2019-2020

## PART VIII: MALARIA PERFORMANCE FRAMEWORK

**Table 23: Malaria Program Performance Framework**

ITEMS	INDICATORS	Baseline	Year of Baseline	2018-2019 Target	2018-2019 Results
<b>Goal</b>	<b>Impact Indicators</b>				
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	308	2015-16	383	321
	Inpatient malaria deaths per 100,000 persons per year	6.2	2015-16	4,5	2,1
	Number of confirmed malaria deaths	698	2015-16	542	264
<b>Objective 1:</b>	<b>Outcome Indicators</b>				
By 2020, 90 % of population at risk will be effectively protected with locally appropriate preventive and vector control interventions based on evidence	Proportion of structures in targeted areas that received indoor residual spraying (IRS) during the reporting period	98%	2015-16	99%	99,7%
	Proportion of population protected by indoor residual spraying within the last 12 months in targeted districts	98.90%	2015-16	99%	99,5%
<b>Objective 2:</b>	<b>Outcome Indicators</b>				
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%	2015-16	99%	100%
	Proportion of suspected malaria cases that receive a parasitological test at the community level	99%	2015-16	99%	100%
	Proportion of confirmed malaria cases that received first-line antimalarial treatment according to national guidelines at public sector health facilities*	98.4%	2015-16	100%	101%
	Proportion of confirmed malaria cases that received first-line antimalarial treatment according to national guidelines at the community*	79%	2015-16	100%	101%
<b>Objective 2:</b>	<b>Outcome Indicators</b>				
By 2020, strengthen surveillance, monitoring and evaluation and operational research	Proportion of public health facilities submitting malaria indicators timely	94	2015-16	95%	95.8%
	Proportion of public health facilities submitting complete report on malaria indicators	98	2015-16	98%	97.6%

ITEMS	INDICATORS	Baseline	Year of Baseline	2018-2019 Target	2018-2019 Results
	Proportion of private health facilities submitting complete report on malaria indicators	45	2015-16	49%	51.1%
<b>Objective 4:</b>	<b>Outcome Indicators</b>				
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	0	2015-16	1	1

**Note:**

Following the OIG recommendations of 2018 and after discussion with the GF/Secretariat, two RBF-Malaria Performance Indicators changed the way of reporting and source of data as follows

(1) Proportion of confirmed malaria cases that received first-line antimalarial treatment according to national guidelines at public sector health facilities and

(2) Proportion of confirmed malaria cases that received first-line antimalarial treatment according to national guidelines at the community

While previously these indicators were calculated using Health Facilities Surveys and ICCM, they are now reported using routine data from HMIS or SISCOM in FY 2018/2019.