Republic of Rwanda
Ministry of Health

Rwanda Biomedical Centre
Healthy People, Wealthy Nation

RWANDA MALARIA PROGRAMME MID TERM REVIEW

REPORT

MARCH 2023

ACRONYMS

AL	Artemether-Lumefantrine
ALMA	African Leaders Malaria Alliance
BIOS	Biomedical Services
CHW	Community Health Worker
DHS	Demographic and Health Survey
DHIS2	District Health Information System
EAC	Eastern African Community
EIR	Entomologic Inoculation Rate
FY	Fiscal Year
GIS	Geographical Information Systems
GOR	Government of Rwanda
HBM	Home-Based Management in children and adults
HMIS	Health Management Information System
HRH	Human Resources for Health
i-CCM	Integrated Community Case Management
HSSP	Health Sector Strategic Plan
HDPC	HIV/AIDS, Disease Prevention and Control
IRM	Insecticide Resistance Management
IDSR	Integrated Disease Surveillance and Response
IRS	Indoor Residual Spraying
ITN	Insecticide-Treated Net
IVM	Integrated Vector Management
LLIN	Long-lasting Insecticide-treated Net
MOPDD	Malaria & Other Parasitic Diseases Division
MDG	Millennium Development Goals
MINECOFIN	Ministry of Economy and Finance
MIS	Malaria Indicator Survey
RMS	Rwanda Medical Supply
MOH	Ministry of Health
MSP	Malaria Strategic Plan
MTR	Mid Term Review
NGOs	Non-Governmental Organizations
NISR	National Institute of Statistics Rwanda
NMCP	National Malaria Control Program
NRL	National Reference Laboratory
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 Centre
RBM	Roll Back Malaria Partnership
RDT	Rapid Diagnostic Test
RPPA	Rwanda Public Procurement Authority
SBC	Social Behavior Change Communication
SIS-Com	Système d'Information Sanitaire Communautaire
SP	Sulfadoxine-pyrimethamine
SPR	Slide Positivity Rate
TPR	Test Positivity Rate
WCO	World Health Organization Country Office
WHO	World Health Organization

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The full lists of participants to the malaria program review are found in the annexes.

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EXECUTIVE SUMMARY

Introduction

The Malaria Program Review (MPR) is a periodic joint program management process for reviewing the progress and performance of a malaria program in the context of national health and development plans. It is aimed at improving performance or redefining the program's strategic direction and focus.

In 2019, Rwanda conducted a comprehensive Malaria Program Review (MPR) of the National Extended Malaria Strategic Plan (MSP) 2013-2020. The ensuing recommendations led to the development of the MSP 2020-2024 with its goal set as the reduction of morbidity and mortality caused by malaria by half of the 2018/19 levels by 2024. The period of the MSP 2020–2024 started in July 2020 and ends in June 2024. The strategy was hence due for a Mid-Term Review which was undertaken by the Ministry of Health (MOH) through the Malaria and Other Parasitic Diseases Division (MOPDD/RBC) in collaboration with partners, to review the progress and performance of the malaria program for the period of FY 2020-21 to FY 2021-22 towards attainment of the targets therein.

Objectives of the MTR

The overall objective of the MTR was to undertake an evidence-based review of the country malaria situation and a comprehensive performance review of the MSP against its set targets. Specifically, the review sought to achieve the following:

a) To assess the progress made by the malaria program, towards the epidemiological and entomological impact targets in the Malaria Strategic Plan 2020 – 2024, at 2020-2022 period under review.
b) To review the level of financing of the national malaria program.
c) To review the capacity of the national malaria control program to implement planned activities.
d) To review the attainment of program outcome targets during the period under review.
e) To define the recommendations and programming implications of the lessons learned in the implementation of the malaria strategic plan 2020-2024 to the remaining period.

The review was undertaken in three phases from December 2022 - March 2023. First was the **planning phase** which defined the concept, timelines, and resource requirements. The next was the **desk review** and the performance assessment against implementation targets. **Final phases** included the external validation, field visits and the Rwanda MTR consolidation workshop. The MPR process was led by the MOPDD/RBC and had a wide range of stakeholder engagement.

Key findings, Conclusions, and Recommendations

1. Epidemiological and Entomological Impacts

The goal of the MSP 2020−2024 is to reduce malaria morbidity and mortality by half (50%) of the 2018/19 levels by 2024. Rwanda has made tremendous progress towards the epidemiological impact, recording significant reduction in malaria incidences and malaria deaths, as well as uncomplicated malaria and severe cases. The review found that nationally, the malaria parasite incidence declined by 76% from 321 cases/1000 persons-year in 2018/19 to 76 cases/1000 persons-year in 2021-22. Severe malaria cases were reduced by 74% from 7,054 cases in 2018/19 to 1,831 in 2021-22. Malaria mortality was reduced by 73%

from 264 deaths at baseline 2018/19 to 71 deaths in 2021-22. The decrease in malaria incidences, severe malaria cases and malaria deaths is due to several factors including the scale up of malaria vector control interventions, the result of the Home-Based Management of malaria (HBM), the free treatment of malaria for Category I and II of Ubudehe and the quality of care at health facility level.

Regarding entomological impact, the MSP 2020−24 monitoring, and evaluation framework did not contain impact-level entomological indicators and related targets even though relevant data was collected by the program. Rwanda routinely collects entomological data to inform rotational use of insecticides of new IRS formulation products and different types of ITN (PBO-pyrethroid ITN, next generation ITN with dual-active chemicals). The entomological inoculation rate (EIR) was reduced by 93%, from 15 to <1 infective bites per person-year in 2021-22, compared to baseline 2018/19. Resistance against pyrethroid insecticides is widely spread, vector species composition remains heterogenous and *An. arabiensis* has replaced *An. gambiae* s.s as the major malaria vector in areas where IRS is deployed. This has important implications for malaria epidemiology and control given that this vector predominately rests and feeds on humans and cattle/animals outdoors. There was evidence of reduction in vector densities and sporozoite rates of *An. funestus* in some areas where IRS was implemented. Resistance to pyrethroids, mediated by metabolic resistance mechanism of which susceptibility can be fully or partially restored by PBO synergist, was observed in majority of sentinel sites used for monitoring, and emerging resistance to new public health active ingredients was reported in less than 10% of the monitoring sites.

Plasmodium falciparum remains the predominant species at 98% while the remaining infections are due to *P. malaria* and *P. ovale*. The malaria parasites are still susceptible to Artemether Lumefantrine (the first line ACT drug currently used for malaria treatment). While there are reports of parasites with mutations linked to Artemisinin drug resistance and historical record of SP resistance in Plasmodium parasites, the extent of spread of the drug resistance mutations and status of SP resistance, and impact on malaria case management require further investigations and mitigation plans.

Malaria Stratification

The last stratification was undertaken in 2019, using only Annual Parasite Incidence (API) of 2016 to classify the country into four different transmission zones. As stratification was aimed at classifying districts only, it did not address the identification of hot spots at lower levels of disaggregation to allow for better targeting the interventions.

Action points

a) Considering the MSP 2020-2024 targets for epidemiological impact indicators have been achieved at mid-term, new targets should be set and included in the revised M&E framework of MSP 2020-2024.
b) In the current epidemiology with significant reduction in malaria burden, the use of stratification at sub-district, sector and/or village level is more relevant to identify different areas of malaria burden and to better target interventions and maximize impact.
c) Program to revise existing malaria stratification maps informed by the current guidance, changing epidemiology profile, annual parasite incidence, test positivity rates and entomological surveillance data.
d) Monitor changes in *Plasmodium* parasite species composition and distribution to update malaria epidemiological profile, specifically parasite resistance to (i) ACT following recent detection of parasite carrying Artemisinin resistance gene and (ii) SP which is recommended for malaria chemoprevention in pregnant women.

2. Financing of the National Malaria Program

This review found an improvement in the funding level of malaria activities compared with the last Malaria Program Review. The national Government allocation to the health sector increased over the period under review from 14.7% in 2019/20, 14.9% in 2020-21 and 16.5% in 2021-22, in line with the Abuja Declaration 2000 target of 15%. From 2019 to 2021, the available funds surpassed the planned budget due to the commitment of the government to sustain the IRS in 12 districts. A slight increase in health sector budget allocation, noted in FY 2021-22 was due to the government contribution of COVID-19 vaccine procurement.

The malaria program in Rwanda is primarily financed by the Government of Rwanda (GOR), the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFTAM) and the US President's Malaria Initiative (PMI). Of the budget allocated to the health sector, the budgetary allocation to malaria increased to 14.7% in 2019/20 and 15.2% in 2020-21 with a slight decrease to 12.1% in 2021-22. Partner's' financial contribution has increased over the period from 56.6% of the overall malaria program budget in 2019/20 to 63.2% in 2021-22. Overall, there has been inadequate funding to enable full program implementation during the period under review. In 2020-2022, there was a funding gap of 3%. The available allocation by program area ranged from 4% for Surveillance Monitoring and Evaluation Operational Research (SMEOR/EPR) up to 57% for malaria prevention (LLINs and IRS). The MSP program need indicated a funding gap of 21% for malaria prevention which was exacerbated by the increase in unit cost of malaria commodities particularly LLINs and IRS insecticides. However, this gap was addressed by additional funding from Global Fund and reprogramming of funds.

The review noted the following challenges related to the financing of the malaria program in the MSP 2020-24, for 2020-22 period:

- Increase in unit price of commodities due to COVID-19 pandemic and budget gap in outdoor vector prevention.
- There is a high level of dependence on external sources of funding for the key commodities, particularly vector control ITN and IRS products.
- Programmatic areas, such as SMEOR/EPR, and SBC, experience low funding allocations.

3. Effectiveness of the Health System in Delivering Malaria Services

*MSP Objective 1: By 2024, at least 85% of the population at risk will be effectively protected with preventive interventions. (**Malaria Prevention**)*

Review found that, close to 7.5 million LLINs (7,447,601) were distributed to people at risk of malaria from 2019/20 to 2021/22 using various channels. According to DHS 2019/2020, 66% percent of households surveyed owned at least one ITN and the proportion of the population that could sleep under a net if the LLIN in the household were used up to two people was 34% (universal coverage). Proportion of children under five years who slept under an LLIN the night before the survey was 77% compared to 68% reported in the 2017 Rwanda MIS. In the areas where IRS was implemented, high levels of coverage (98%) were achieved. Rwanda does not implement chemoprevention through IPTp due to SP resistance and not planned in NMSP, and the country is yet to adopt SMC for malaria prevention. This review identified some of reasons that may explain the gap in LLIN coverage: (1) Inadequate and untimely availability of resources, 2) delays in procurement and delivery of LLINs, related to different challenges including the COVID-19 pandemic, 3) in some cases due to non-compliance of health facilities to the national guidelines.

IRS had a significant impact in reducing the indoor resting densities (97 percent) and sporozoites prevalence in *An. funestus* and *An. gambiae* s.s, the major vectors in Rwanda. Resistance to pyrethroids

in malaria vectors is widespread across the country. Also, the *An. arabiensis* has now replaced *An. gambiae* s.s as a predominant vector and there is an increase in vector outdoor resting and biting tendency in IRS districts. Larval source management was implemented as pilot at small scale, from July 2020 to April 2021. Integrated Vector Management (IVM) is well articulated in the policy documents, with a focus to build capacity at decentralized levels where 250 TOTs were trained from all 30 districts and 1201 TOTs from sector levels selected from 22 districts.

Key challenges on malaria prevention is inadequate funding to ensure a full implementation of various strategies in the malaria strategic plan (2020 - 24), an increase in unit cost of vector control commodities (IRS & LLINs) related to COVID-19 pandemic, insecticide resistance and changes in mosquito/vector behavior and composition may compromise effectiveness of the current tools in use, data gap to report progress in some of key malaria indicators (case of DHS instead of MIS to evaluate LLINs outcome indicators done before the current review).

*MSP Objective 2: All suspected malaria cases are promptly tested and treated in line with the national guidelines. (**Case Management**).*

The review found that targets for testing suspected malaria cases and treatment of first line antimalarial drugs in public health facilities and community was achieved. The review also noted increased adherence to national treatment guidelines in public health facilities, where the target for proportion of health provider trained was achieved. During the 2020-22, 249 nurses and midwives, 78 Medical Doctors, 268 laboratory technicians, and 34 pharmacists were trained in malaria case management. In FY 2021-2022, 102 CEHOs and 102 nurses from Health Centers were trained as trainers (TOTs) on iCCM and HBM component. The TOTs then in turn trained 4816 ASM and Health Promotion CHWs on Community Case Management of Malaria. Also, 168 nurses and 17 laboratory technicians from 185 health posts were mentored on best practices in malaria diagnosis and treatment, supply chain management and referral of complicated cases, and 18,985 CHWs benefited from Community Health Mentorship on iCCM and Home-Based Management of malaria.

The key issues identified included quality assurance and control of malaria case management services in private facilities, and delay in implementation of some activities due to COVID-19 pandemic and data quality issues from the community and private facilities, as well as malaria commodity stockouts at all levels.

The review identified home-based management of malaria as a best practice that significantly increased the proportion of malaria cases attended to at the community level, leading to early diagnosis and treatment and subsequently contributing to a decrease in severe malaria and deaths due to malaria.

*MSP Objective 3: By 2024, strengthen surveillance and reporting to provide complete, timely and accurate information for appropriate decision making at all levels. (**SMEOR + EPR**)*

Rwanda has a well-functioning surveillance system with high-quality public routine health data that is available to inform programmatic and policy decisions. The country has used DHIS2 since 2013 to facilitate management of routine aggregate data collected at both public and private health facilities and community level. Reporting of malaria data is integrated with other diseases, malaria is reported weekly through the IDSR system and monthly as part of routine reporting. The review found that the reporting

rates of malaria cases improved from the baseline of 80 percent in 2019/20 to 91 percent in 2021-22, there was a decreasing trend on annual blood examination rate from 72% at baseline to 41% in 2021-22 which is expected due to a decline in malaria incidence in the country. While report completeness and timeliness are high from public health facilities at 98%, reporting rates from private health facilities remain at 60%. The progress on indicators related to the number of community health facility evaluations was low because there was no activity done for the reporting period. The review found that collaboration between the program and research community in terms of sharing of findings for use in public health decision making was inadequate and that the SMEOR TWG meetings were not done. Inadequate funding was identified as a key challenge that impeded a full implementation of various strategies related to SMEOR.

The review identified lessons and best practices that should be maintained going forward, this includes:

- Use of Malaria scorecards as a management tool to monitor performance of key malaria indicators of service delivery at national, district and sector level.
- Rwanda Health Analytics Platform (RHAP), a dashboard on data triangulation, that facilitates the identification of data quality gaps in HMIS and correction in real time.
- Quarterly joint data quality audit and integrated supportive supervision with all implementing partners at selected facilities in all districts improved services deliveries and contributed to high quality data reported.
- Quarterly data review meetings speed up the feedback at all levels and this led to improved data quality, use for decision makers and ownership at district hospitals and health centers.

*MSP Objective 4: Strengthen coordination, collaboration, procurement & supply management, and effective program management at all levels. (**Program Management**)*

MOPDD operates within an environment of strong political will and committed funding for malaria control by the Government of Rwanda and partners. Oversight and guidance of the malaria program is provided by the MOH and RBC leadership, with the malaria as a mainstream program in the RBC structure. The program structure has key units (prevention, case management, program management and M&E) managed by skilled and committed human resources, and development partners, engaged to assist with technical aspects of malaria programing. Though intersectoral stakeholders are invited to participate in malaria strategic meetings and planning sessions such as the TWGs and annual review and planning meetings, there is no formalized structure for ongoing collaboration with them. In 2021, the Great lakes malaria initiative (GLMI) was launched in Rwanda, its mission is to contribute to the control and elimination of malaria in Africa Great Lakes region with special focus on the cross-border areas. However, the effective implementation of the GLMI Strategic Plan 2021-25 has been affected by COVID-19 pandemic.

*MSP Objective 5: By 2024, 85% of the population at risk will have correct and consistent practices and behaviors towards malaria control interventions. (**SBC**)*

Health promotion and SBC activities on malaria prevention and control are guided by the Health Promotion Policy, (HPP, 2014) building on the principles of community participation, health education, access to health services, advocacy, and partnerships. Malaria SBC Strategy (2022-24) is anchored on the Rwanda Health Promotion Policy and guides implementation of SBC activities at all levels of service delivery from central to community level. Progress on attainment of SBC objective is based on four outcome indicators measured through biennial or triennial surveys. The 2017 MIS provides a baseline for

these indicators, however, no survey (either MIS or KAP) was conducted for the reporting period, therefore no data to report on SBC progress. The overall performance on the implementation activities of various strategies under SBC objective was high given >90 percent of activities were fully implemented. Strategy to increase awareness on community role in malaria prevention and control interventions achieved moderate score of 88%, while the other three strategies (Strengthening SBC malaria framework; Advocating for high level support to sustain malaria prevention and control interventions including social marketing; and Promoting community engagement in malaria prevention and control interventions) achieved the high score of 100%.

During implementation of the SBC plan, different strategic approaches and communication channels were used to reach different target audiences. The main approaches and channels included both interpersonal and mass media communication channels. However, there is a need to strengthen targeted SBC and produce standard tools and IEC materials. This will facilitate attainment of SBC targets, subsequently contributing to the overall goal of the Rwanda Malaria Strategic Plan 2020–24: to reduce malaria mortality by 50% of the 2018/19 level by 2024. Overall, there is low investment in advocacy, communication, and social mobilization as well as inadequate budget allocations to these activities.

Conclusion and Proposed Future Strategic Implications.

There is strong political and technical commitment towards malaria control and exemplary commitment and dedication from health workers and partners at all levels of the health system. A malaria-free future is feasible in Rwanda considering significant reduction in malaria burden observed during the 2020 – 22 period under review. The program should sustain efforts to reduce the burden further to position the country firmly on the path towards the vision of a malaria free Rwanda. To achieve this goal, the review recommends the following strategic directions:

1) Advocate for establishment of sustainable and innovative financial resource mobilization mechanisms to ensure implementation of MSP interventions at full scale, maintain effective coverage of core interventions, and scale up next generation LLINs /IRS, and LSM. This is critical considering the declining trend in external resources and projected high cost of new interventions (new LLINs and IRS formulation) planned for deployment in the next phase of MSP 2020-24.

2) Considering the MSP 2020-24 targets for epidemiological impact indicators have been achieved at mid-term, new targets should be set and included in the revised M&E framework of MSP 2020-24.

3) In the current epidemiology with significant reduction in malaria burden, the use of stratification at sub-district, such as sector and/or village level is more relevant to identify different areas of malaria burden and hotspots, and to better target interventions and maximize impact.

4) Revise existing malaria stratification maps informed by the current guidance, changing epidemiology and entomology profiles, annual parasite incidence and test positivity rates.

5) Use the stratification map at sub-district level to better target vector control interventions and maximize impact.

6) Evaluate and document the impact of malaria control interventions and identify current gaps to inform effective interventions deployment.

7) Explore the use of new malaria control tools for management of mosquito insecticide resistance and behavioral changes of malaria vectors.

8) Explore introducing malaria vaccines as an additional prevention tool.

9) Strengthen malaria service delivery through a robust refresher training and supportive supervision that includes private sector facilities to maintain competency of health workers in diagnosis and malaria case management.

10) Maintain the capacity of the national reference laboratory to continue supporting malaria diagnosis QA/QC activities.

11) Revise procurement, distribution, and re-distribution process of commodities to adequately address the risk of commodity expiration and stockouts.

12) Continue monitoring the drug treatment efficacy, the parasite drug resistance and put mitigation plans in place.

13) Introduce multiple first line treatment (MFT) strategy to mitigate the emerging drug resistance.

14) Develop a research agenda and mobilize funds for an effective implementation to inform malaria programming.

15) Develop malaria surveillance guidelines including malaria EPR in collaboration with the Epidemiological Surveillance and Response division.

16) Build capacity in Surveillance, M&E, data management, visualization and use for decision at the decentralized level.

17) Address the malaria high risk groups as identified by Malaria Matchbox Assessment to deploy tailored interventions.

18) Investigate the drivers of malaria parasite infection and other specific risk factors in sectors with persistent high burden and malaria hotspots to inform effective and appropriate malaria control interventions.

19) Explore disaggregation of data in HMIS to identify malaria hotspots at the lowest level (Village).

20) Scale up malaria advocacy at national, district and community levels for increased use of malaria interventions. Leverage all levels of the health care including the community and private and non-health sectors to undertake advocacy communication and social mobilization for malaria with a clear mandate and guidelines.

21) Conduct Knowledge, Attitude and Practices (KAP) survey in order track progress in uptake of malaria services and to inform the revision of IEC/SBC material and messaging.

22) Develop standard messages for adaptation and contextualization by the district and other stakeholders and factor in finding from the malaria matchbox analysis and KAP.

23) The MOPDD should strengthen annual review and planning meetings to deliberate and document progress made and outline priorities and milestones for the following year; this will help to critically review the strategy implementation across all objectives.

24) Strengthen capacity at the malaria program by filling approved positions (accelerating recruitment of malaria SBC senior officer, case management senior officer, and three supervisors) and creating new relevant positions such as Supply Chain Coordinator and training existing staff.

25) Enhance stock management of malaria commodities at all levels including the community given that more than 50% of cases are now managed at community level. To track the indicator on proportion of CHW reporting no stock out of ACT/RDT, consider revising the reporting system to include a data element on the number of CHWs reporting no stock out.

26) The government to consider reviewing the CHWs compensation amounts for missed working days for example during collection of medicines and attending monthly meetings, in line with the current inflation, in addition to reviewing the CHWs Performance-Based Financing (PBF) and adaptation to epidemiological status of reduced malaria burden.

27) Enhance coordination and collaboration of RBC divisions and units, relevant government sectors and partners through TWGs with clear mandate and scope of work.

28) Continue to support EAC efforts and operationalization of the Great Lakes cross border malaria initiative.

29) Establish an End Malaria Council (EMC) as part of integrated disease council, a country-owned forum to convene senior leadership from Government, the private sector, and community leaders to support the NMCP and the implementation of the malaria strategic plan.

CHAPTER 1: INTRODUCTION

1.1 Geography, Climate, and malaria transmission

Geography

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

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

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

Climate

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

Socio-economic

Rwanda's population is 13,246,394 inhabitants according to the 2022 census (NISR). The population density of Rwanda is high at 503 people per square kilometer. Administratively, Rwanda consists of 4 provinces and Kigali City, composed of 30 districts, 416 sectors, 2148 cells, and 14,837 villages[1]. The population is largely rural with almost 72 percent of the country's residents living in rural areas. Among the total urban population, 49 percent live in the City of Kigali, the capital of the country. The population is predominantly young, with 70.3 percent of all Rwandans underage 30[2].

Malaria Transmission

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

[1] Fourth Population and Housing Census 2012

[2] RPHC4: ATLAS

implementation of malaria control interventions such as mass distributions of Long-lasting Insecticidal nets (LLINs), indoor residual spraying (IRS) and Larval Source Management (LSM).
All these environmental and climate factors are part of the factors influencing malaria in the country: climate variability (especially in the northern part of the country); differences in altitude; places of high human concentration (e.g. boarding schools in proximity of marsh); resident of population whether urban or rural setting, population movement (especially in the areas of low transmission to high transmission area); irrigation schemes (especially in the eastern and southern parts of the country); and cross-border movement of people (especially in the eastern and south-east parts of the country) as well as assembly of people such as mine workers.

1.1.1 Demography

The Rwandan population is essentially young, with 70.3 percent of all Rwandans under age 30 according to the RPHC5. According to the third (2002) and fourth census in Rwanda (2022) the country's population was 8,128,553 and 13,246,394 inhabitants respectively. The population of Rwanda has grown by 63% between 2002 and 2022. The current annual growth rate is 2.3%. The fifth population and housing census in 2022 showed that 51.5 percent and 48.5 percent of the Rwandan population were female and male, respectively. Both fertility and mortality levels remain high, although the rates have decreased substantially over the past decade. Under the current fertility conditions, a Rwandan woman would have 3.6 children on average at the end of her reproductive life when compared to a total fertility rate of 5.8 in 2000. The level of mortality has declined considerably. The infant mortality rate dropped considerably from 107 per 1000 live births in 2000 to 33 per 1000 in 2010 (RDHS 2019/20) and the life expectancy at birth for both sexes has risen from 53.7 years in 1991 to 69.6 years in 2022 (Table 1).

Table 1: Basic demographic indicators

Indicator	DHS 2000	PHC3 2002	DHS 2005	DHS 2010	PHC4 2012	DHS 2014-15	DHS 2019/20	PHC5 2022
Population (millions)		8,128,553			10,515,973			13,246,394
Density (pop. /km2)					414	445	500	503
Percent urban		17			16			
Crude birth rate	54.0	41.2	48.0	41.3	30.9	34.8		
Crude death rate		15.4						
Fertility Trends	5.8	5.9	6.1	4.6	4.0	4.2	4.1	3.6
Fertility Trends Rural	5.9		6.3	4.8		4.3	4.3	3.8
Fertility Trends Urban	5.2		4.9	3.4		3.6	3.4	3.2
Under-five mortality (per 1000 births)	196	221	152	76	72.2	50	45	
Infant mortality rate (per 1000 births)	107	139	86	50	49	32	33	
Neonatal Mortality	44		37	27		20	19	
Maternal Mortality Ratio	1071		750	476		210	203	
Life expectancy at birth		51.2			64.5			69.6

RPHC3 – 2002 Rwanda Population and Housing Census; RPHC4 – 2012 Rwanda Population and Housing Census
Source: RHDS 2000, RDHS 2005, RDHS 2010, RDHS 2014-15, RDHS 2019/20, RPHC3, RPHC4 and RPHC5

1.2 The National Health System and the Malaria Control Program

1.2.1 Organization of the Health System

Health services in Rwanda are provided through the public sector, government assisted health (agrée) facilities and the private sector. The public sector has 3 levels: the central level, the intermediate level, and the peripheral level. The central level consists primarily of the MOH and the referral health facilities it manages. The intermediate level consists of the provincial and district hospitals. There are 4 provincial administrative regions namely Northern, Eastern, Western and Southern provinces and Kigali City. The peripheral level consists of the health centres, health posts and Community Health Workers (CHWs).

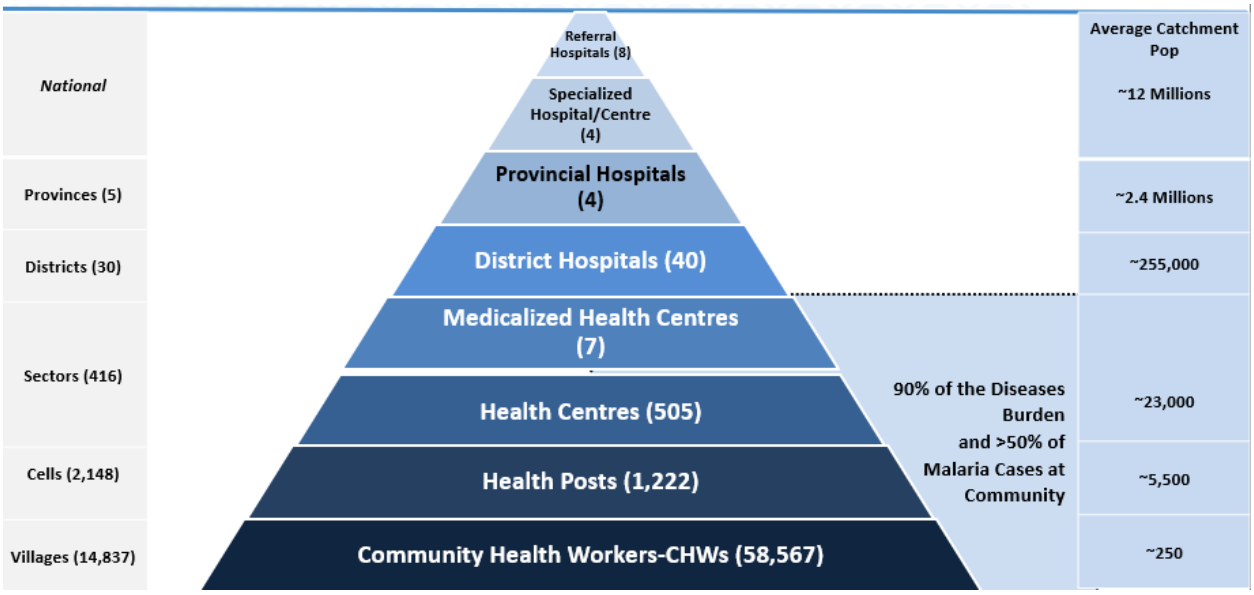


Figure 2: Rwanda National Health System

The MOH oversees, coordinates, and regulates all programs aimed at improving the health status of the population. The MOH 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.

MoH consists of the core MoH and affiliated institutions including the Rwanda Biomedical Centre (RBC), the Rwanda Medical Supply Ltd and the Food and Drug Administration (FDA). The RBC coordinates health services provided through 2 main departments: the Biomedical Services (BIOS) and the HIV/AIDS, Diseases Prevention and Control (HDPC) which includes the MOPDD.
The health sector priorities are defined by; (i) the National Strategy for Transformation (NST1) for the period of 2017–2024, (ii) the fourth Health Sector Strategic Plan (HSSP4) for 2018/19– 2023/24, and iii) a Health Financing Strategic Plan for 2018/2024. The country has a health development strategy that has a decentralized management and district-level care approach. Additionally, financial, and logistic resource management has also been decentralized. The main role of each district is to improve the quality of hospitals, enhance general hygiene, assist sectors to promote better nutrition and establish a health insurance scheme within its area.
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 (CHWs) and other community-based associations for community outreach activities.
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.

The Umudugudu or community implements health policies by providing community health workers; creating awareness of hygiene and primary health care (including distribution of insecticide repellants, mosquito nets, etc) in the community; mobilizing the communities to health insurance schemes; giving children basic emergency health care before taking them to health facilities; sensitizing pregnant women of the need for antenatal care and facility-based deliveries; registering deaths and, submitting reports on death.

Services are provided by a variety of providers including public, faith-based, private-for profit, and non-governmental organizations (NGOs). The public health facilities represent about 65% of the total number of health facilities in Rwanda. Faith-based organizations (FBOs) play an important role in the health system. In 2018, 18% of primary and secondary health facilities were congregational structures (FBOs)[3] and 1% were managed by parastatal organizations.
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 consider the needs of the population, but rather the capacity of patients to pay for the care provided. Rwanda made strides towards ensuring equality and universal access to health services through the introduction of Community Based Health Insurance (CBHI). Health insurance coverage is relatively high with 86% of the households having at least one family member with health insurance (2020 DHS) and among those insured, 97% have CHBI (Mutuelles).

1.2.2 Malaria and Other Parasitic Diseases Division

The Malaria and Other Parasitic Diseases Division (MOPDD) is responsible for prevention, vector control and case management for malaria and curbing morbidity and mortality of Neglected Tropical Diseases (NTDs). The MOPDD is housed as a Division within the Rwanda Biomedical Centre (RBC) which in turn falls under the purview of the MoH (Fig. 3). Within the MOPDD Division, there are separate Units for malaria vector control, prevention, case management, epidemiology and NTDs. The MOPDD manager supervises and provides oversight to five technical units that support delivery of malaria and NTD services. Additionally, he/she is overall in charge of all program management activities including advocacy, partnership coordination planning, procurement, finance, and administration. Each of the five technical units has a focal point and one or more technical officers.
The MOPDC has a Malaria technical working group (TWGs) that meet quarterly and with flexibility based on the needs, as aligned with the technical units. Members of Malaria TWG are drawn from different government sector units (private sectors, social cluster ministries – Agriculture, Education, MoH, Local Government, Medical Supply, RBC – SPIU, and representative from district hospitals), the UN agency (WHO), bilateral partners (USAID, PMI), research /academia (Univ. of Rwanda), NGO and community organization (CSO) supporting malaria activities. Health promotion and Social Behavioral change communication is cross cutting and there is a Health Promotion TWG coordinating all SBC related matters including malaria.

[3] Rwanda Master Facility List, Planning & HFIS TWG meeting September 7, 2018

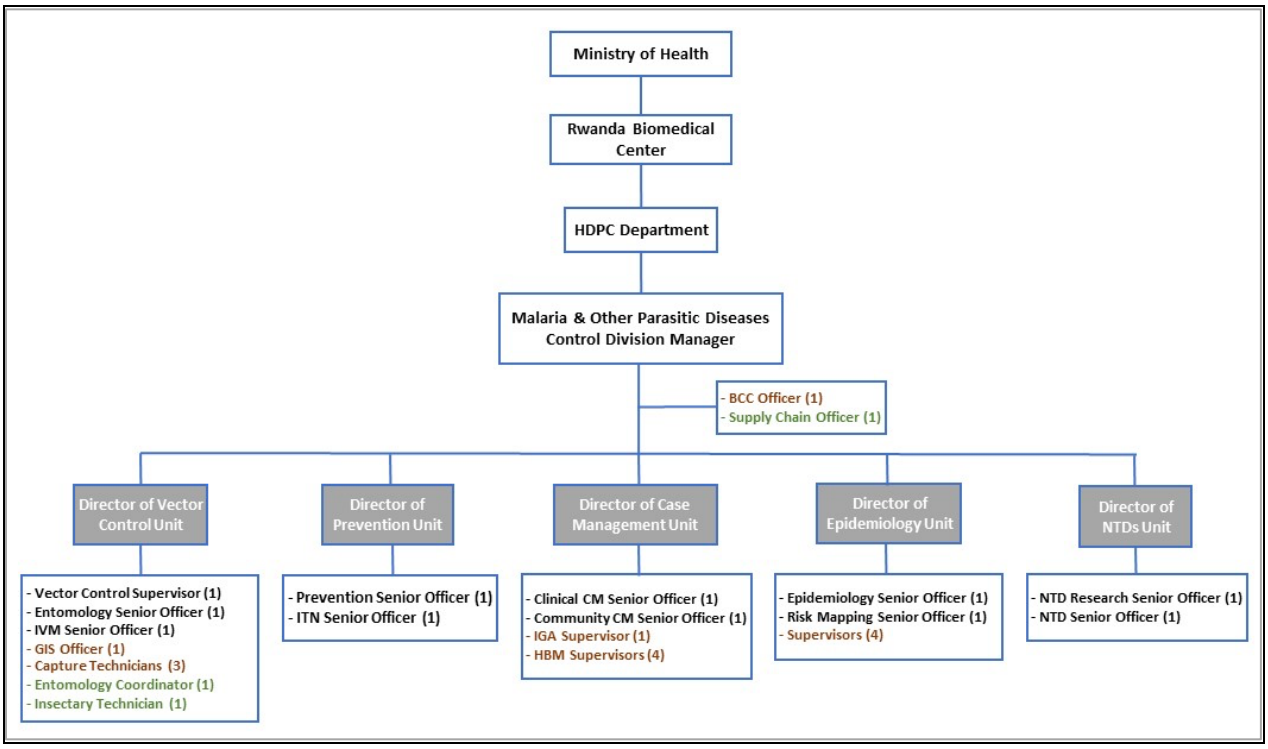


Figure 3: Organizational Structure of MOPDD

1.2.3 Governance and Coordination of Malaria Program

Oversight and guidance of the malaria program is provided by the MOH and RBC leadership, with the malaria program as a mainstream program in the RBC structure. The program has available both skilled and committed human resources, and development partners, engaged to assist with technical aspects of malaria programing. MOPDD interacts with various divisions within RBC, as follows:

- National Referral Laboratory (NRL): malaria diagnostics, molecular biology, QC/QA of diagnostics, microscopy training, and special studies such as TES to monitor for resistance to antimalarial medication.
- Maternal, Child and Community Health: MiP, and delivery of the Community Health package for iCCM.
- Public Health Surveillance and Emergency Preparedness Response (PHS&EPR): disease surveillance and response (e.g., IDSR)
- Rwanda Health Communication Center (RHCC): SBC activities
- Single Projects Implementation Unit (SPIU) and RBC Corporate: budget planning and support for implementation
- The Rwanda Medical Supply Limited (RMS): supply chain support including regular quantification of anticipated commodity needs, as well as procurement, distribution, and quality control of malaria commodities (drugs, ITNs, diagnostic kits, etc.)
- Rwanda Food and Drugs Authority (RFDA): product registration, regulation, and import (e.g., medication, insecticides)

1.2.4 Rwanda Malaria Control National Malaria Strategic Under Review

The vision of malaria control is a Rwanda free from malaria to contribute to socio-economic development. Implementation of malaria control objectives and strategies is guided by the Rwanda Malaria Strategic Plan RMS. The current RMS was developed in 2019 to cover the period from July 2020 to June 2024. A mid-term review (MTR) of this strategy is the subject of this report. The mission of RMS 2020 – 2024 is to contribute towards the social- economic development of Rwanda through malaria control by strengthening and implementing appropriate interventions and quality health delivery services in partnership with stakeholders. The goal and objectives of current RMS are as follows:

Goal: By 2024, reduce malaria morbidity and mortality by at least 50% of the 2019 levels.

Objectives

1. By 2024, at least 85% of the population at risk will be effectively protected with preventive interventions.
2. All suspected malaria cases are promptly tested and treated in line with the national guidelines.
3. By 2024, strengthen surveillance and reporting to provide complete, timely and accurate information for appropriate decision making at all levels.
4. Strengthen coordination, collaboration, procurement & supply management, and effective program management at all levels.
5. By 2024, 85% of the population at risk will have correct and consistent practices and behaviors towards malaria control interventions.

1.3 The Malaria Mid Term Program Review (MTR)

The Ministry of Health (MOH) through the MOPDD/RBC in collaboration with partners undertook a comprehensive review of the progress and performance of the malaria program. The overall objective of the malaria mid-term review was to undertake an evidence-based appraisal of Rwanda's malaria situation and program performance at the middle of the malaria strategic cycle of 2019 - 2022, to strengthen the program for better results and inform the revision of the malaria strategic plan (2020-2024).

1.3.1 Specific Objectives of the Review

1. To assess the progress made by the malaria program, towards the epidemiological and entomological impact targets in the extended malaria strategic plan during the period under review.
2. To review the level of financing of the national malaria program during the period under review.
3. To review the capacity of the national malaria control program to implement planned activities during the period under review.
4. To review the attainment of program outcome targets during the period under review.
5. To define the recommendations and programming implications of the lessons learned in the implementation of the malaria strategic plan 2020 - 2024.

1.3.2 Methodology of the Malaria Program Review (MPR)

The review was conducted in three phases adapted from the adapted from the WHO Practical manual for malaria program reviews (April 2019) and consisted of the following phases:

Phase 1 – Planning

The MOPDD/RBC developed a concept note for the MTR, engaged senior MoH management for approval and then held a stakeholder meeting to build consensus on the scope of the review, timelines and develop a road map. A proposal was developed to mobilize funding and technical support. A local and an international consultant were hired to facilitate the process of the MTR. All required reference documents and information were assembled including program implementation reports from both the national and subnational levels, routine malaria surveillance reports, national health statistics, data from sentinel sites, demographic, and health surveys (DHS), and malaria indicator surveys (MIS) among others. These documents were shared with the relevant personnel, partners, and consultants. Resources were mobilized to facilitate the process from Society for Family Health (SFH), World Health Organization (WHO), the Global Fund, and Roll Back Malaria Partnership (RBM).

Phase 2– Thematic Desk Review

The thematic desk reviews were conducted over a period of 3 weeks, February 6 - 28, 2023. The desk review was initiated by assembling all the information for evaluation including malaria policies, guidelines, the strategic plan, malaria program reports and documents such as routine malaria surveillance, national health statistics, data from sentinel sites, and demographic and health surveys (DHS) to determine progress towards impact indicators. The review of these documents was then conducted along the framework of four strategic analyses: program epidemiological and entomological impact analysis; program financing analysis; program "capacity to implement" analysis; and analysis of the attainment of program outcome targets. A draft MPR report was produced from the thematic reviews and shared with external validators.

Phase 3 – External Validation

The aim of this phase was to validate and build upon the thematic review reports through national level consultations and sub-national field visits. WHO on request from RBC/MOH sent an external review team consisting of experts in different malaria program thematic areas who conducted the evaluation from 28 Feb to 6 March 2023. Field visit teams were formed comprising external reviewers and members of the desk review teams and implementing partners. The validation teams interviewed the District Health Management, hospital directors/managers, health facility and post, as well as the selected Rwanda Medical Supply branches at district hospital and health facilities. The teams also met with community health workers to understand community perspective on malaria prevention and control activities.
A two-day meeting was conducted to analyze and incorporate the findings from the internal thematic desk review and the field visits. Each team prepared feedback presentations on findings and thereafter, the validation team and desk review thematic leads worked to consolidate the MPR report findings and recommendations and drafted an Aide Memoire. The draft Aide Memoire were shared with all key stakeholders and feedback incorporated into the report. National level dissemination and signing of Aide Memoire was held on 10 March 2023.

Phase 4 - Program Strengthening

This phase will follow the MTR and will include the following steps:

- Finalization, production, and dissemination of the final MTR Report
- Review of the malaria strategic plan targets as appropriate
- Implementation of MTR recommendations
- Development and dissemination of the revised Malaria Strategic Plan (MSP) 2020-2024

CHAPTER 2: ASSESSMENT OF PROGRESS TOWARDS EPIDEMIOLOGICAL AND ENTOMOLOGICAL IMPACT

This section analyzes progress towards attainment of the impact targets, appropriateness of the indicators, and inclusion of baselines and targets.

2.1 Progress Toward Epidemiological Impact of the Rwanda MSP

Rwanda MSP epidemiological indicators and targets

The strategy proposed five epidemiological indicators (# 1 to 5) with additional set of other key program indicators (#6 to 10) as reported in annual malaria reports (Table 2). Overall, the impact indicators are aligned with the recommended indicators in the Global Technical Strategy for malaria 2016-2030 (WHO 2016). The epidemiological indicators reflect the goal of the strategy with reference to measurement of morbidity and mortality and address the existing epidemiology with reference to children below five years of age and pregnant women. Indicators on test positivity rates and proportion of cases treated at the community were included to describe quality of diagnosis and to help with interpretation of observed trends in malaria incidence. Other than the two prevalence indicators measured through survey (MIS) every three years, data for the indicators were sourced from routine surveillance. Baseline values and targets were set for all indicators to assess performance at the mid-term in 2022 and at end of the strategy in 2023/24 and reflected the anticipated reduction in morbidity and mortality.

Progress towards MSP malaria morbidity impact indicators

The strategic goal of the Rwanda Malaria Strategic Plan (MSP) is to reduce malaria morbidity and mortality by 50% of the 2019 level by 2024. The goal was based on the annual parasite incidence of 321 per 1,000 persons at 2018/19 baseline, Inpatient malaria deaths of 2.1 per 100,000 persons per year at baseline and malaria deaths records of 272 at baseline for data tracked through the HIMS, and Malaria prevalence in U5 (MIS 2017 baseline) and Malaria prevalence in PW (MIS 2017 baseline) tracked through the MIS. No data for malaria prevalence in children <5 years and pregnant women was available for 2020 – 2022 period under review. Findings on the progress towards epidemiological impact indicators are summarized on Table 2.

Progress towards MSP malaria morbidity and mortality impact targets

Malaria incidence

There is a steady progress towards the epidemiological impact targets. Overall, there has been a 76% reduction in the incidence of malaria from 321 cases/1000 persons in 2018/19 to 76 cases/1000 persons in 2021/22 (Table 2). The trend since 2008 shows the lowest incidence of 36 cases per 1000-person year in 2011-12, then increased to highest level of 409 cases/1000person-year in 2017/18 (Fig. 4). Changes in malaria incidences by districts and sectors, from 2018/19 to 2021/22, is shown in Fig. 9A to 9F. Currently, higher malaria incidence was observed in the southern districts (Fig. 9C) with concentrated pockets of sectors showing incidences greater than 450 cases per 1,000 people (Fig. 9F).

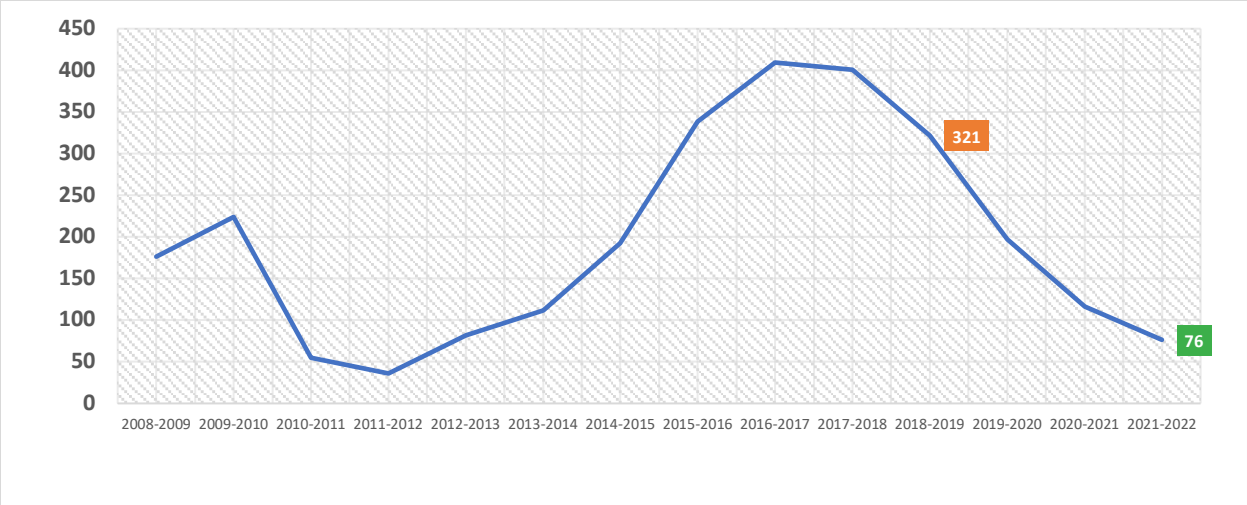


Figure 4: Trends of malaria incidence per 1000-year (2008-2022)

Table 2: Achievement of Epidemiological Impact Targets

	Baseline	Results		Target	Achievement
Indicators (source)	**2018/19**	**2020/21**	**2021/22**	**2023/24**	%
Annual Malaria Incidence per 1,000 persons per year (HIMS)	321	114	76	127	100%
Inpatient malaria deaths per 100,000 persons per year (HMIS)	2.1	-	0.54	1.5	100%
Malaria Deaths (HMIS)	264	94	71	198	100%
Malaria prevalence in U5 (MIS 2017 baseline)	7.2%	-	No data	4.4%	-
Malaria prevalence in PW (MIS 2017 baseline)	5%	-	No data	3%	-
Slide Positivity Rate (%) (HMIS)	44	27	22	NA	-
Uncomplicated Malaria Cases (HIMS)	3,973,973	1,481,698	998,874	1,724,356	100%
Severe Malaria Cases (HIMS)	7,054	2,592	1,831	3,047	100%
Case Fatality Rate per 100,000 Malaria cases (HMIS)	6.8	6.5	7.0	-	+3%*
Proportion of malaria cases treated at community HBM (HMIS)	57%	54%	55%	-	-

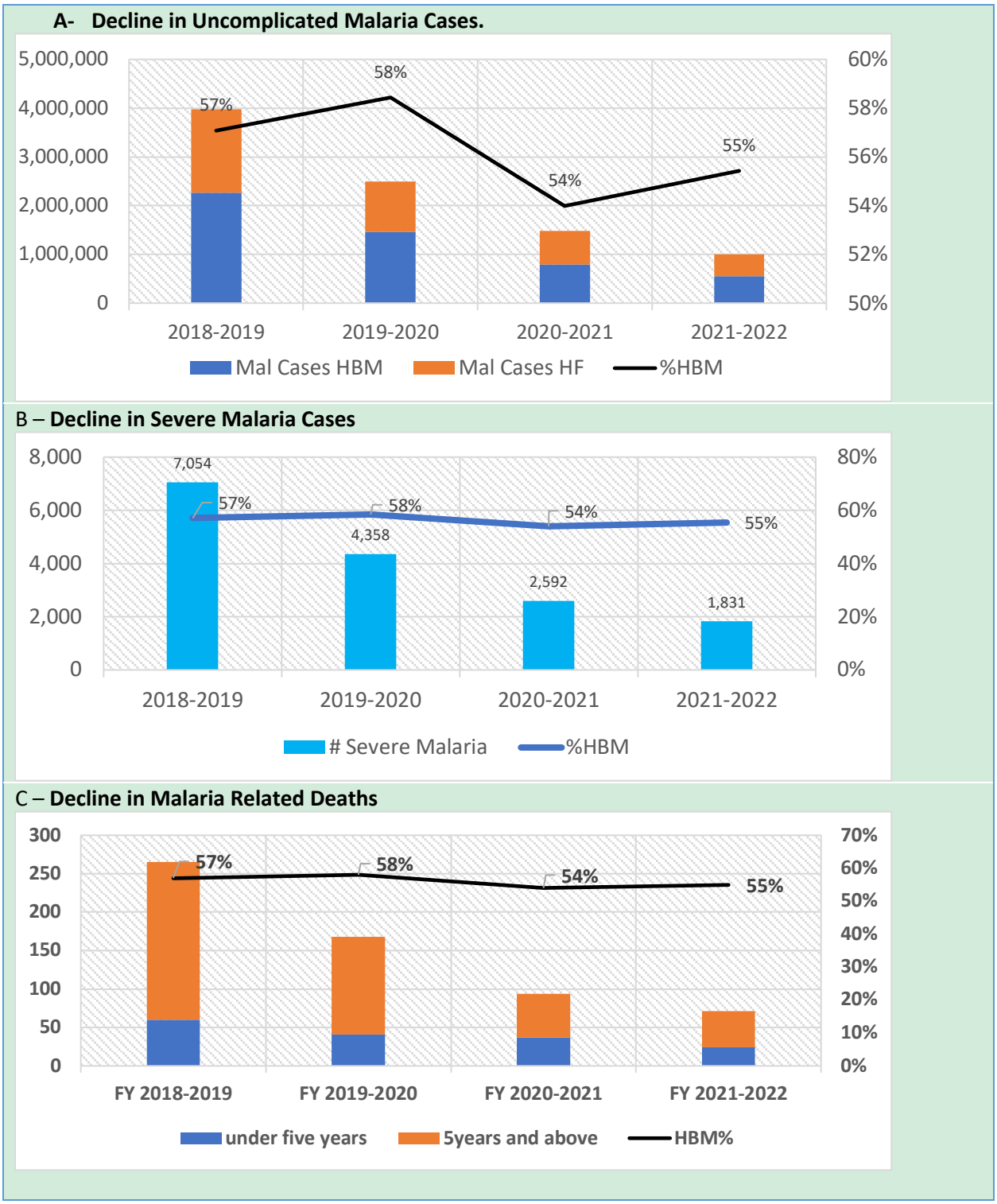
* Even though both Malaria cases and deaths decreased from 2020/2021 to 2021/2022, the ratio of decrease was bigger in malaria cases (0.33) compared to deaths (0.26) explaining the increase in CFR observed. No MIS data to report on indicators 4 and 5.

Trends in Malaria Morbidity and Mortality

During 2018/19 and 2021/22, nationally, malaria incidence decreased by 76% (Table 2 & Fig.4), uncomplicated malaria cases declined by 75% (Fig 5A), severe malaria cases by 74% (Fig. 5B) and malaria related deaths by 73% (Fig. 5C) likely related to Home Based Malaria Management (HBM) of children under 5 years and adults leading to early diagnosis and treatment of malaria. Currently, 55% of all malaria cases are treated by CHWs at the community and the target is to increase this to 80% of cases being treated at community level.[4]

[4] The Global Fund: Rwanda Malaria Funding Request 2020–22

Figure 5: Malaria cases by level of service delivery (A), and the impact of HBM on severe malaria (B) and mortality for under 5 years and adults (C).



Malaria Test Positivity Rate (TPR)

There has been a decline of national TPR from 44% (2018/19) 27% (2020/21) and 19% (2021/22) which is expected with the continuous decrease in malaria cases over the same period (Fig. 7).

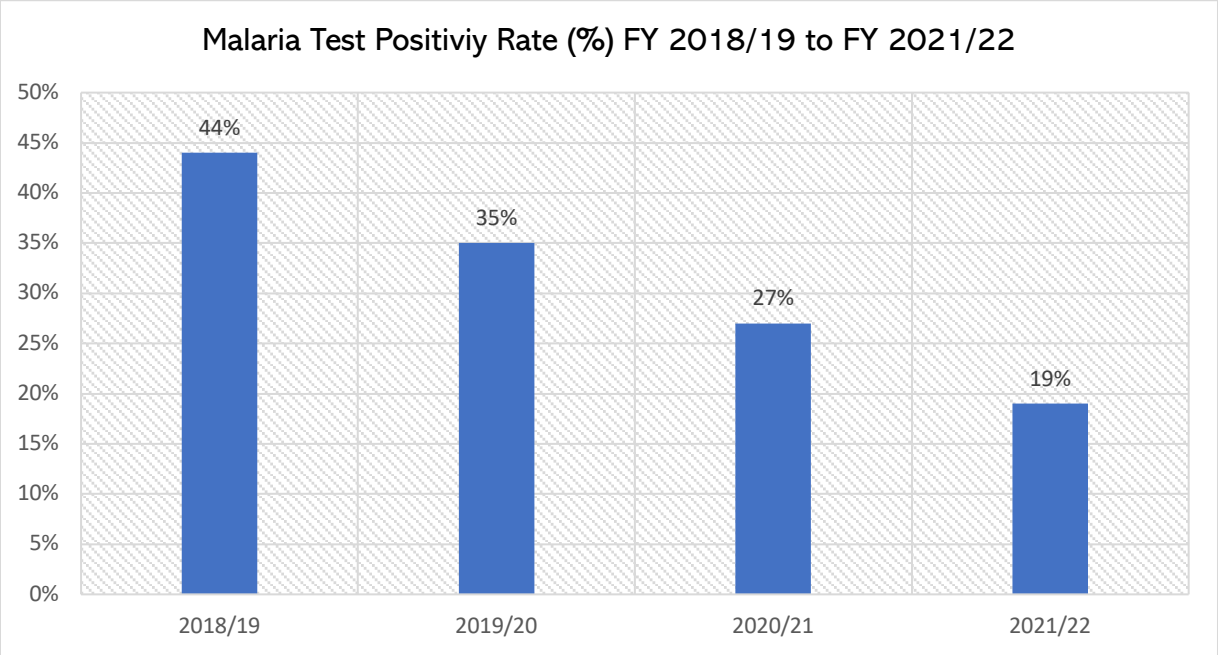


Figure 6: Malaria test positivity rate 2018/19 to 2021/22

Malaria Transmission Risk Map and Stratification

In FY 2019 -20, the first detailed national malaria control and epidemiological profile was developed (Fig. 8) that stratified districts into varying levels of malaria endemicity driven by altitude, rainfall patterns, temperature as well as malaria parasite index (API). Stratification resulted in four eco- epidemiological zones: (1) High Endemicity Zone: > 450 API per 1000, (2) Moderate Endemicity Zone: 250-450 API per 1000, (3) Low Endemicity Zone 100-250 API per 1000 and (4) Very Low Endemicity Zone < 100 API per 1000 (Fig. 8, Table 3). This epidemiological stratification was done based on the malaria situation in 2016 when the country recorded a malaria epidemic (HMIS 2016). This information guided implementation of malaria interventions in the different epidemiological zones as provided in the national malaria policy and in the Rwanda Malaria Strategy 2020-2024.

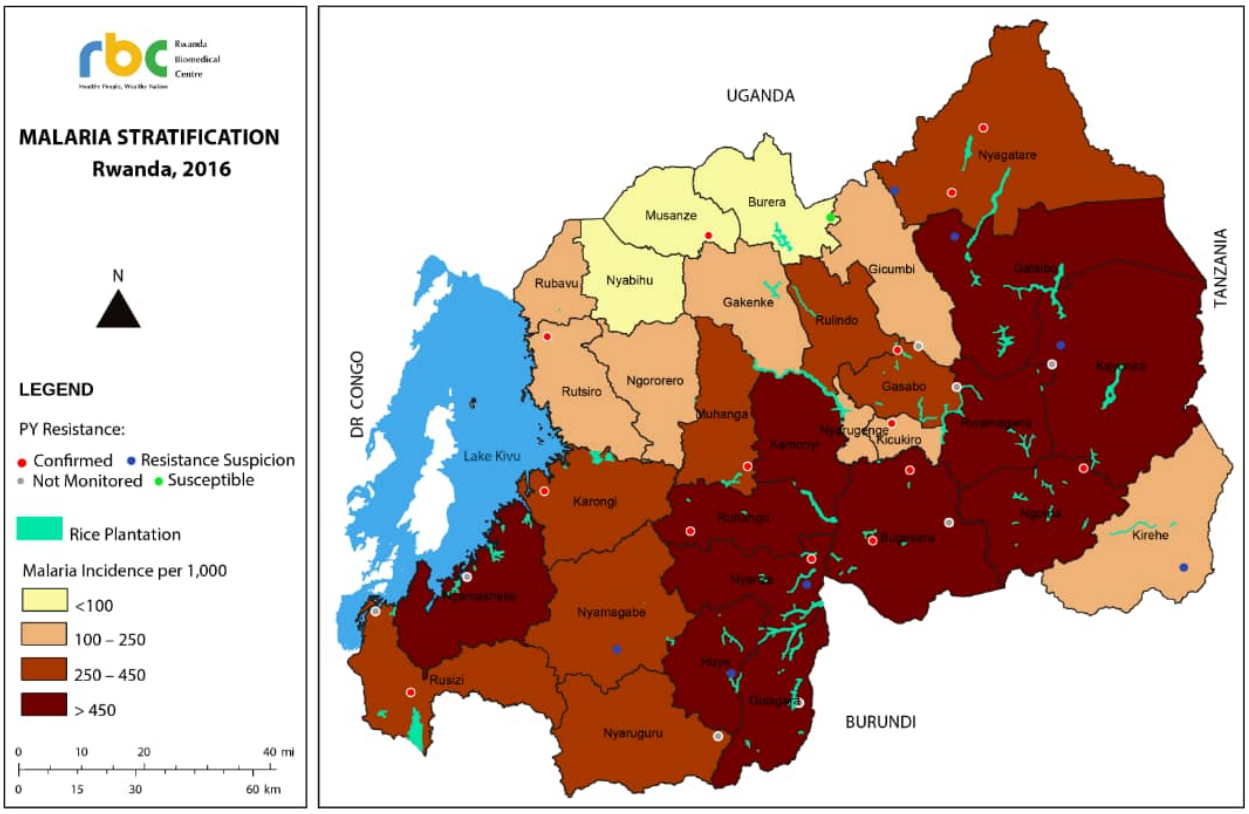


Figure 7: Rwanda malaria stratification and malaria transmission risk factors (2016)

Table 3: Populations at risk of malaria by API in 2016.

Population at risk at baseline year 2016

API	Population	District Names	District No.
<100	1,049,453	Musanze, Nyabihu, Burera,	3
100 <250	3,028,865	Gakenke, Gicumbi, Kicukiro, Kirehe, Ngororero, Nyarugenge, Rubavu, Rutsiro	8
250-450	3,389,247	Gasabo, Karongi, Muhanga, Nyagatare, Nyamagabe, Nyaruguru, Rulindo, Rusizi	8
>450	4,340,736	Bugesera, Gatsibo, Gisagara, Huye, Kamonyi, Kayonza, Ngoma, Nyamasheke, Nyanza, Ruhango, Rwamagana	11
	11,808,301		30

Source Rwanda MSP 2020-2024, page 11

Since 2019/20, malaria burden has been declining, as shown by an increase in the number of districts with API < 100 cases per 1000 persons (lower API) in 2021/22 (Table 4). Although there is a general decline in malaria in Rwanda, there are districts and sectors with persistent high malaria incidence. Changes in malaria incidence at district level compared to baseline shown on Fig. 9A-C. Changes in sector level incidence of malaria for 2019, 2021-2022 is shown in Fig. 9D-F. There are eight districts consistently with

API near or above 100 cases per 1000 persons for 2019/20 to 2021/22, namely, Bugesera, Gasabo, Gisagara, Kamonyi, Nyamagabe, Nyamasheke, Nyaruguru, and Ruhango. In 2021/22, a total of nine sectors, distributed within four districts, had API >450 cases per 1000 persons based on malaria incidence at sector level (Fig. 9F). The districts and number of sectors with API >450 include Nyamagabe (4 sectors), Nyaruguru (3), Gasabo (1) and Gicumbi (1). A summary of sectors with persistently high API >450 and or malaria incidence above the average for the districts and the interventions deployed is shown on Table 5. Clearly, there is a need to investigate the drivers of malaria in sub-district areas and sectors consistently with high malaria incidences with a view to inform programmatic response to target malaria hot spots and further bring down malaria burden in the country.

Table 4: Number of District per Malaria API Zones, FY 2018/19 to FY 2021/22.

API Zones	2019/20	2020/21	2021/22
<100	10	18	24
100 <250	11	7	6
250-450	4	4	0
>450	5	1	0

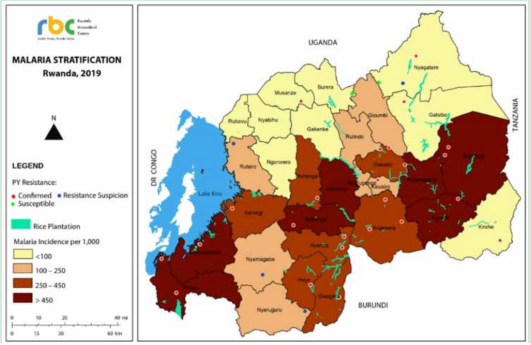
Table 5: Sectors with Persistence High Malaria Incidence, 2020-2022

Districts (API)	Sectors with API > 450 or incidence higher than average for the district.	Existing interventions (2020/2022)
Bugesera (132)	Juru, Nyarugenge, Mareba, Rweru, Ntarama, Gashora, Nyamata, Kamabuye	IRS, routine ITN, and case management
Nyagatare (84)	Nyagatare, Matimba, Karangazi, Rwempasha, Rwimiyaga	IRS, routine ITN, and case management
Gicumbi (84)	Mutete, Rwamiko, Bukure, Giti	PBO-ITN mass campaign and routine, and case management
Rulindo (51)	Masoro, Ngoma, Cyinzuzi, Burega, Ntarabana	PBI – ITN mass campaign and routine, case management
Gakenke (41)	Muhondo, Rusasa, Minazi, Coko, Ruli, Mataba	Standard ITN mass campaign and routine, and case management

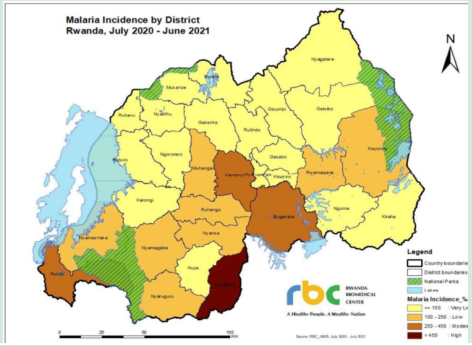
Figure 8: Changes in malaria incidence per 1000 population, 2021 - 2022

Malaria Incidence by District

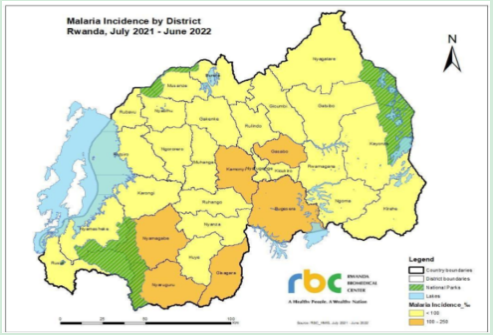
A – Malaria Incidence by District in 2019



B – Malaria Incidence by District in 2020-21

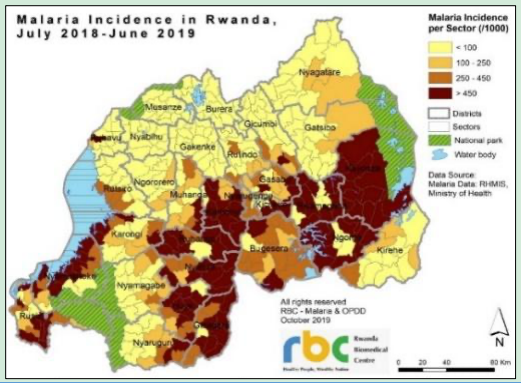


C - Malaria Incidence by District in 2021-22

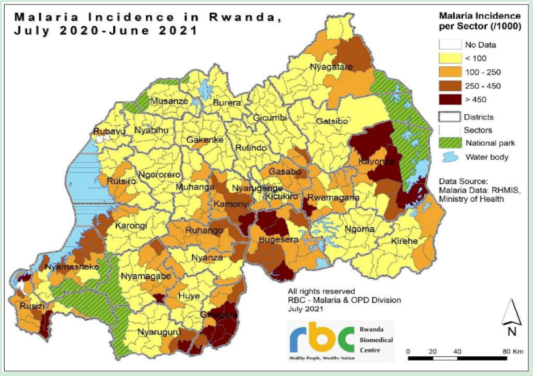


Malaria Incidence by Sector

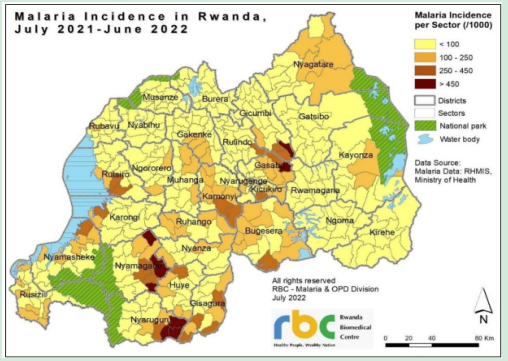
D – Malaria Incidence by Sector in 2019



E – Malaria Incidence by Sector in 2020-21

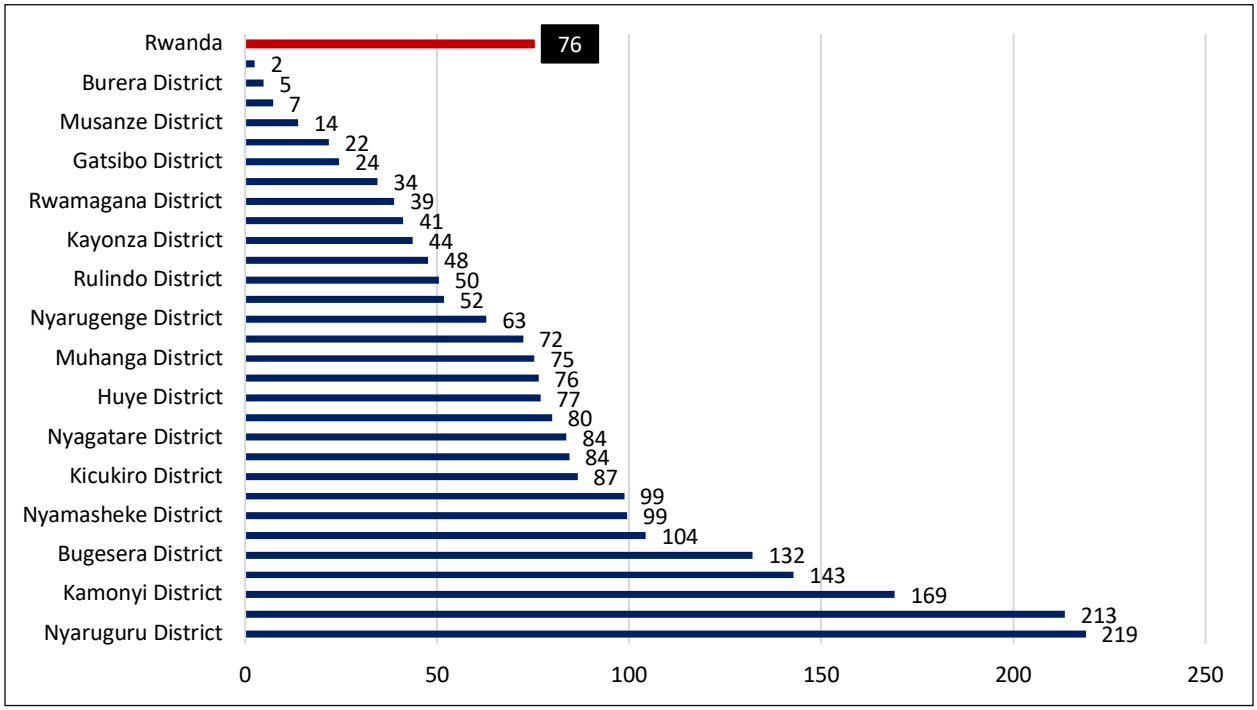


F – Malaria Incidence by Sector in 2021-22



Whilst the whole population is still at risk of malaria, the incidence varies greatly between and within the districts from less than 10 cases per 1000 person-year to over 100 cases per 1000 per person-year (Fig. 10). Given the current epidemiology indicating a decrease in number of districts with API > 100 cases per 1000, and sectors with API >450 observed in 2021/22 (Fig. 10) even though there was no district with API> 450, the API analysis at sub-district (sector) level becomes more informative to identify subpopulations at risk of malaria. Furthermore, triangulation of malaria incidence and other malaria data, and the determinants of the malaria risk to which sub-populations are exposed, will be useful to optimally target appropriate malaria interventions.

Figure 9: Malaria incidence by districts, 2021/22



Considering a tremendous decline in malaria recorded in 2021/22 compared to 2018/19 and the current epidemiological profile of malaria (Fig 9 C & F), the API calculation based on sector level malaria incidences becomes sensitive and relevant to characterize malaria situation at sub-national level. Malaria stratification at sub-district / sector level will be useful to identify and characterize the areas with highest malaria burden for better targeting of interventions.

Changes in Parasite Species Distribution

The population based surveys conducted between 1950 and 1951, in four sites in the Ruzizi Valley of altitudes ranging from 775 m to 2030 m, found the *Plasmodium* parasite prevalence was highest at lower altitudes (98.7% and 83.4% positivity at 775 m and 900–950 m, respectively) compared to higher altitudes (46.5% positivity at the 1500 –1580 m range) while only a few *P. falciparum*, *P. malariae*, and *P. vivax* cases were detected in the 2000–2030 m range.

Currently, *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 (RDHS 2018). In 2020, a case of *P. vivax* was detected in Masaka [5] following a confirmatory test by PCR method, of the same patient that was considered a *P falciparum* mono-infection based on the earlier RDT and microscopy blood examination. The report of *P vivax* confirmed by molecular assay for a case that was earlier misdiagnosed microscopically as *P falciparum* stress the need for a refresher training of laboratory technicians on morphological identification of rare parasite such as *P vivax*, the strengthening of QA/QC of blood microscopic diagnosis, including cross-checking of routine blood slides to monitor the accuracy of examination.

Anti-malaria Drug Resistance

Globally the geographical distribution of artemisinin resistance has been monitored since 2014, based on the detection of mutations in the Kelch13 gene in parasites. Resistance to artemisinin, the main component of the current antimalarial treatments recommended by WHO, is already widespread in South-East Asia. The first signs of emergence of artemisinin resistant parasites in Africa is based on the report from Rwanda describing artemisinin-resistant parasites carrying the Kelch12-R561H mutation in two locations 100km apart (prevalence of 7.4% in Masaka and 0.7% in Rukara, respectively).[6] Continued monitoring of ACT resistance is critical given the potential of *Plasmodium falciparum*-Kelch13-mediated artemisinin resistance to compromise the antimalarial chemotherapy.

2.2 Progress towards Entomological Impact of the Rwanda MSP

Rwanda MSP Entomological Indicators and Targets

The main aim of entomological surveillance should be to inform vector control planning and implementation. Both entomological and epidemiological surveillance information must be linked to program decisions to ensure optimal vector control impacts. The Rwanda MSP 2020 -2024 did not include entomological impact indicators with neither baseline nor targets to assess impact of vector control interventions on malaria parasite transmission. However, Rwanda Annual Malaria Reports 2020 – 2022 include entomological data to inform on the various vector bionomics, ecology, and transmission potential. Also, Rwanda has been using entomological data to routinely adopt the rotational use of insecticides, including the use of next generation IRS and LLIN products. Surveillance of insecticide resistance is conducted in 30 sites and monthly routine entomological monitoring is done in 12 sites.

Appropriateness of entomological indicators

- The entomological indicators, as reported in Rwanda Annual Malaria Reports, are appropriately defined as recommended in the WHO Malaria Surveillance manual (2018).
- No entomological impact indicator, baseline and or targets are included in the M&E framework of Rwanda MSP 2020-2024. However, entomological impact indicators are reported in program annual reports.

[5] McCaffery JN, et al., (2022). Symptomatic Plasmodium vivax Infection in Rwanda. Open Forum Infect Dis. 2022 Jan 19;9(3): ofac025. doi: 10.1093/ofid/ofac025. PMID: 35187194; PMCID: PMC8849279.

[6] Uwimana, A., Legrand, E., Stokes, B.H. et al. Emergence and clonal expansion of in vitro artemisinin-resistant Plasmodium falciparum kelch13 R561H mutant parasites in Rwanda. Nat Med 26, 1602–1608 (2020). https://doi.org/10.1038/s41591-020-1005-2

Progress towards MSP Entomological Indicators

Overall, the entomological inoculation rate (EIR) was reduced from 15 infective bites per person-year for 2016-2019, and to 0.8 infective bites per person-year for 2021/22 period (Table 6). The general trend in reduction of EIR is associated with a scale up of vector control interventions, particularly the introduction of new generations of ITN (PBO-pyrethroids LLIN and Pyrrole chlorfenapyr treated ITN - Interceptor G2) and Pirimiphos-methyl and Fludora Fusion based IRS formulations (Actellic 300 CS and Fusion® 56.25 WP) for which local malaria vectors are fully susceptible.

Table 6: Trends in EIR from 2018/19 to 2021/22

Vector species	2018/19	2019/20	2020/21	2021/22
***An. gambiae* s.l.**	15	17.9	20.6	0.8
An. funestus	0.3	1.05	0.5	0

Source: Annual Malaria Reports 2019/20, 2020/21 & 2021/22

Trends of Malaria Vector Bionomics

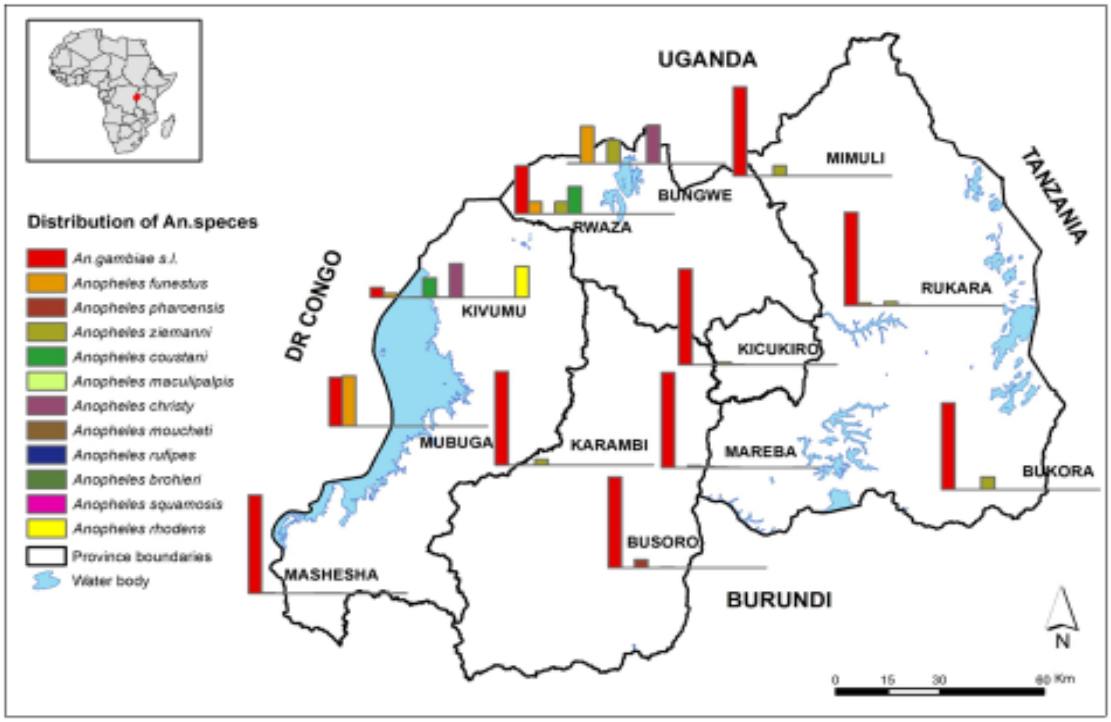
The main malaria vectors in Rwanda include *An. gambiae* complex (*An. gambiae* s.s, *An. arabiensis*) and *An. funestus* complex (*An. funestus* s.s). In 2019 – 2020, *An. arabiensis* was the predominant species in IRS districts (97%), and *An. gambiae* s.s. the primary malaria vector in non-IRS districts. The average of *An. gambiae* s.l collected outside the house was 53.1% in non-IRS sites and 57.9% in IRS sites. Recent findings (2021/22) show the same trend, with more *An. gambiae* s.l collected outside the house, 59.1% in non-IRS Districts and 55.3% in IRS, and the continued replacement of *An. gambiae* s.s by *An. arabiensis* in IRS districts. For example, out of 797 samples *An. gambiae* complex identified in 2021/22, 9% were *An. gambiae* s.s and 91% were *An. arabiensis*, as a dominant malaria vector in IRS districts (Rwanda Annual Malaria Report 2021/22). Determination of parity in mosquitoes reveal a much lower parous rate for An gambiae collected from IRS districts than in non IRS districts (Table 7). This indicates the effect of IRS intervention in reducing the longevity of malaria vectors.

Table 7: Parity rates of Anopheles gambiae s.l caught in IRS and non-IRS sites.

Vector	IRS status	2018/19	2019/20	2020/21	2021/22
	IRS	**26.1% (n=323)**	**18.9% (n=495)**	**26.1% (n=578)**	**16.3% (n=516)**
***An. gambiae* s.l**	**No-IRS**	**58.1%(n=227)**	**60% (n=49)**	**53.6% (n=45)**	**48.4% (n=31)**

Source: Annual Malaria Reports 2019/20, 2020/21 & 2021/22

Figure 10: Distribution of malaria vectors, Rwanda 2019



Source: Rwanda Malaria Strategic Plan 2020-2024

Insecticide resistance in adult malaria mosquitoes

The program monitors insecticide resistance in the adult vector population on an annual basis in sentinel sites representative of different eco-epidemiological situations of the country (Fig. 12). During the 2016-2019 reporting period, biological insecticide resistance tests using *An. gambiae* s.l. was performed on: bendiocarb 0.1%, fenitrothion 1%, pirimiphos methyl 0.25%, DDT 4%, permethrin 0.75%, deltamethrin 0.05%, and lambdacyalothrin 0.05%. No resistance was reported for Fenitrothion and to the next generation of insecticides for public health use (Fig. 11).

Figure 11: Insecticide resistance in Rwanda, 2018/19

Source- MOPDD annual report 2018/2019

In 2019/20, biological resistance tests were performed in 25 sites and resistance was confirmed to deltamethrin in 64% of sites, permethrin in 72%, lambdacyalothrin in 60%, bendiocarb in 8% and DDT in 20%. No resistance to pirimiphos methyl was detected in Anopheles mosquitoes in all surveyed sites. Resistance to fenitrothion was detected in 4 sites (16%) and chlothianidin in one site (4%).

During the 2021-2022 period, insecticide resistance test was conducted in 30 sites and resistance confirmed to deltamethrin 0.05% in 60% of the surveyed sites (18 of 30 sites), Alpha-

cypermethrin 0.05% in 80% (24 of 30 sites), and permethrin 0.75% in 70% (21 of 30 sites) of the total sites surveyed. Pyrethroid resistance was found to be more prevalent in endemic districts in low land areas than in high land. Resistance to pirimiphos methyl 0.25% was found in 40% (12 of 30) of the surveyed sites (Fig. 13). The highest susceptibility was found on fenitrothion 1% in all 30 sites, chlorfenapyr 200µg in 85% (23 of 27), Clothianidin in 83% (15 of 18) and bendiocarb in 73% (22 of 30) sites surveyed. This indicates emerging resistance against chlorfenapyr 200µg found in 15% of surveyed sites, clothianidin in 17% and bendiocarb in 27%.

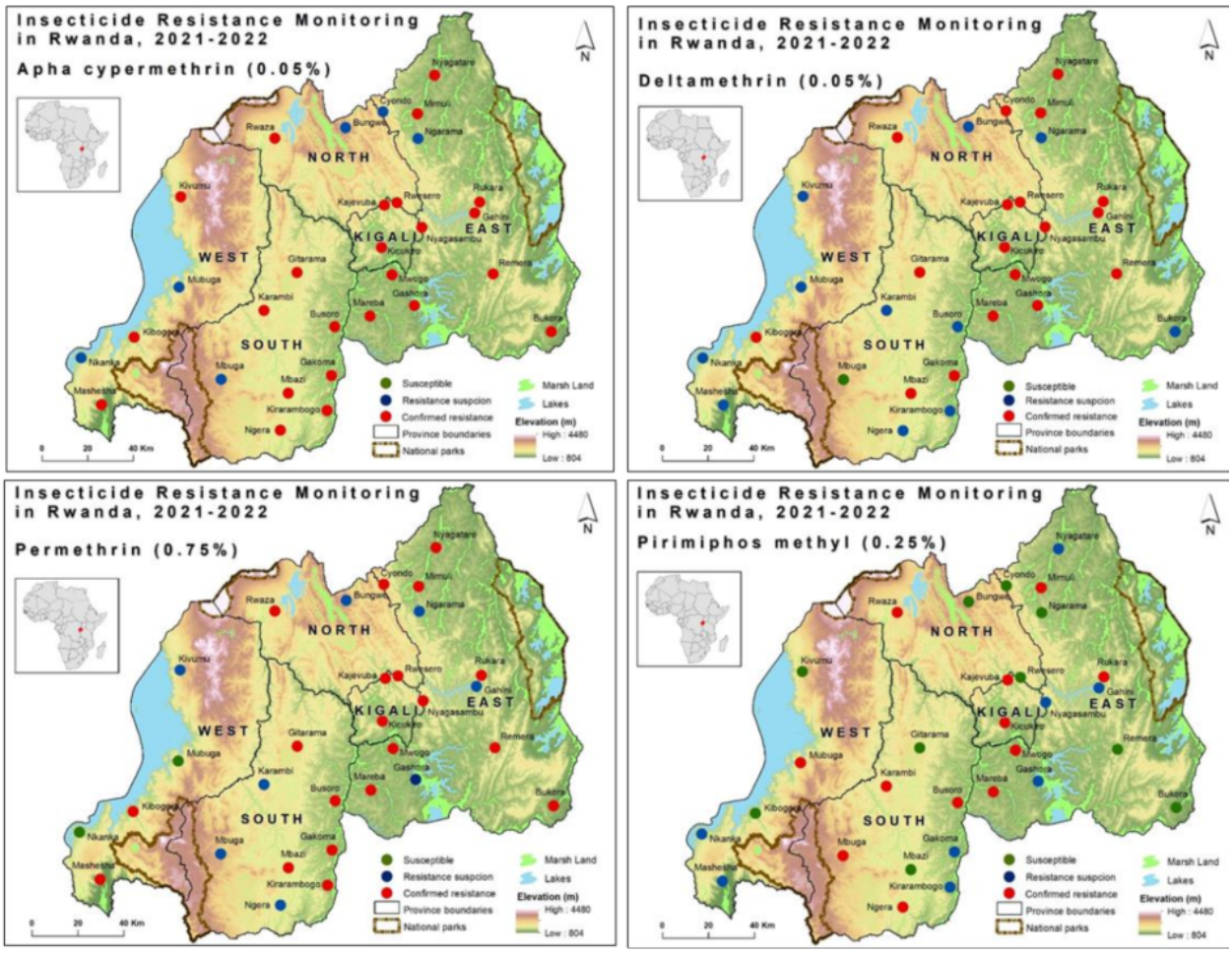


Figure 12: Status of insecticide resistance in Rwanda, 2021-2022.

Intensity of Pyrethroid Insecticide Resistance and Resistance Mechanisms

In the sites with confirmed resistance to pyrethroid insecticides; the addition of synergist (PBO) fully restored susceptibility (100%) to deltamethrin 0.05%, 95% to Permethrin 0.75% and 92.3% to Alpha-cypermethrin 0.05%, suggesting a role of metabolic mechanism of resistance in mediating pyrethroid resistance in vector population from surveyed sites (Rwanda Annual Malaria Report 2021/22).
Findings from the insecticide's resistance monitoring help the program to adapt vector control interventions with guidance in the choice of insecticides to use either in IRS or LLINs (Fig. 14). In IRS, Fludora Fusion (a combination of a pyrethroid/deltamethrin and a neonicotinoid/clothianidin) was used for two consecutive years from 2019 and later replaced by pirimiphos methyl 300 CS (an organophosphate) from 2021. A shift back to Fludora Fusion planned in the spray round of September 2023. LLINs treated with PBO as well as IG2 nets were distributed in March 2020. The PBO-pyrethroids nets are deployed in areas with confirmed metabolic mediated pyrethroid resistance that is fully or partially restored by a PBO synergist.

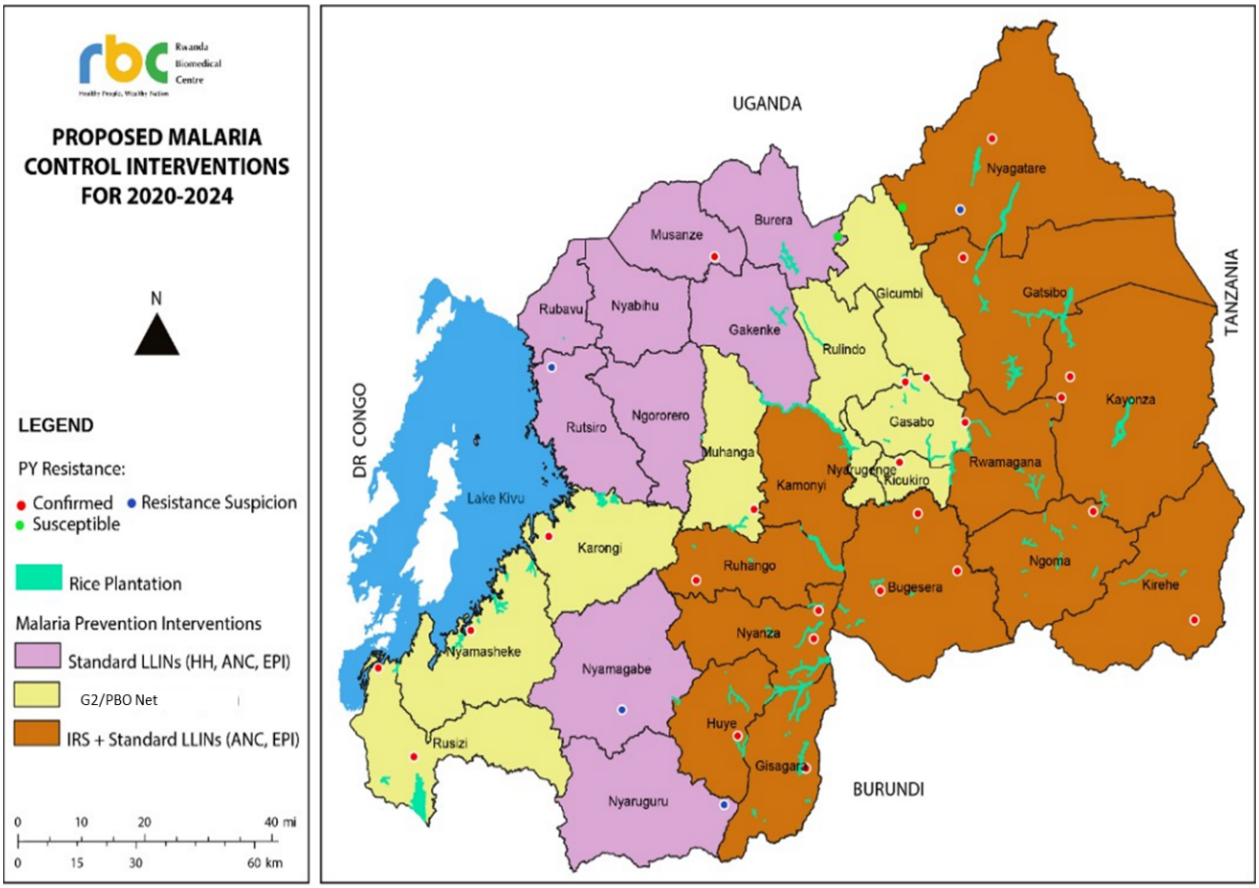


Figure 13: Malaria vector control intervention deployment plan, 2020-24

2.3 Conclusion and Recommendations

2.3.1 Conclusion

Malaria remains a public health concern in Rwanda even in the context of a reduced prevalence and incidence nationally. Epidemiological profile of malaria has changed since 2018/19, currently 80% of districts (24 out of 30) have malaria API <100 compared to 30% of all districts (9/30) during 2018/19 baseline year. Overall, malaria incidence, deaths due to malaria and parasite positive rate have declined by more than 70% compared to baseline year. However, the burden of the disease in the country is not homogenous and variations are observed at sub-district (sector) level and in different epidemiological zones. Triangulation of malaria incidence at sub-district (sector) level with other malaria, ecological and entomological information will be useful in drawing up an updated malaria transmission map and better characterization of sub-populations at risk of malaria. As noted in the 2021/22 reporting period, pockets of sectors with high incidence above API 450 and or malaria upsurges above the average for the district, are distributed in four districts in Rwanda. Understanding drivers of malaria in districts and sectors with persistent high malaria burden will inform better planning and target of interventions.

Many of the districts in Rwanda are now under low transmission with API <100. Efforts must now be concentrated in the assembly of high quality, complete, and timely routine data to track trends in disease patterns and to maintain optimal coverage of interventions. Pillar three of the WHO-GTS speaks to the transformation of malaria surveillance into a core intervention. Surveillance has been identified as the basis of operational activities in settings of any level of transmission. Also, identifying malaria hot spots at sub-district level becomes important to inform targeting interventions especially in the low transmission areas. This means conducting malaria interventions with granularity to the health facility, cell, or village level where CHW are available to provide malaria services. Data gaps in epidemiological impact indicators such as malaria prevalence in under five-year-old and pregnant women need to be addressed in the next phase of MSP implementation.

Vector species composition remains heterogeneous but, in most areas, the main vectors remain *An. gambiae s.l (An. gambiae s.s*, and *An. arabiensis*) and *An. funestus* s.s. There is evidence of reduced diversity of Anopheles species where IRS was implemented and decreased indoor resting densities and sporozoite rates of *Anopheles vectors*. The predominance of *An. arabiensis* over *An. gambiae s.s* in IRS districts has important implications for malaria epidemiology and control given that this vector predominately rests and feeds on humans outdoors. In non-IRS districts, and despite the high coverage of LLINs, the predominance of indoor malaria vectors, A*n. gambiae* s.s. and *An. funestus* may explain the residual of malaria transmission which requires a focal IRS with high impact on indoor mosquito density.

In Rwanda insecticide resistance is common to pyrethroids than other classes of insecticides. Subsequent synergist bioassay tests suggest a role of metabolic mechanism of resistance in mediating pyrethroid resistance in malaria vectors from surveyed sites. Resistance to pirimiphos methyl 0.25% was found in 40% of sites used for routine monitoring. Resistance against chlorfenapyr 200µg, clothianidin 2% and bendiocarb (73.3%) detected in 15% and 27% of surveyed sites, respectively. This indicates an emerging resistance against the new insecticides, namely chlorfenapyr, clothianidin and pirimiphos methyl. Going forward, both epidemiological and entomological surveillance must be strengthened to avail effective and timely information to be linked to program decisions and ensure optimal vector control impacts.

2.3.2 Action Points

1. Investigate the drivers of malaria in sectors consistently with high malaria burden to generate evidence that will inform optimal targeting interventions to further reduce malaria incidence in Rwanda.
2. Strengthen capture of outpatients, inpatient morbidity, and mortality information, and implement population-based malaria surveys to track progress and impact of interventions.
3. Monitor changes in *Plasmodium* parasite species composition and distribution to update malaria epidemiological profile. Monitor parasite resistance to (a) ACT following recent detection of parasite carrying ACT resistance gene and (b) SP which is recommended for malaria chemoprevention in pregnant women.
4. The predominance of *An. arabiensis* over *An. gambiae* s.s in IRS districts has important implications for malaria epidemiology and control given that this vector predominately rests and feeds on humans outdoors. Geographical areas where *An. arabiensis* is a predominant vector will benefit from supplementary interventions that target outdoor resting and biting vectors. The collaboration with the Ministry in charge of livestock and local government must be strengthened for regular treatment of cattle and community based larviciding and environmental management of mosquito breeding sites.
5. The predominance of indoor primary malaria vectors, A*n. gambiae* s.s. and *An. funestus* that maintains the residual malaria transmission despite the high coverage of LLINs, requires a focal IRS with high impact on indoor mosquito density.
6. Include entomological impact indicators (EIR) or sporozoite rate and parity rate as proxy impact indicators, in the MSP M&E performance framework, with baseline and target to achieve at the end of MSP 2020-2024. A minimum entomological impact indicator such as EIR should be estimated once every two years.
7. Considering the MSP 2020-2024 targets for impact indicators have been achieved at mid-term, new targets should be set and included in the revised M&E framework of MSP 2020-24.
8. In the current epidemiology with significant reduction in malaria burden and incidence, the use of stratification for targeting of interventions becomes more relevant. At a minimum this should be done by sector level, although the best is to do this at the lowest level, such as a health post at cell level or at village level served by CHW. This will also allow a non-blanket approach to interventions across the district, especially in low endemic areas.

CHAPTER 3: REVIEW PROGRAM FINANCING

3.1 Malaria program funding landscape analysis

Trends of Budgetary allocation to the health sector within national budget

The Government of Rwanda (GoR) allocation to the Health Sector increased over the period under review from 14.7% in 2019/2020 to 16.5% in 2021/22 in line with the Abuja Declaration 2000. From 2019/2021, the available funds surpassed the planned budget due to the commitment of the government to sustain the IRS in 12 districts. A slight increase in health sector budget allocation, noted in FY 2021-2022 was due to the government contribution of COVID-19 vaccine procurement (Fig.15).

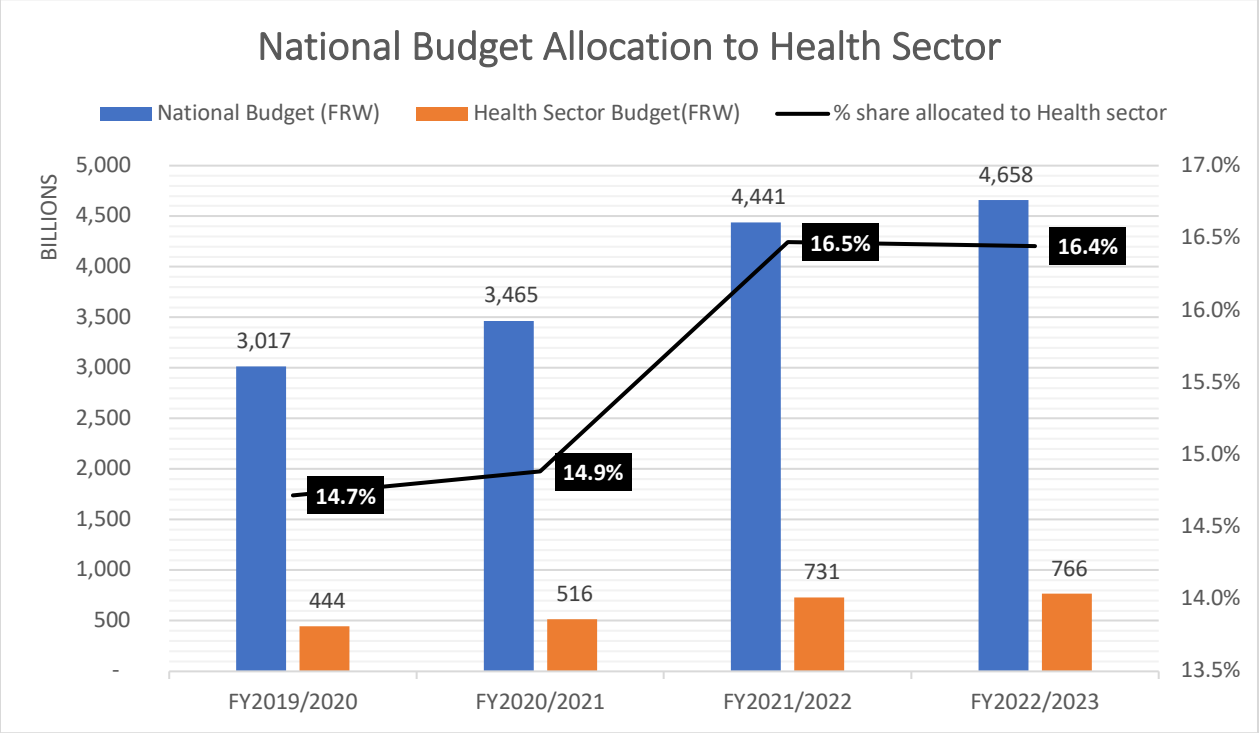


Figure 14: Budgetary allocation to the health sector within the national budget (RWF)

Budgetary Allocation to Malaria Programming within Health Sector

The malaria program in Rwanda is primarily financed by the Government of Rwanda (GOR), the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFTAM) and the US President's Malaria Initiative (PMI). Of the budget allocated to the health sector, the budgetary allocation to malaria was 14% in 2019/20, 15.2% in 2020/21 and 12.1% in 2021/22 (Fig. 16). Though the percentage of health sector allocation to malaria shows a decrease from 15.2% in 2020/2021 to 12% in 2021/2022, the total budget allocated to malaria program increased from 78 billion RwF to 89 billion RwF in the same period, this was due to a significant increase in the total budget allocated to the health sector in 2021 and 2022 in response to COVID-19, contributing indirectly to malaria response by mitigating COVID-19 on malaria service provision.

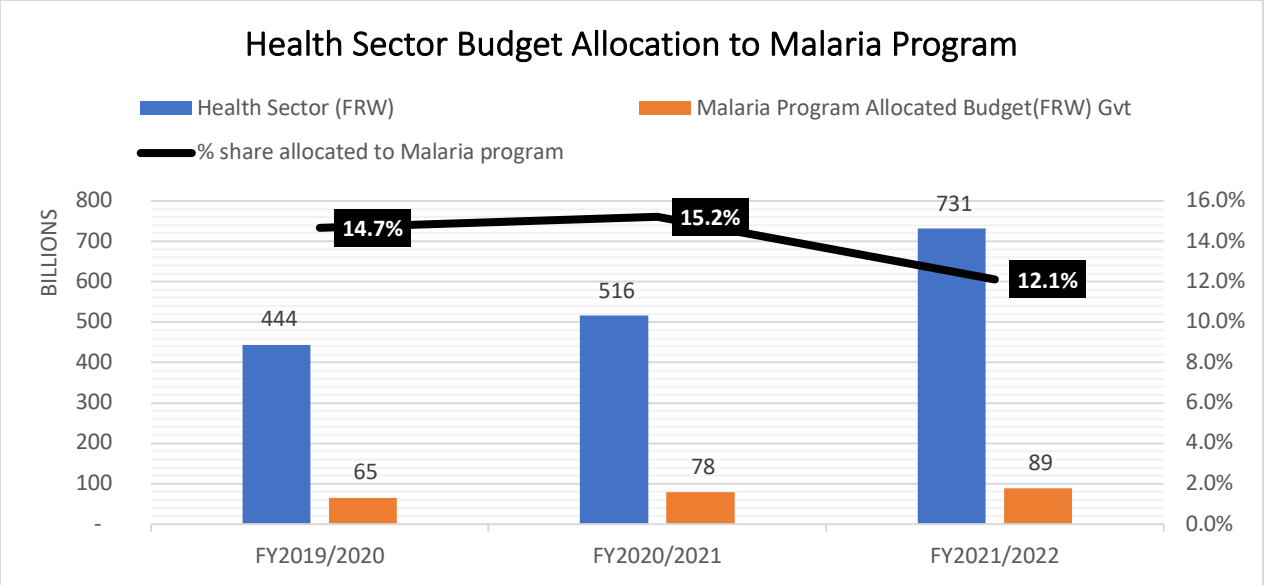


Figure 15 :*Budgetary Allocation to Malaria Programming within the Health Sector (RWF)*

MSP Funding per Program Area (2020-2024)

The available allocation by program area ranged from 3% for Surveillance Monitoring and Evaluation Operational Research (SMEOR) up to 57% for malaria prevention (LLINs and IRS). The MSP program need indicated a funding gap of 21% for malaria prevention which was exacerbated by the increase in unit cost of malaria commodities particularly the LLINs and IRS insecticides (Fig. 17). However, this funding gap was addressed by additional funding from Global Fund and reprogramming of funds.

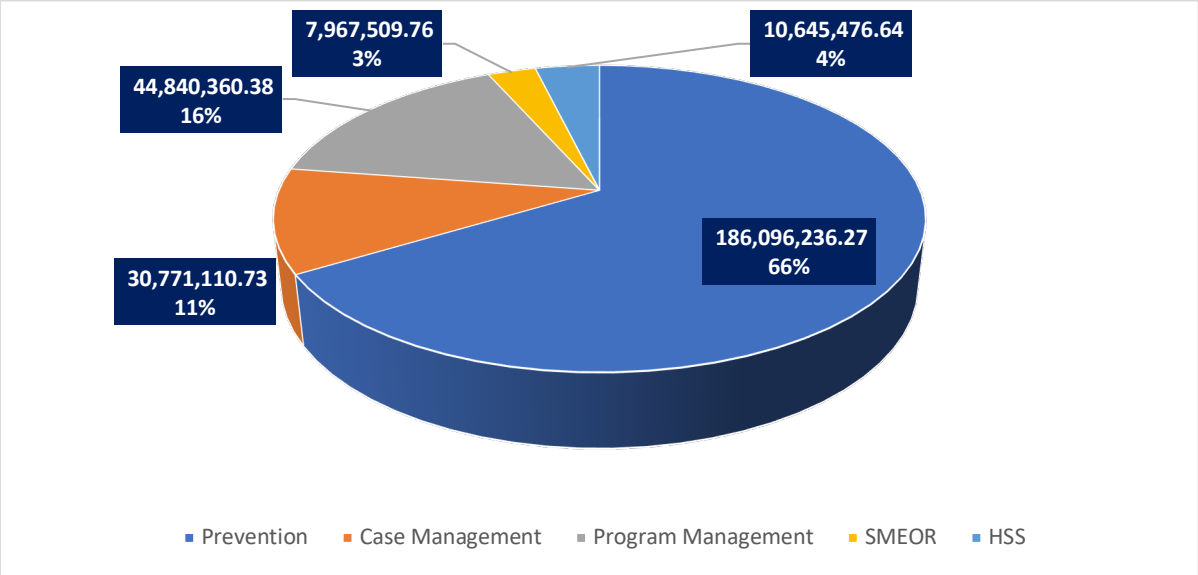


Figure 16: MSP Budget by Program Areas, 2019/20- 2023/24

Considering the potential source of funds (GF, PMI and GOR), the projected commitments was estimated at 206,826,519.51 USD (74%).

MSP Funding by Partner from 2020 to 2022

Overall partner's' financial contribution has increased over the period from 38,333,296 USD (56.6%) in 2019/20 to 53,965,803 USD (63.23%) in 2021/22 as detailed in the Table 8 below.

Table 8. The MSP budget by source of funding, 2019/20 to 2021/22

Source of Fund	FY 19-20	FY 20-21	FY 21-22	MSP Budget FY20-22	%
GF	20,533,296	29,647,540	35,965,803	65,613,343	40%
PMI	18,000,000	18,000,000	18,000,000	36,000,000	22%
GOR	29,474,779	30,729,213	31,378,930	62,108,143	38%
Total	**68,008,075**	**78,376,753**	**85,344,733**	**163,721,486**	**100%**

The budget for Malaria program from the Fiscal year 2020-21 to 2021-2022 was 163,721,486 USD from the 3 sources of funds, including 65,631,343 USD from GF (40%), 36,000,000 USD (22%) from PMI and 62,108,143 USD from GOR (38%). Considering annual contribution by source of funds there is a notable progressive increase of GoR contribution from 29,474,779 in the FY 2019/20 to 31,378,930 in FY 2021-22. There has been a steady increase in donor funding from 56.7% in FY 2019/20 to 63.2% FY 2021-22 (Fig. 18).

In the same period, additional technical and financial support from Roll Back Malaria (RBM), African Leaders Malaria Alliance (ALMA), World Health Organization (WHO) and Bill and Melinda Gates Foundation has been received.

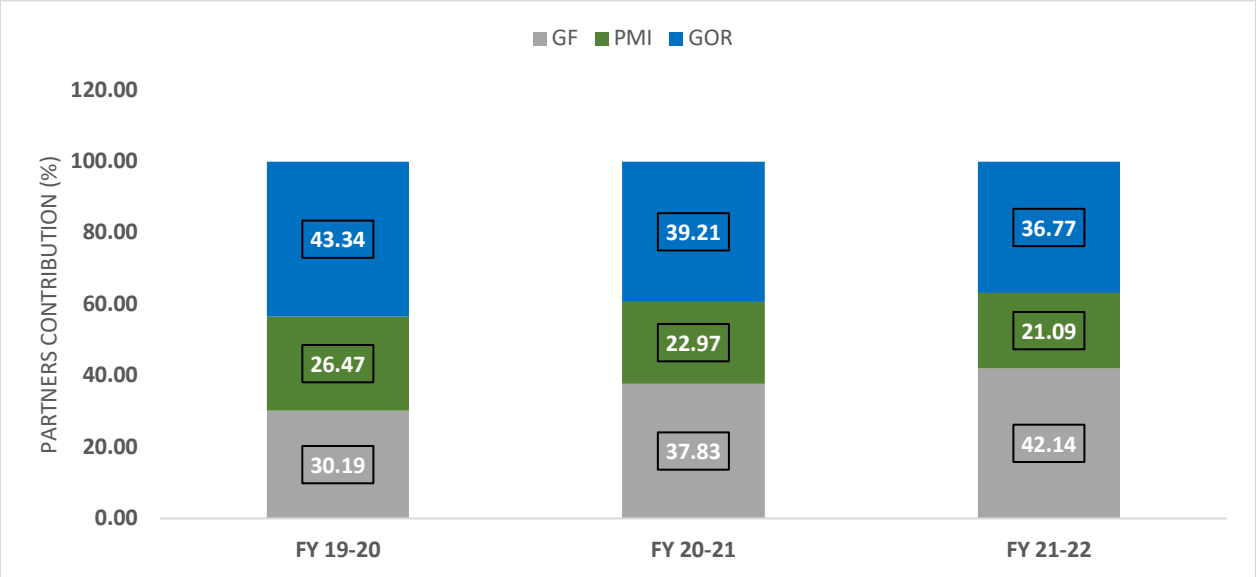


Figure 17: MSP Funding by Partners from 2020 to 2022 in percentage.

3.2. Malaria Expenditure Analysis in the Context of Need-based Budget

Financial analysis conducted in the period showed that MSP malaria program needs were estimated at $182 Billion and received an allocation of $175 Billion, representing the funding level of 97%, meaning a MSP funding gap of 3%, with an execution of $158 Million (90.3% of execution rate) (Fig. 19).

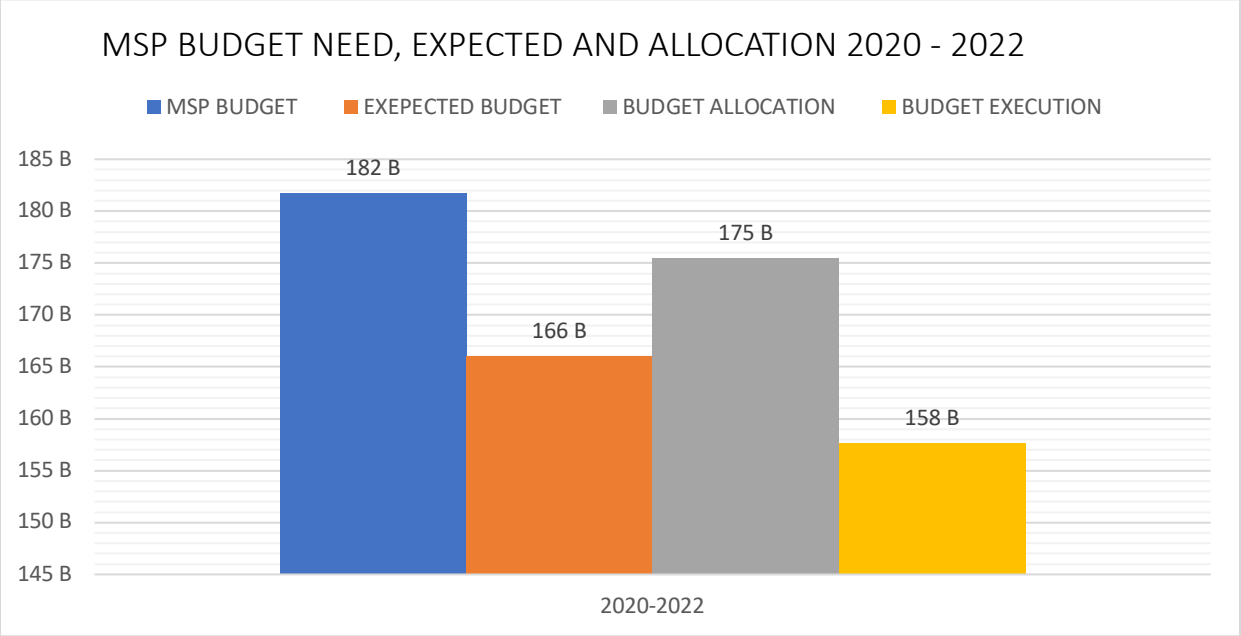


Figure 18: MSP funding level and budget execution (2020 – 2022)

Breakdown by program areas revealed a funding gap of 21% for malaria preventions (Table 9), and the main reason for this gap is related to an increase in unit cost of commodities particularly the LLINs and IRS insecticides. Overall, the available allocation by program areas ranged from 4% HSS and SMEOR up to 57% for malaria prevention (LLINs and IRS). Allocation for malaria prevention and case management include the cost for commodities and SBC activities.

Table 9: MSP budget need and allocation, 2020 - 2022

Malaria MSP Budget and Budget Allocation 2020 – 2022 (in FRW)					
MSP Program Areas	**MSP Budget in 2020-2022**	**% of Annual Budget**	**Budget Available in 2020-2022**	**%**	**% Gap by Program**
1. Prevention	126,119,318,534	69%	100,137,800,446	57%	21%
2. Case Management	18,327,808,345	10%	17,571,863,273	10%	4%
3. SMEOR	5,041,668,058	3%	6,866,548,383	4%	(36%)
4.Program Management	25,821,923,396	14%	44,358,837,958	25%	(72%)
5.HSS	6,444,779,462	4%	6,502,318,657	4%	(1%)
TOTAL	**181,755,497,795**	**100%**	**175,437,368,717**	**100%**	**3%**

MSP Funding Allocation per Program Area (2020-2022)

From July 2020 to June 2022, a total of FRW 163,965,177 were allocated to Malaria Program with 68% of all budgets allocated to Malaria Prevention, followed by Program Management with 26% allocation (Fig. 20). The remaining program areas (SMEOR, Program Management and HSS) was allocated 6% of the budget.

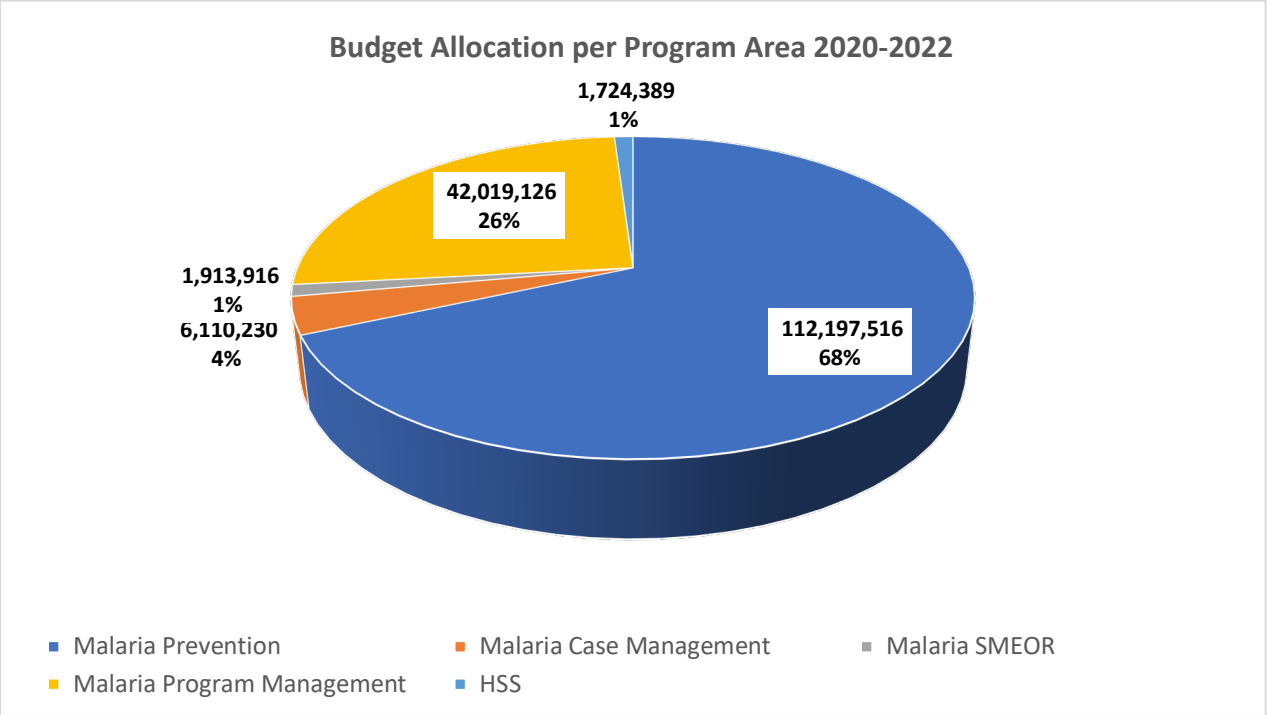


Figure 19: MSP budget allocation by program area, 2020-22

Annual Budget Allocation per Program Area 2020-21 and 2021-22

Breakdowns of budget allocation by financial year shows allocation was highest for malaria prevention, increasing from 65% to 71% (Fig 21), while allocation to program management remained around 25%. Main reason for an increase in budget on malaria prevention in 2021/22 was money re-allocation to cover high unit price for LLINs and IRS.

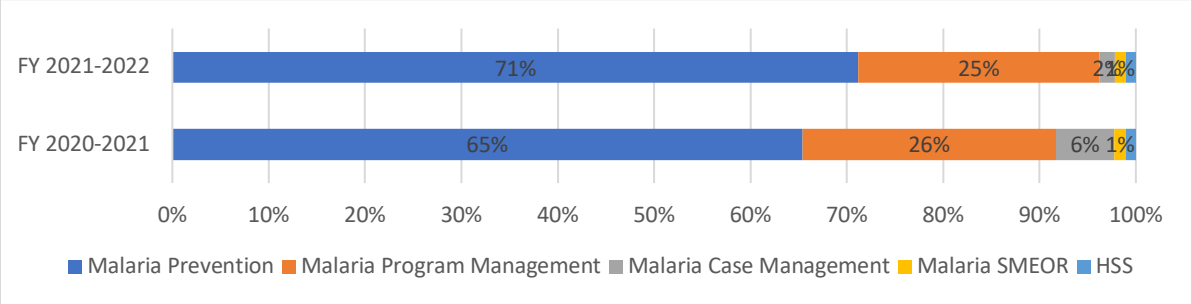


Figure 20: MSP budget allocation by program area 2020/21 and 2021/22

The Malaria Program Budget Execution (BE) was 100% in FY2020-2021 and dropped to 83% in the following year. The low budget execution in FY2021/2022 was mainly due to the delayed procurement of LLINs for both routine and mass distribution (Fig. 22). The procurement and distribution will be done in 2023.

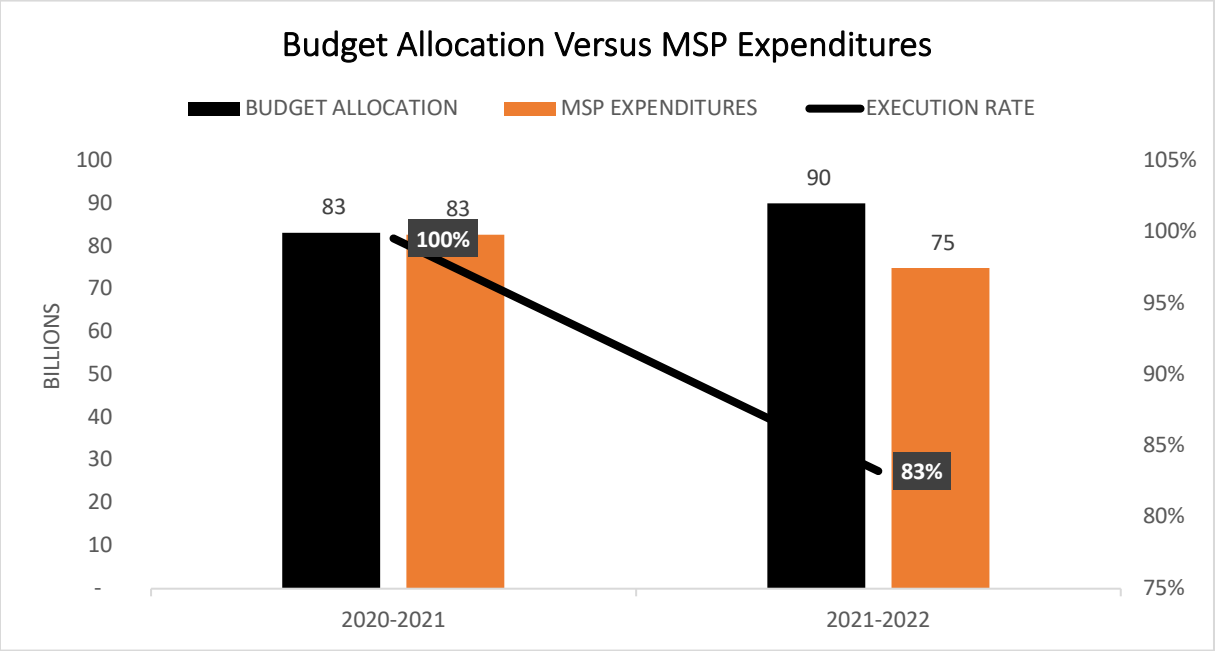


Figure 21: MSP budget allocation vs expenditures 2020/21 and 2021/22

MSP Expenditure as per Program

The malaria prevention program benefited from 50% of the whole budget followed by M&E (21%) and case management with SBC receiving relatively minimal finances for implementation of direct activities during the period under review (Fig. 23). **The overall budget execution rate for two years was 92%**

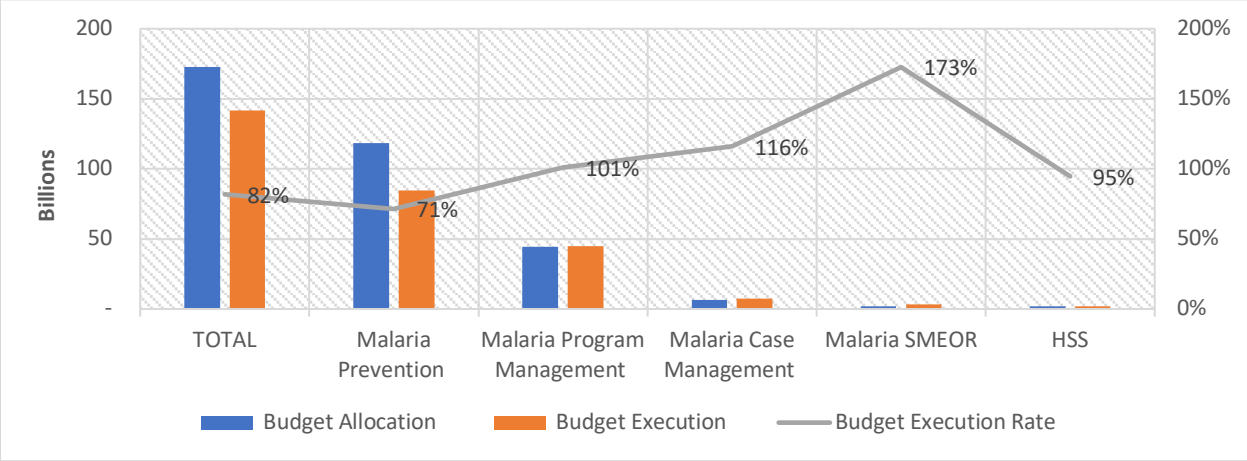


Figure 22: MSP Budget Allocation versus Budget Execution per Program Area (2020-2022)

Key Challenges in Malaria Program Financing in Rwanda

The review noted the following challenges related to the financing of the malaria program in the MSP 2020-24, for 2020/22 period:

- Increase in unit price of commodities due to COVID-19 pandemic and budget gap in outdoor vector prevention.
- There is a high level of dependence on external sources of funding for the key commodities.
- Programmatic areas, such as SMEOR/EPR, and SBC, experience low funding allocations.

3.3 Conclusion and Action Points

3.3.1 Conclusion

This review found an improvement in the funding level of malaria activities compared with the last Malaria Program Review (MPR). GoR allocation to the Health Sector increased from 14.7% in 2019/2020 to 16.5% in 2021/22 in line with the Abuja Declaration 2000. From 2019/2021, the available funds surpassed the planned budget due to the commitment of the government to sustain the IRS in 12 districts. The MSP malaria program needs were estimated at $182 Billion and received an allocation of $175 Billion, representing the funding level of 97%. The available allocation by program area ranged from 4% for SMEOR up to 57% for malaria prevention (LLINs and IRS). The MSP program need indicated a funding gap of 21% for malaria prevention which was exacerbated by the increase in unit cost of malaria commodities particularly the LLINs and IRS insecticides.

3.3.2 Action Points

Advocate for establishment of sustainable and innovative financial resource mobilization mechanisms to ensure implementation of MSP interventions at full scale. This is critical considering the declining trend in external resources and projected high cost of new interventions (new generation LLINs and IRS formulation) planned for deployment in the next phase of MSP 2020-2024.

CHAPTER 4: CAPACITY OF THE PROGRAM TO IMPLEMENT PLANNED ACTIVITIES

4.1. Rate of Implementation rate of planned MSP activities

The program had planned to implement 305 activities in five objectives. Out of these 81% were fully implemented, 9% were partially implemented and 10% were insufficiently or not implemented at all. In addition, 29% of the 2019 MTR recommendations were fully implemented, most of the recommendations (64%) were partially implemented (Table 10). Inadequate funding and disruption due to COVID-19 pandemic was cited as challenges that impeded full implementation of various strategies in the MSP 2020-2024 for the 2020-2022 period. Below is the summary of implementation of activities by MSP objectives and for each strategy is provided at the Annex 7.

Objective 1: By 2024, at least 85% of the population at risk will be effectively protected with preventive interventions.

The achievement for this objective was analyzed under two thematic areas, vector control and MIP. The overall score was high, at 98 percent. The performance of the strategies on IRS and LLIN was high >92%, but the strategy face challenges related to an increase in unit price of commodities and mostly relying on external funding sources for commodities. In particular, the planned LLINs mass campaign could not be

implemented and completed as planned due to challenges related to COVID-19 pandemic (refer to Excel sheet on summary of MSP activities implementation by strategies). The score on the strategy to introduce innovative vector interventions was high at 100%, but this was based on a pilot project on delivering larvicide using drones, which showed a significant reduction in densities of both adult and aquatic stages of mosquitoes. In addition, progress has been made addressing recommendations derived from the review of Rwanda IVM strategy that recommended strengthening the capacity for entomological surveillance and insecticide resistance monitoring, which were fully implemented. The national database on vector control on a DHIS2 platform has been established with transfer of data from paper into the system ongoing.

Objective 2: All suspected malaria cases are promptly tested and treated in line with the national guidelines.

The overall performance for this objective is moderate given 75% of activities were fully implemented. Performance of the six strategies under this objective ranged from 0 percent for strengthening mechanisms to maintain competency of health workers in malaria case management at all levels including private sector to 92 percent for strengthening early detection and treatment in pregnant women.

Objective 3: By 2024, strengthen surveillance and reporting to provide complete, timely and accurate information for appropriate decision making at all levels.

The overall performance was moderate at 64 percent of planned activities fully implemented, with scores of its six strategies ranging from 40 percent to 100 percent. A key reason for this underachievement was lack of a functional malaria early warning system (given 60% of planned activities were fully implemented), with strategy on community health evaluation and improving reporting from the private health sector scoring 40% and 45%, respectively.

Objective 4: Strengthen coordination, collaboration, procurement & supply management, and effective program management at all levels.

The overall achievement was moderate, given 88% of activities were fully implemented. Performance of two strategies under this objective were 67 percent for strengthening intra and inter-sectoral collaboration and coordination of malaria control activities; and regional collaboration; and the score for the rest of strategies were 80 percent and 100 percent.

Objective 5: By 2024, 85% of the population at risk will have correct and consistent practices and behaviors towards malaria control interventions.

The overall performance of this objective was high given >90 percent of activities were fully implemented. Status of a strategy to increase awareness on community role in malaria prevention and control interventions was moderate given 88% of activities were fully implemented while the other three strategies (Strengthen SBC malaria framework; advocate for high level support to sustain malaria prevention and control interventions including social marketing; and promote community engagement in malaria prevention and control interventions) achieved highest score of 100% with all activities fully implemented.

Table 10: Rate of implementation of planned activities by MSP objectives, 2020-2022.

Objective	Fully Implemented Activities		Partially Implemented Activities		Activities NOT Implemented	Total	
	No.	%.	No.	%	No.	No.	No
Malaria Prevention	39	98%	1	3%	0	0%	**40**
Case Management	75	75%	8	8%	17	17%	**100**
Surveillance, Monitoring and Evaluation	39	64%	11	18%	11	18%	**61**
Program Management	41	88%	5	8%	2	4%	**48**
SBC	54	96%	2	4%	0	0%	**56**
Total Activities	**249**	**81%**	**27**	**9%**	**30**	**10%**	**305**

Implementation rate (IR) is HIGH if >90% fully implemented; MODERATE if 75–90% of activities fully implemented; LOW if <75% fully implemented.

4.2 Status of Implementation of the Recommendations of Last MPR

Review of implementation status of the previous malaria program has indicated that 29% of the recommended actions have been fully implemented, 64% partially implemented and 1 of action point was implemented at a low level. The implementation rate is thus rated as "low" since just under 75% of the majority (64%) of recommended actions were partially implemented (Table 11). The review highlighted the main achievements and gaps as follows.

- NMCP is staffed with skilled and competent personnel in key technical unit, but there is a gap in sourcing funding to train malaria entomologists and epidemiologists, as well as filling in key positions (senior officer of case management and SBC, and 3 posts of supervisors) due to long recruitment process.
- Overall, there is improvement in establishing mechanisms to support multi-sectoral and regional coordination to support malaria programming. In particular, the GLMI strategic plan 2021-2025 developed by all the 7 members of EAC in 2020 was launched at regional and national level in 2021. Several interventions implemented under GLMI initiative, including establishment of cross border health posts, GLMI experts TWG, and the development of the GLMI structure and the baseline survey at different borders areas at regional level is being conducted. Though the establishment of the End Malaria Council wasn't completed, the program developed the concept note and the cabinet paper of its establishment. Malaria TWG and sub TWGs have been established with approved TORs and members of some TWG do meet to advise the program. In particular, the SMEOR TWG meetings were not conducted, and the research agenda wasn't developed during the review period.
- The review noted improvement in establishment of malaria surveillance systems. Five Malaria indicators were integrated into the existing community PBF framework and in 2021 a ministerial instruction was issued informing all districts on the integration of malaria indicators in the community performance-based financing. Malaria M&E and data utilization capacity has improved due to existence of a well-functioning Health information management system (HIMS) which includes RapidSMS, eLMIS and, SISCom and this enabled integration of health information, including aggregate malaria data from private and public facilities, and from the community.
- Currently, data from Rwanda's HIMS is relatively complete, accurate, and timely for routine program monitoring. While the completion and timeliness of reporting rates are high from public health

facilities at 98%, the reporting rates from private health facilities is around 60%. The Malaria Data Quality Dashboard has improved management of commodities in the health facilities and program staff do analyze and use data to make evidence-based programmatic decisions and produce geospatial illustrations of malaria trends over time. However, data analysis at the decentralized level and private health facility is low and it led to some evitable inconsistencies in terms of malaria reported cases compared to reported diagnosed cases and drug consumption. Also, the malaria EPR system is not established yet though there has been preparatory work done.

Table 11: Detailed Implementation Status of 2019 MPR Recommendations

	2019 MTR Recommendations	Implementation status as of 2022
1	Conduct adequate advocacy for establishment of sustainable and innovative financial resource mobilization mechanisms to enable implementation of the MSP interventions at full scale.	**Partially**
2	Synchronize and align the procurement and timely distribution of LLINS need to be achieved to maintain their impact.	**Partially**
3	Mobilize adequate resources (local and external) required to scale up and sustain effective coverage with IRS.	**Fully**
4	Use stratification map to better target vector control intervention and maximize impact.	**Fully**
5	Strengthen malaria service delivery through a robust refresher training and supportive supervision that includes private sector facilities to maintain competency of health workers in diagnosis and malaria case management.	**Partially**
6	Review, update, produce and distribute adequate diagnostic and treatment guidelines to both public and private health facilities is essential.	**Partially**
7	Strength the capacity of the national health laboratory (NHL) to support malaria diagnosis QA/QC activities.	**Partially**
8	Adequately address the risk of commodity expiration by revising the procurement and distribution process of commodities.	**Partially**
9	Develop malaria surveillance guidelines including EPR in collaboration with the Epidemiological Surveillance and Response division in addition to an operational research agenda to inform programming needs.	**Low**
10	The NMCP should build capacity in M&E and data utilization at the decentralized level ensuring mobilization of resources for this.	**Partially**
11	Of essence the program needs to advocate for increased funding to support implementation of SBC activities. This is to ensure production and distribution of adequate SBC tools and materials with standard messages for use at all levels, strengthening human resource capacity for SBC at all levels and strengthening targeted SBC to increase knowledge on malaria and improve uptake of interventions.	**Partially**
12	The MOPDD should also strengthen annual review and planning meetings to deliberate and document progress made and outline priorities and milestones for the following year, this will help to critically review all factors that lead to under-achievement of strategy implementation across all objectives. Coordination and collaboration of RBC divisions and units and relevant partners should be enhanced through TWGs.	**Partially**
13	Expansion of the performance-based financing (PBF) to CHWs providing malaria services is recommended.	**Fully**
14	The program also needs to continue to support EAC efforts to develop the structures and operationalization of the Great Lakes cross border malaria initiative.	**Fully**

4.3 Conclusion and Recommendations

Based on the findings described in this chapter, the review made the following conclusions and recommendations on the capacity of the NMCP to implement the planned strategies and activities.

4.3.1 Conclusion

- The performance for implementation of all the five objectives was generally moderate, ranging from a score of 64 percent for objective 3 on SMEOR/EPR to 98 percent for objective 1 on malaria prevention. Overall, the implementation rate was moderate, given 82% of MSP activities were fully implemented.
- Only 5 out of the 26 strategies (19.2%) in the MSP achieved a moderate score (between 75% and 90%). Nine strategies (34.6%) achieved a low score with <75% implementation rate. All the other 12 strategies achieved a high score (>90%).
- Implementation status of recommendations derived from previous MTR was rated low, given most actions (64%) were partially implemented while only 29% were fully implemented.
- Inadequate funding was cited as a challenge that impeded full implementation of various strategies in the MSP. Some strategies, such as net distribution and IRS, did however receive adequate funding but faced delay challenges related an increase in unit cost of commodities and COVID-19 pandemic.
- Implementation rate of actions that originated from the 2019 MTR were low since <75% of recommendations were fully implemented.
- There was also insufficient follow-up of planned activities to ensure sustained achievement of expected outcomes. Among other things, engagement at a decentralized level in malaria management and data use for decision is necessary for optimal delivery of malaria services and timely response to operational bottlenecks.

4.3.2 Action Points

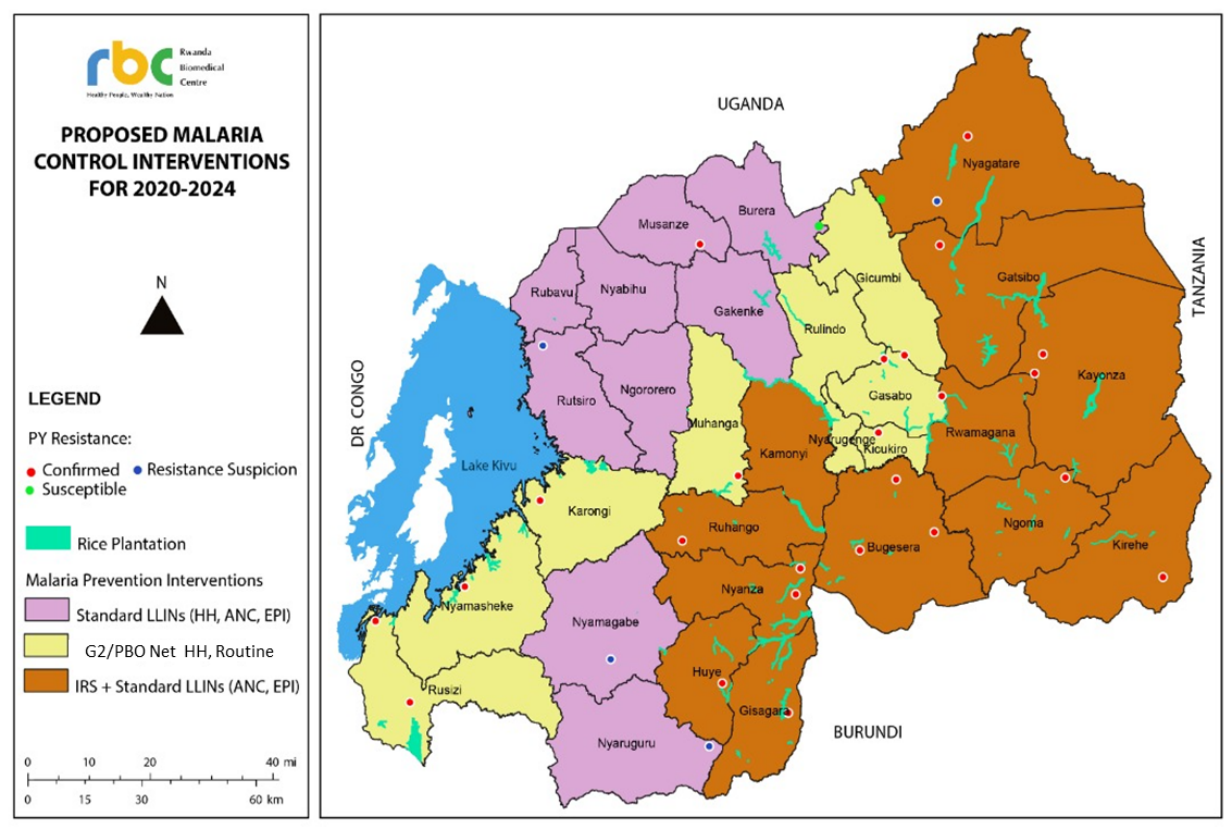
- Advocate for establishment of sustainable and innovative financial resource mobilization mechanism to implement MSP interventions at full scale.

CHAPTER 5: EFFECTIVENESS OF THE HEALTH SYSTEM IN DELIVERING MALARIA SERVICES

Objective 1: By 2024, at least 85% of the population at risk will be effectively protected with preventive interventions.

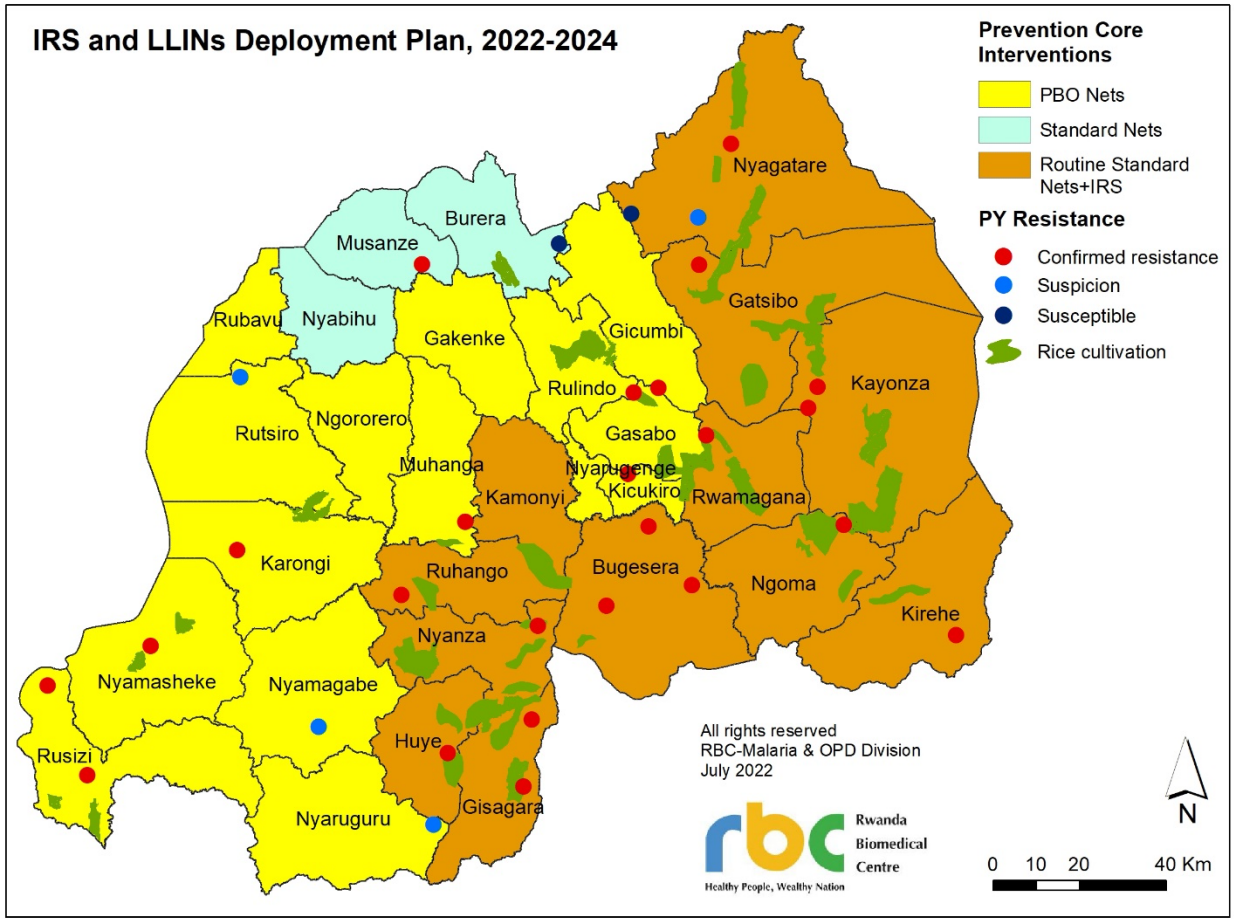
Vector control is the primary component of malaria control and prevention in Rwanda. It remains one of the key Malaria &OPDD responses to consolidate the gains in malaria control and drive down the transmission. Key vector control includes Long Lasting Insecticide Treated Nets (LLINs), Indoor Residual Spraying (IRS), and Larval Source Management (LSM), and innovative integrated vector control tools which will be deployed according to the country's epidemiological and risk stratification zones. Vector control deployment plan based on MSP 2020-2024 is presented on Fig. 24A. For the reporting period, vector control strategies were universal LLINs Coverage (UC) of the population at risk through the LLIN mass distribution of households conducted in 18 districts with low and moderate incidence as well as routine distribution to the most vulnerable groups (children of under five years old and pregnant women) country wide (Fig 24B); indoor residual sprayed targeting district with high malaria burden and evidence of pyrethroid resistance and larval source management as complimentary intervention. There was no chemoprevention strategy given presumptive treatment of malaria in pregnancy is not implemented in Rwanda due to SP resistance and the country is yet to adopt SMC.

A: MSP Malaria Interventions 2020-24



Correction done

B: Revised Deployment plan IRS & LLIN 2022-24



Correction done

Figure 23: Vector control deployment plan as per MSP (A) and for 2022-2024 period (B)

Malaria Prevention Outcome Indicators and Targets

There are four strategies to be implemented under objective 2 of MSP 2020-2024. The first two strategies (first on IRS and second on LLIN) have defined outcome indicators which are shown below.

1. Percentage of the population that could sleep under an ITN if each ITN in the household were used by up to two people.
2. Proportion of HH with at least one LLIN
3. Proportion of population effectively protected by either IRS or LLINs
4. Proportion of children under five years old who slept under a LLIN the previous night.
5. Proportion of pregnant women, who slept under a LLIN the previous night.
6. Percentage of population aged 5-14 who slept under an LLIN.
7. Proportion of total population who slept under an LLIN the previous night.
8. Proportion of structures in targeted areas that received indoor residual spraying (IRS) during the reporting period (IRS coverage in targeted districts)
9. Proportion of population effectively protected by IRS in targeted 12 districts.
10. Proportion of targeted districts covered by IRS.

Most of these are standard indicators and thus appropriate for measuring achievement of the vector control interventions related to IRS and LLINs. The progress on vector control indicators was captured by the MIS 2017 and DHS 2020 as presented below. However, the review found that there was a lack of established standardized indicators to measure progress of strategy 3 (introduction of innovative vector control) and 4 (community-based source modification) of MSP objective 2. The wording for access indicator should change to "Proportion of household with access to LLINs (one net for every 2 people)." Given all LLIN coverage and utilization indicators are tracked through population-based surveys, the program should include operational coverage indictor which can be reported using program data.

Progress Towards Vector Control Outcome Indicators

Strategy 1.1: Sustain and Extend IRS in High Malaria Incidence Districts

Progress on IRS indicators was captured through program reports / records. Overall targets for proportion of structures to be sprayed and population to be protected by IRS were achieved by 100% for 2020-2022 reporting period (Table 12).
In Rwanda IRS has evolved, shifted from focal spraying in 2016 to blanket coverage in high malaria endemic districts. A summary of the number of structures sprayed and the total population protected in targeted districts from July 2020 to June 2022 is provided on Table 13. There was a rotational use of insecticides from Fludora Fusion 56.25 WP (a combination of a deltamethrin and a clothianidin) to pirimiphos methyl 300 CS (an organophosphate), as part of insecticide resistance management strategy.

Table 12: Progress towards IRS outcome targets, 2020-2022.

IRS Indicators	Baseline 2018/19	Targets 2021/22	Results 2021/22	Achievement
Proportion of structures in targeted areas that received indoor residual spraying (IRS) during the reporting period	98%	98%	99%	100%
Proportion of population protected by indoor residual spraying within the last 12 months in targeted districts	98%	85%	99%	100%
Proportion of targeted districts covered by IRS.	83%	100%	100%	100%

Overall, there has been a steady expansion of IRS from 621,169 sprayed structures in 2016-2017 (Annual Report 2017) to 1,376,832 in 2021/22 (Annual Report 2022). Also, the population protected increased from 4.86M people in 2019/20 to 5.17M in 2021/22.

Table 13. Districts covered with IRS, 2019/20, 2020/21, 2021/22.

FY	District covered	Structures sprayed	Coverage	Population protected	Insecticide used
2019 - 2020	Nyagatare, Kirehe, Ngoma, Ruhango, Kamonyi, Huye, Gisagara, Nyanza, Rwamagana, Kayonza, Gatsibo, Bugesera, Rusizi: 13 districts (12 Blanket, 1 Foci control)	**1,231,070**	99.3	**4,867,811**	Fludora Fusion
2020-2021	Nyagatare, Kirehe, Ngoma, Ruhango, Kamonyi, Huye, Gisagara, Nyanza, Rwamagana, Kayonza, Gatsibo, Bugesera, Rusizi: 13 districts (12 Blanket, 1 Foci control)	1,308,889	99.5	5,043,795	Pirimiphos methyl 300 CS + Fludora Fusion 56.25 WP
2021-2022	Nyagatare, Kirehe, Ngoma, Ruhango, Kamonyi, Huye, Gisagara, Nyanza, Rwamagana, Kayonza, Gatsibo, Bugesera, Rusizi, Nyamagabe, Nyaruguru: 15 districts (12 Blanket, 3 Foci control)	1,376,832	99,2	5,170,303	Pirimiphos methyl 300 CS

The proportion of structures in targeted areas that received IRS during the review period and the operational coverage has been satisfactory at above 98% (Fig. 25)

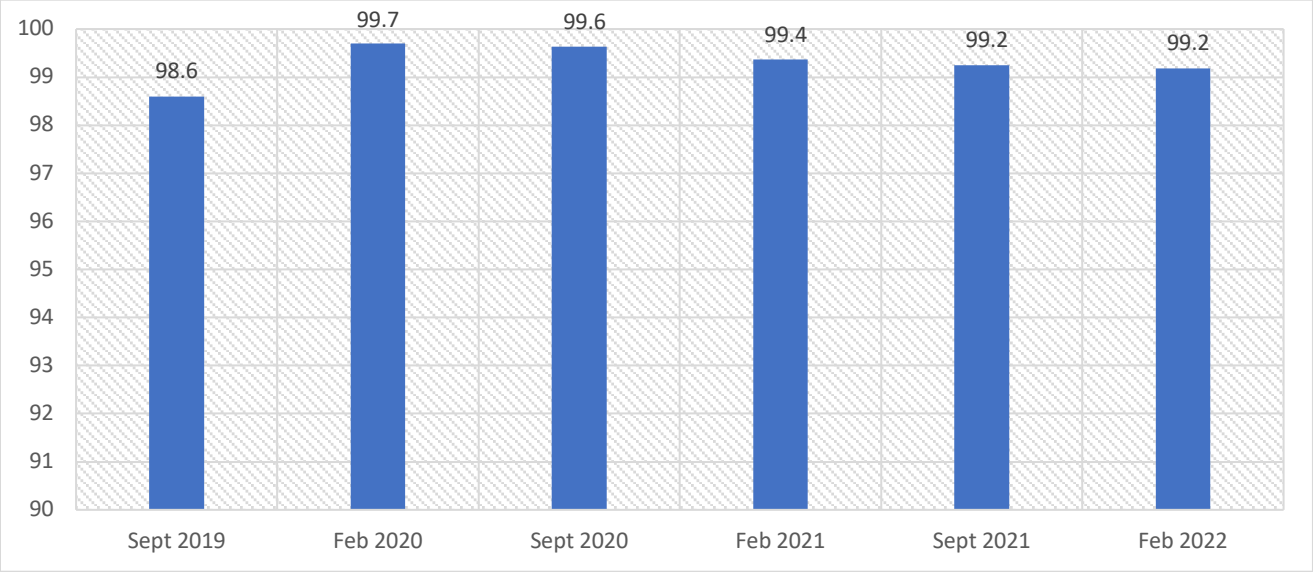


Figure 24: Proportion of structures in targeted areas that received IRS, 2020/21 to 2021/22

National proportion of population that is protected by IRS was calculation based on the projected population (Census 2012) of 12,955,768 for the first year, 13,252,274 for the second year. Nationally, the proportion of the population protected by IRS was around 39% for the reporting period (Fig 26).

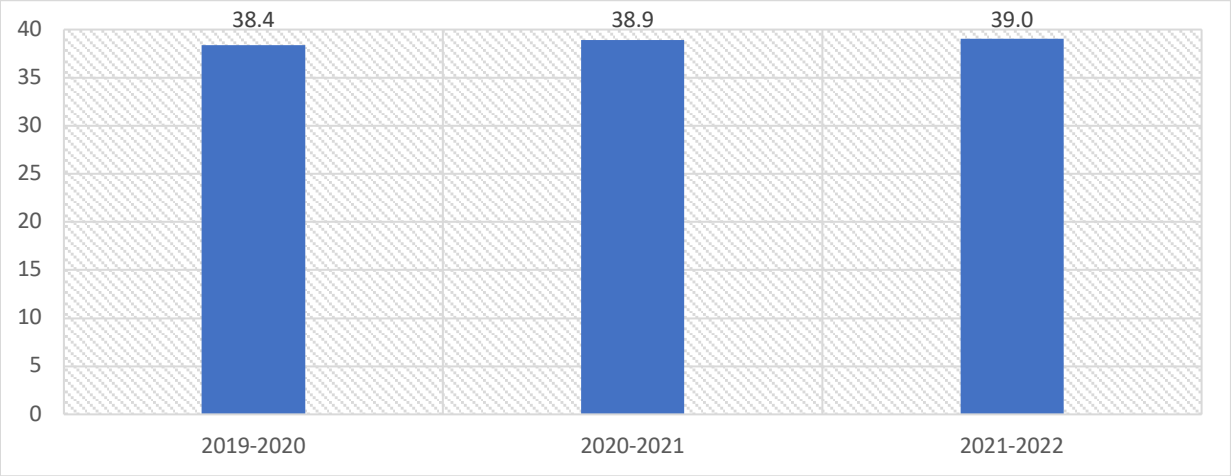


Figure 25: Proportion of population protected by IRS, 2020/21 to 2021/22

Quality of spraying in monitored through standard WHO assay. In all districts, the insecticide was still effective at the end of the year with mortality of exposed mosquitoes above the cut off mortality of 80% as recommended by WHO. Results confirm a residual efficacy of Actellic® 300CS (Organophosphate insecticide, pirimiphos-methyl) of more than ten months in the context of Rwanda as shown the above results from all Districts. With Fludora Fusion 56.25 WP, results of the wall bioassay confirm a residual efficacy of more than ten months in Rwanda.

Strategy 1.2: Universal coverage in LLINS (Mass Distribution and Routine Distribution through EPI, ANC, PPP).

Access to LLINs, proportion of households with at least one net per two people and proportion of the population that could sleep under an ITN if ITN in the household were used by up to two people were 66% and 34%, which is below the 85 percent target. Likewise, the proportion of population effectively protected by either IRS or LLINs was 51% below the 95% target. Although the proportion of children under five years old and pregnant women, who slept under a LLIN the previous year was considerably high, at 77% and 82% respectively, it was below the target set (Table 14).

The observed low LLIN coverage and utilization may be due to an inefficient net distribution approach. The DHS was conducted before the LLINs mass campaign. This explains the low proportions of different indicators displayed in the table below; as LLINs found in households surveyed were two to three years old, hence the reduction in ownership and utilization because of applied physical decay that accelerated the attrition rate.

Overall, this review identified some of reasons that may explain the gap in LLIN coverage: (1) Inadequate and untimely availability of resources, 2) delays in procurement and delivery of LLINs, related to different challenges including the COVID-19 pandemic, 3) in some cases due to non-compliance of health facilities to the national guidelines.

Table 14: Progress towards LLINs outcome targets, 2020-2022.

LLIN Indicators	Baseline MIS2017	Targets 2020/24	Result 2020/22	Achievement	Source
Proportion of HH with at least one LLIN	84%	90%	66.40%	74%	DHS 2020
Proportion of the population that could sleep under an ITN if ITN in the household were used by up to two people	55%	85%	34.30%	40%	DHS 2020
Proportion of population effectively protected by either IRS or LLINs	68%	95%	51%	54%	DHS 2020
Proportion of children under five years old who slept under a LLIN the previous night	68%	85%	77.40%	91%	DHS 2020
Proportion of pregnant women, who slept under a LLIN the previous nigh	69%	85%	81.60%	96%	DHS 2020
Percentage of population aged 5-14 who slept under an LLIN	57%	85%	-*	-	No data
Proportion of total population who slept under an LLIN the previous nigh	64%	85%	34.30%	40.5%	DHS 2020

* This indicator is only tracked in MIS which was not conducted in 2022. MIS will be conducted in Oct – Dec 2023.

LLINs Distribution to Pregnant Women and Children Under 5

LLINs distribution targeting pregnant women and children under five years old is integrated in Antenatal Care (ANC) package for maternal health and Expanded Program in Immunization (EPI) services. The distribution of LLINs is reported through the national HMIS. During FY 2019/20, a total 201,565 LLINs were distributed to 347,756 children registered and a total 178,477 LLINs were distributed to 355,599 pregnant women representing a coverage of 58% and 50% respectively.

For FY 2020/21, the first year of MSP 2020-24 implementation, 243,249 LLINs were distributed to 327,249 children and 284,588 LLINs were distributed to 362,301 pregnant women representing a coverage of 74% and 79% respectively.

For the 2021/22 fiscal year, the second year of MSP 2020/24 implementation 278,828 LLINs were distributed to children under one year over 325,510 children who attended MR1 and 317,184 LLINs were distributed to 373,828 pregnant women who attended the first visit of antenatal care representing a coverage of 85% and 86% respectively.

LLINs Distribution to Households through Mass Campaign

Mass LLIN distributions are conducted every two to three years. WHO recommends an overall ratio of 1 LLIN for every 1.8 people in the targeted population, should be used to calculate countrywide LLIN needed for the household mass campaign distribution to reach universal coverage. Quantification of LLINs for distribution is based on household needs estimated at a threshold of one LLIN by two household members or the number of assessed sleeping spaces when it exceeds the number of household members divided by two. Fig. 27 shows LLIN distribution and coverage for EPI and ANC.

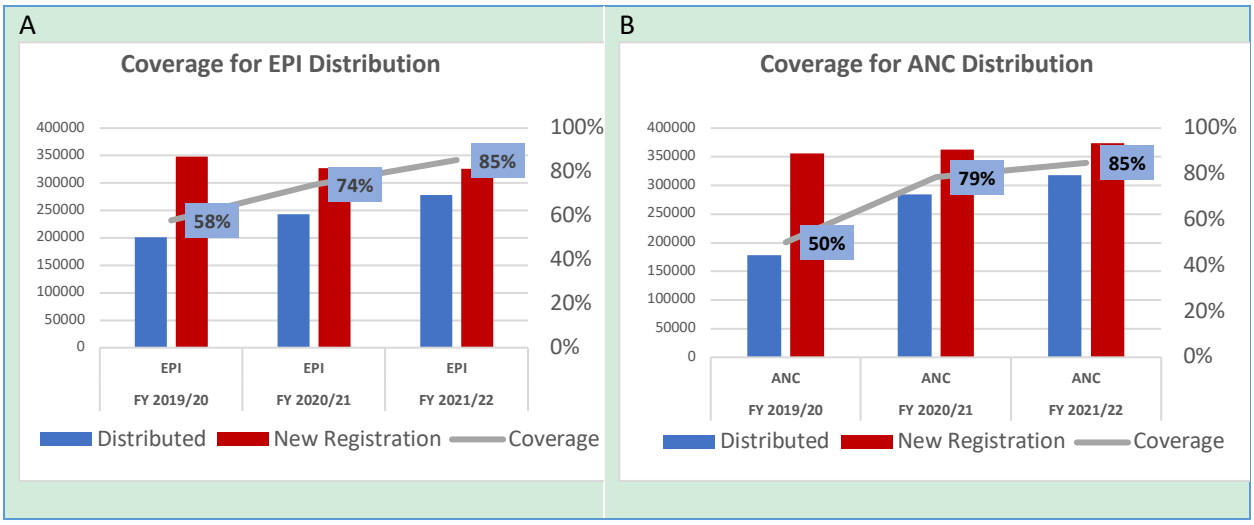


Figure 26: Monthly Coverage of LLINs Distribution through ANC and EPI, 2019/20 - 2020/22

The distribution of LLINs to households is done through health centers and community health workers in collaboration with local authorities using outreach site approach closer to village households. Communities are called for gatherings in selected sites across districts to receive LLINs and the health promotion is done through radio sport and radio talks as well as usual community communication channels (churches, community forums etc). Considering the baseline of 4,393,400 LLINs distributed during FY 2019/20, in FY 2020/21, 1,313,310 were distributed to households as a continuation for the remaining districts that were not yet covered in the mass campaign that had started in the previous fiscal year that goes from July to June 2020. For the FY 2021/22, 237,000 LLINs were distributed to households through mass distribution campaigns in Nyamagabe district.

Strategy 1.3: Introduction of Innovative Integrated Vector Control Tools to Supplement the Core Interventions

Larval Source Management – Application of Larvicide by Drones

Over the period from July 2020 to April 2021(ten months), in collaboration with CHARIS UAS and SFH Rwanda, RBC implemented a pilot project of malaria control using LSM with the drone's-based application of larvicides, supplemented by hand applications in small breeding sites; *Bacillus thuringiensis Israeliensis* (Bti), ITU 3000 in the marshlands mainly made of irrigated rice fields of Kabuye, in Jabana sector of Gasabo District covering an area of 336 ha. Results show a positive impact on entomological data, the intervention reduced to more than 90% and 60% respectively of Anopheles mosquito larval (late instars) (Fig 28) and adult stages (Fig. 29). The average adult anopheles mosquito reduction was 67% in the treatment area while increased by 39% in the control area.

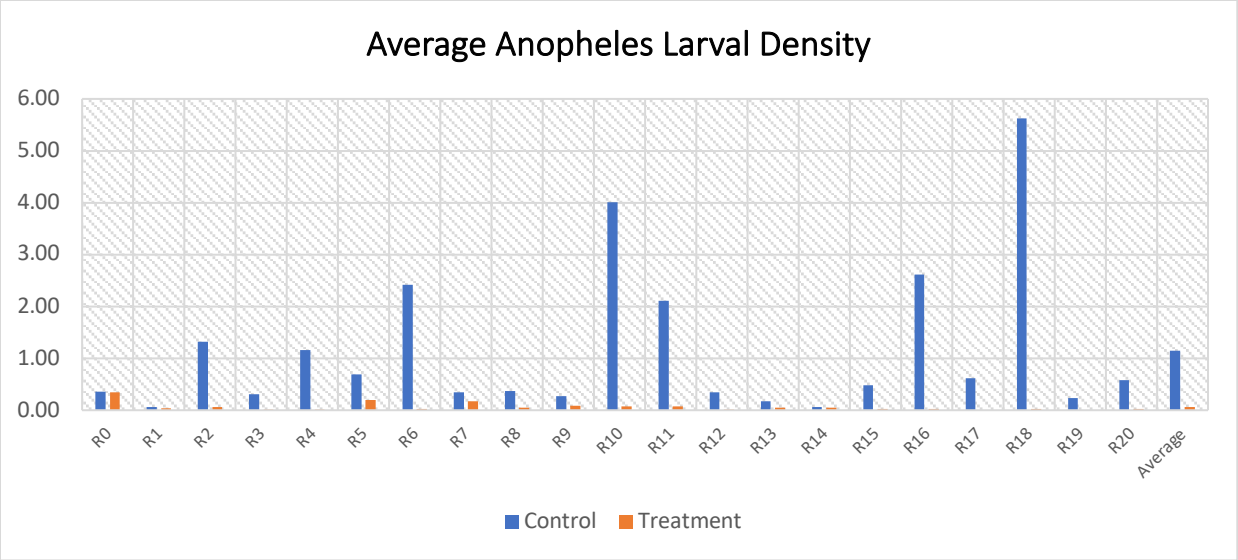


Figure 27: Drone application of larvicide: larval density in intervention and control sites

The average anopheles' larval density (# An. larvae/dip) reduced by 94% in the treatment area while increased by 61% in the control area.

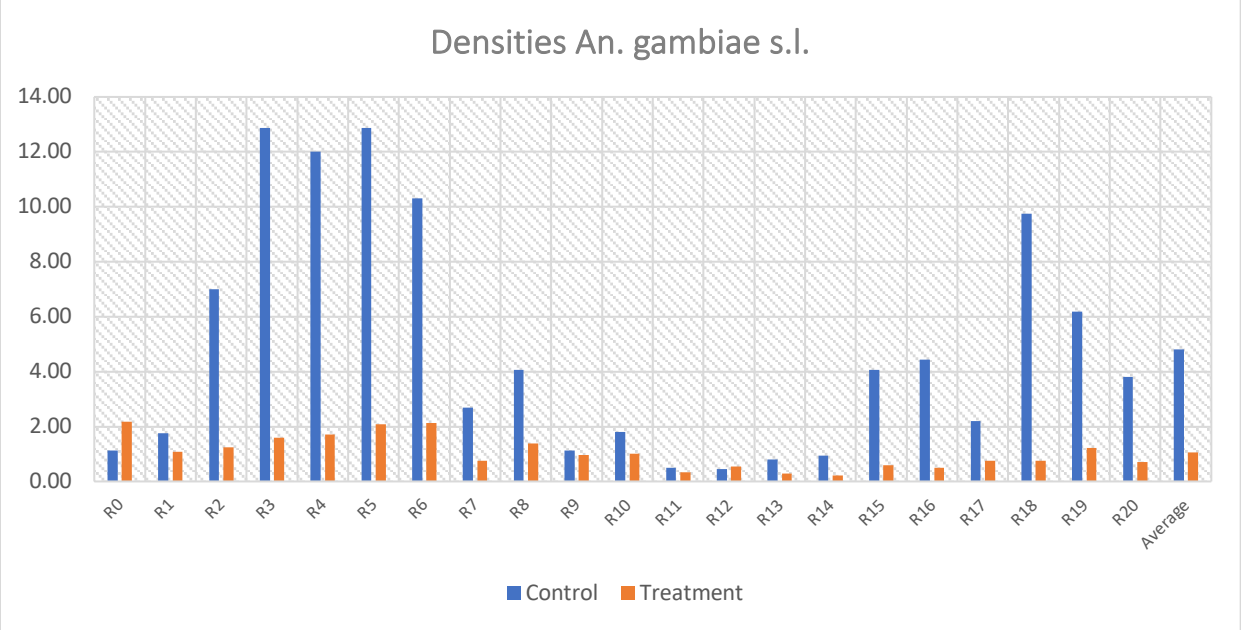


Figure 28: Drone application of larvicide: adult density in intervention and control sites

Strategy 1.4: Community Based Environment Management through Community Works/ Meetings

In the framework of integrated vector management and inter-sectoral collaboration, the following trainings were performed for community engagement towards supporting vector control through environmental management. The MOPDC in collaboration with Ingobyi and CSOs: Ingobyi, SFH Rwanda, CARITAS-Rwanda, Profemmes Twese Hamwe, URUNANA, RDO and RICH conducted the IVM capacity

building in 22 districts. The training targeted different stakeholders at sector level and covered 34.3% (110) out of the 321 total sectors of the above districts. In total 1,201 participants have been trained as IVM trainers to support the awareness and training on IVM approach to the identified targets of the community grassroots. The training used mixed training methods involving in class theories and in field practices for mosquito larval collection and their physical identification "learning by doing or seeing". The participants were identified in collaboration with districts, Ingobyi activity and CSO partners were composed by in charge of agriculture and livestock (Agronomists), president of rice farmers cooperatives (Where applicable), president of fish farmers cooperatives (Where applicable), president of mining cooperatives (Where applicable), in charge of social affairs, in charge of schools, in charge of community health workers, head of health center, Malaria focal person and CHW representative at sector level (Table 15).

Table 15: Community TOTs trained on Environment Management per district and sector.

Province	District	# of Sector in district	# of sector trained	# of trainees	% of sector trained
Western Province	Karongi, Nyamasheke, Rusizi, Rubavu, Rutsiro, Ngororero	84	16	171	19.0
Southern Province	Kamonyi, Muhanga, Ruhango, Nyamagabe, Nyaruguru, Gisagara	77	51	559	66.2
Eastern Province	Rwamagana, Bugesera, Nyagatare, Kayonza, Kirehe	77	30	352	39.0
Northern Province	Gicumbi, Rulindo, Gakenke	57	9	75	15.8
Kigali City	Nyarugenge, Gasabo	26	4	44	15.4
		321	**110**	**1201**	**34.3**

Objective 2: All suspected malaria cases are promptly tested and treated in line with the national guidelines.

Malaria case management policy and guidance

Malaria case management in Rwanda is guided by the current National Malaria Strategic Plan, 2020-2024 (MSP) and the 4th version of the National Malaria Treatment Guidelines, 2020. In addition, the Health Sector Policy 2014 is also available with detailed and clear objectives and key strategies aimed to guide achievement of the overall goal of the health Sector policy and orient the development of guidelines. The malaria National Treatment Guidelines provide guidance on the performance of parasitological diagnosis of malaria using RDTs at community level and microscopy at health facility level and clearly lay out how to provide appropriate and effective treatment of confirmed malaria cases including referrals of severe malaria cases. At community level, CHWs can treat confirmed simple malaria cases in children and adults. Patients with signs of severe malaria are tested and referred to the Health Center. Rwanda does not

implement chemoprevention strategies such as IPTp due to SP resistance and the country is yet to adopt SMC.

The objective related with case management will be achieved by:

- Ensuring availability of malaria commodities for diagnosis and treatment at all levels of the health facility and in the community.
- Ensuring universal access to malaria diagnosis and treatment services including the most vulnerable and high-risk populations.
- Ensuring that all suspected malaria cases are tested at all health facility levels and, in the community, using appropriate, quality assured diagnostics (RDTs and/or microscopy)
- Ensuring that all confirmed uncomplicated and severe malaria cases are effectively managed in a timely manner with correct treatment.

Case Management Outcome Indicators and Targets

There are eight indicators to measure and evaluate the success toward case management targets. The indicators are:

- Proportion of suspected malaria cases that receive a parasitological test at public sector health facilities.
- Proportion of suspected malaria cases that receive a parasitological test at the community level.
- Proportion of confirmed malaria cases that received first-line antimalarial treatment at public sector Health Facilities
- Proportion of confirmed malaria cases that received first-line antimalarial treatment at Community level.
- Inpatient malaria deaths per year: rate per 100,000 persons per year
- Percentage of people treated within the 24 hours at community level.
- Proportion of health providers trained on National Malaria case management Guidelines.
- Percentage of CHWs that reported no stock out of ACTs and RDTs.

These case management indicators are appropriately phrased and SMART. While the indicators are appropriately aligned to the objective, their use is mostly limited to public health facilities and on average 50% of private health facilities are currently reporting through HMIS, thus there is need to strengthen reporting from the private health facilities. Also, there was no comprehensive data on prevalence because the last malaria indicator survey was conducted in 2017.

There the “Percentage of CHWs that reported no stock out of ACTs and RDTs” is a PSM indicator tracked under MSP objective 2 on case management. All suspected cases are promptly tested and treated in line with national guidelines. It was noted that this indicator which aims to assess the availability of RDTs/ACTs to the end user does not accurately capture this information. Ideally, the data reported under this indicator is obtained from iCCM evaluation (communities and health facility surveys which happens once every 2 to 3 years). Given 55% of malaria cases are currently treated at community level therefore any stock outs at this level are key and need to be monitored routinely. Similarly, indicators to monitor RDT/ACT stock availability at the health facility level are tracked under MSP objective 4 on PSM strategy.

Progress towards Case Management MSP Outcomes and Targets

The achievements on the key performance indicators and targets are shown below (Table 16). Overall, the program has met the performance targets proposed in the MSP, 2020-2024.

Strategy 2.1: Strengthen the quality of malaria diagnosis at all levels including the private sector.
Enablers:

- Good collaboration with the NRL with a clear mandate to support QA/QC activities for malaria diagnostic testing in the country.
- Availability of core group of malaria microscopists that have undergone ECAMM and WHO recommended technical SOPs at NRL, and schedule refresher training of lab technicians every 2 years.
- Well-equipped laboratory for malaria testing at public health facilities (health center, health post, hospitals).
- Strong supply chain management system for laboratory commodities resulting in availability of malaria commodities at all levels of health care.
- Home based management of malaria by CHW expanding diagnosis and treatment of children and adults at community level.

Table 16: Progress towards malaria case management outcome indicator targets, 2019/2022

Indicators	Baseline Year	Source	Target 2021/22	Result 2021/22	Achievement
Proportion of suspected malaria cases that receive a parasitological test at public sector health facilities	NA	HMIS	90%	100%	100%*
Proportion of suspected malaria cases that receive a parasitological test at the community level	NA	HMIS	90%	100%	100%*
Proportion of confirmed malaria cases that received first-line antimalarial treatment at public sector Health Facilities	100% 2018/19	HMIS	100%	100%	100%
Proportion of confirmed malaria cases that received first-line antimalarial treatment at Community level	100% 2018/19	HMIS	100%	100%	100%
Inpatient malaria deaths per year: rate per 100,000 persons per year	2.1 2018/19	HMIS	1.5	0.6	100%
Percentage of person treated within the 24 hours at community level	95% 2018/19	MOPDD Annual Report	96%	100%	100%
Proportion of health providers trained on malaria case management	98 2018/19	MOPDD Annual Report	99%	91%	92%
Percentage of CHWs that reported no stock out of ACTs and RDTs.	NA	iCCM Evaluation	87%	-	-

.* No data for indicators on ACT/RDT stockout at community level because iCCM evaluation was not conducted.

Constrainers

- Lack of funds to support the training of Lab technicians in private health facilities. The possibility of cost sharing with income generated by private health facilities is being explored.
- Delay of supportive supervision activities due to COVID 19 pandemic.
- While support to CHW is provided through mentorship and checking quality of service and data management, there is sub-optimal supervision and quality assurance of community case management due to the low number of supervisors and large number of CHWs (around 30,000).
- Sustainability of malaria community outreach program given the CHWs, the backbone of community outreach program, are volunteers and currently there is around 10% turnover especially in towns and cities.
- Shortage of Lab technicians at decentralized level.

Opportunities:

- Assessment of WHO accredited microscopists for recertification (ECAM) with plans well advanced.
- Training of CHWs on Polyvalent module through MCCH to cover wider health problems (iCCM + Maternal health + Nutrition and Family Planning + Health Promotion + NCDs), will double the number of CHWs capable of providing malaria case management at community level therefore reducing workload for CHWs.

Strategy 2.2: Strengthen prompt and correct simple malaria treatment at all levels including private sector.

Enablers:

- Availability of the revised national treatment guidelines at all levels and a culture of strong adherence to guidelines.
- Strong supply chain management system for commodities resulting in availability of anti-malarial drugs and consumables at all levels of health care.
- Universal access to diagnostic and treatment services at all levels including Ubudehe 1 & 2.
- Pharmacovigilance/Notification system is in place however, the central notification component requiring follow-up and investigations is not well functional.

Constraints

- Threat of expiries of malaria commodities due to decreasing malaria burden.
- Currently training and QA/AC of malaria diagnosis and treatment does not adequately cover the private health sector.

Opportunities:

- Functioning Commodities quantification and procurement system under MOH coordination.
- Expand the quality control and assurance of malaria management to cover the public health sector.
- Enhance the capacity and skill of health workers at health post on malaria management as an opportunity to improve delivery of malaria services at health post and community at large.

Strategy 2.3: Strengthen referral and case management of severe malaria cases at health facility level.

There is a strong community outreach program in Rwanda providing health services including malaria diagnosis, treatment, and health promotion. Each village has at least 4 CHWs, of which two of them are

involved in malaria management. The country has around 60,000 trained CHWs, of which about 30,000 are supporting home-based malaria management. Currently 55% of malaria treatment is done at community level contributing reduction in malaria admission, severe malaria, and death due to malaria because of early diagnosis, treatment of cases and referral of severe cases. A planned iCCM evaluation was not done and therefore no data to report results on stockout of ACT/RDT at community level.

Home based Management.

Enablers:

- Effective Home-based management of malaria (treating more than 50% of malaria cases)
- Training of CHWs on Polyvalent module through MCCH.
- Availability of the right CHWs reporting tools and Job aids.
- Strong supply chain management system for commodities resulting in availability of anti-malarial drugs and RDTs.
- Referral system from the community to health center, and from health center to hospital.

Constraints

- Sustaining CHW motivation who are overwhelmed by a high number of patients seeking and receiving treatment for malaria at the community level.
- Insufficient funds to complete training and supervision of the malaria community outreach program, at reasonable time, given the high number CHWs.
- Inadequate QA/AC of malaria management at the community level.

Opportunities:

- Availability of RapidSMS / RapidPro to report the stock out of Malaria Commodities at the community level has potential to improve case management at community level and avoid stockouts.
- Digitalization of Community Case Management for reporting
- Community E-Learning system to facilitate training of CHWs and health workers.

Strategy 2.4: Strengthen mechanisms to maintain competency of health workers in malaria case management at all levels including private sector.

Program conducted different activities to maintain competency of health workers in malaria case management, this included training of health care providers from all Public Health facilities. During the 2020-2022, 249 nurses and midwives, 78 Medical Doctors, 268 laboratory technicians, and 34 pharmacists were trained in malaria case management. In addition to that, a mentorship and supervision of health Care providers on Malaria Cases Management is conducted countrywide. The training of CHWs on Malaria Community Case Management is conducted in collaboration with MCCH through the Polyvalent Training Model. In FY 2021-2022, 102 CEHOs and 102 nurses from Health Centers were trained as trainers (TOTs) on iCCM and HBM components. The TOTs then in turn trained 4,816 ASM and Health Promotion CHWs on Community Case Management of Malaria.

In FY 2021-2022, 168 nurses and 17 laboratory technicians from 185 health posts were mentored on best practices in malaria diagnosis and treatment, supply chain management and referral of complicated cases. In FY 2020-2021, 18,985 CHWs benefited from Community Health Mentorship on integrated Community Case Management and adult Home-Based Management.

Strategy 2.5: Ensure quantification and distribution of quality assured malaria consumables and commodities (PSM)

Enablers:

- Strong supply chain management system for malaria supplies resulting in availability of malaria commodities at all levels of health care. This system facilitates quantification, procurement, and storage as well as distribution of commodities, including track stock and consumption levels through ELMIS.
- Malaria commodities (treatment and diagnosis) are adequately covered through budget allocation.

Constraints

- Ineffective use of ELMIS at decentralized level (health center) because there HC do not have dedicated person dealing with supply chain activities.
- Data on consumption of Health Posts are not captured in ELMIS due to many factors, especially the high closure rate of health posts because many of them are privately owned.
- Challenges in sourcing malaria commodities with a low consumption rate (for quinine table and injectables).

Opportunities:

- Digitalization of the Community Case Management will also contribute to improve supply management of malaria commodities.
- Well-structured health commodity supply chain system.
- Supply Chain E-learning for CHW and facility Health workers will improve supply management.

Strategy 2.6. Strengthen early detection and treatment in pregnant women.

Malaria program updated, validated, and disseminated the guidelines and job aids on malaria prevention and treatment in pregnancy. Integrated malaria training of health workers on Malaria control guidelines with messages on prevention and treatment of malaria in pregnancy was conducted. The integrated data collection tools for MiP produced and disseminated to all public Health facilities.

Best practices (lesson / innovation)

- The revised malaria treatment guidelines, 4th version 2020 has been distributed in both public and private health facilities and training offered to healthcare providers. For the first private care providers received the malaria treatment guidelines.
- Increase in the proportion of malaria cases attended to at the community level has led to a decrease in severe malaria and as subsequently to reduction in deaths due to malaria.
- The engagement of different Malaria Stakeholders in planning and implementation of the Integrated supervisions contributed largely to the reduction and improvement of Management of Malaria cases. All-inclusive and integrated supervision removes possibility for duplications of activities and efficient use of resources.

Key Challenges / Gaps

- Funding constraints.
- Quality assurance and quality control of malaria diagnosis and treatment in private health facilities, and poor data reporting. This calls for investment in QA/QC of malaria management to also cover private sector facilities.

- Malaria Data reporting - completeness and timeliness of reporting rate is high for public health facilities at 98% however, reporting from private facilities remains low at 60%. Data reporting is one of licensing requirements for operating a private health facility as such there is a legal framework to enforce and ensure reporting is done through the private health sector.

Conclusion and Action Points

- Revise forecasting/ quantification of commodities to adequately address how to accurately procure malaria commodities in the light of decreasing malaria cases.
- Strengthen mechanisms to maintain competency of health workers in diagnosis and malaria case management through a robust refresher training and supportive supervision that includes private sector facilities.
- Strengthen the capacity of the national reference laboratory to support malaria diagnosis QA/QC activities.
- Strengthen the capacity of the district hospital to support malaria case management at lower level – health center & post.
- Strengthen quality assurance and control of malaria case management at community level – re-fresher training and training of new HCW, supportive supervision and mentoring.

Objective 3: By 2024, strengthen surveillance and reporting to provide complete, timely and accurate information for appropriate decision making at all levels.

Policies and Strategies

Rwanda has a well-functioning malaria surveillance system with high-quality routine health data that is available to inform programmatic and policy decisions. The country has used DHIS2 since 2013 to facilitate management of routine data collected at both health facility and community levels for decision making. Reporting of malaria data is integrated with other diseases, malaria is reported weekly through the integrated disease surveillance and response (IDSR) system and monthly as part of routine reporting. The routine data is collected from patient records and is aggregated into the monthly Health Management Information System (HMIS) reporting form and weekly IDSR forms.

Hospitals and health centers are equipped with the internet to support data entry into the HMIS system. Each health facility has a data manager that has been trained on the capturing and management of data as no data entry happens at district health unit or MOH/RBC national level; these 2 levels conduct only data verification and data cross-checking. CHWs collect data that is compiled by the cell coordinators who bring it to the health center monthly for aggregation, and thereafter community data is captured by the data manager into the routine Systeme d'Information Communautaire (SISCOM). Currently, a Rwanda Health Analytics Platform (RHAP) built by Zenesys technology is being used for data analysis and development of dashboard and scorecards both at National and district level.

Data from Rwanda's HMIS is relatively complete, accurate, and timely for routine program monitoring, including malaria. Malaria and Other Parasitic Diseases Division (MOPDD) staff analyze and use these data to make evidence-based programmatic decisions and produce geospatial illustrations of malaria distribution and trends over time. Malaria data from Public health centers, District hospitals, Provincial hospitals, referral hospitals, and the private sector are integrated in the HMIS, whereas data from CHWs implementing integrated community case management are entered in the Community Information System (SIS-COM), which is then aggregated and integrated within the HMIS.

All data entered in the HMIS reflects the national performance because of the high reporting rate of the health facilities. Almost all health facilities report their results on time. The completion and timeliness of reporting rates are high from public health facilities at 98%; however, reporting rates from private health facilities remain lower at 50%.

RapidSMS is a Mobile application for SMS notification available to all public sector healthcare workers. The system is designed to allow effective and real-time communication for action by community health workers to health facilities and this, to report pre-stock outs, stock outs, drugs replenishment and severe malaria cases encountered in the community. This alert from community health workers allows the health facilities to act on time and prevent stock outs of antimalarial drugs used by community health workers and to support these community health workers to treat and evacuate severe malaria cases to health facilities.
The Malaria Data Quality Dashboard has improved management of commodities in the health facilities since the facilities order and update consumption of commodities using the dashboard. Data analysis at the decentralized level is low and it led to some evitable inconsistencies in terms of malaria reported cases compared to reported diagnosed cases and drug consumption.

The national malaria policy stipulates that districts prone to malaria epidemics should establish and maintain effective early warning and detection systems that are part of surveillance, monitoring, evaluation, and operational research of malaria programs.

In the following section, there are highlights of achievements per all SMEOR sub objectives.
SMEOR Outcome Indicators and Targets
There are three outcome indicators under Objective 3 (SMEOR) as follows:

- Proportion of public health facilities submitting malaria indicators timely
- Proportion of **public** health facilities submitting complete report on malaria indicators
- Proportion of **private** health facilities submitting complete report on malaria indicators
- Annual blood examination rate (discuss whether this is outcome indicator for SMEOR)

All four indicators are recommended standardized indicators appropriately defined, with baselines included in the MSP but do not address surveillance and operational research. All indicators had baseline values, and targets were set to assess performance on an annual basis.
(Table 18).

Progress Towards Achieving SMEOR Outcome Indicators

Malaria is among the diseases under surveillance with all health facility malaria cases and deaths being reported on a weekly basis through IDSR. Also, aggregate malaria data reported monthly capturing information from community health workers and health facilities, and data entered through HIMS at health facility level. Analysis and trends in malaria cases from health facilities are produced by the districts weekly. Table 17 shows the outcome indicators and targets for the SMEOR objective. Most indicators have been achieved, only the number of surveys was not completed but initiated the implementation for the three planned surveys such as TES, MIS and KAP. Overall, the review showed the program scored high on SMEOR outcome targets, apart from an indicator on the number of community health facility evaluations which were not done for the reporting period.

Table 17: Progress on SMEOR indicators 2019 – 2022.

Indicator	Baseline Year	Source	Target 2021/22	Result 2021/22	Achievement
Proportion of health facilities reporting on malaria indicators timely (Public)	80% 2018/19	HIMS	85%	91%	100%
Proportion of health facilities submitting complete report on malaria indicators (Public)	85% 2018/19	HIMS	90%	91%	100%
Annual blood examination rate	72% 2019	HIMS	63%	41%	100%
Number of community and health facilities evaluations conducted	2 2018/19	Annual Report	3	0	0

Progress for EPR strategy

Strategy 3.1: Strengthen malaria routine surveillance and epidemic preparedness and response (EPR) at all levels.

The strategy to strengthen Malaria Routine Surveillance and Epidemic Preparedness and Response (EPR) at all Levels included activities that aimed to develop capacity for and a system for malaria EPR. This activity is considered as partially implemented. The Malaria Program developed the concept note and the ToR of the consultant to develop the Epidemic Preparedness and response plan and has shared it with WHO for Technical Assistance. The Training of health provider, data manager officer and M&E officer on malaria epidemic preparedness and response will be conducted after its elaboration. In addition to that, malaria is a notifiable disease integrated within the Integrated Disease Surveillance and Response (IDSR) reported on a weekly basis as aggregated data on malaria cases and deaths and as immediate reportable diseases for severe malaria.

Progress Towards Achieving EPR Outcome Indicators

There were no EPR outcome indicators and targets set for MSP 2020-2024 and for this reason the progress could not be reviewed. There were 3 activities related to EPR that include: developing malaria epidemic preparedness and response plan, training of the health provider, data manager officer and M&E officer to malaria epidemic preparedness and response and conducting quarterly SMEOR SUB-TWG meeting. Although there is no EPR plan, discussions, and preparation to develop that plan is ongoing.

Enablers

EPR:

- Malaria is included in the list of notifiable diseases under the Epidemic Surveillance and Response (ESR) Division and reported through DHIS2 which can enable timely notification of any upsurge in malaria cases from the health facility.
- Existence of an Epidemic Preparedness Division within RBC – covering all notifiable diseases in Rwanda.

Constrainers
EPR:

- Lack of clarity on determination of epidemic threshold levels
- Lack of Malaria epidemic preparedness and response (EPR) Policy and technical guideline.
- Low skills on malaria surveillance and epidemic control at decentralized level

Summary of progress for SMEOR strategy

The remaining strategies under objective 2, include activities related to SMEOR as follows.

Strategy 3.2: Strengthen capacity building in data management, data quality, analysis and use at all levels.

There is a well-functioning Health information management system which includes HMIS, RapidSMS, eLMIS and, SISCom. Activities planned in this section that include, (1) Strengthening of mentorship and supportive supervisions activities (2) Conducting quarterly data quality audit at decentralized level (3) Conducting monthly data analysis of malaria indicators to support decision making (4) Conducting quarterly Coordination meeting to review malaria data quality and Analysis; and (5) training of health provider , data manager and M&E officer in data management, data quality, analysis and information use; were fully implemented for this period.

Strategy 3.3: Conduct Community and Health Facilities Evaluation

Conduct the Rwanda Malaria Indicator Survey (MIS):
This activity was rated as partially implemented. The last Rwanda Malaria Indicator Survey (RMIS) is conducted every two to three years after DHS, the last was conducted in 2017. The survey was planned for November-December 2022; however, it was decided to push it to Nov– Dec 2023 as DHS 2019/2020, was published in 2021 The next MIS will be done during the period of Oct-Dec 2023. However, the program started preparation of the survey with the support of ICF Macro and funding by USAID/PMI, currently the preparation meeting started, and a consultant was selected, the data collection training will be in July and field data collection is planned Oct-Dec 2023.

Conduct Malaria ICCM Evaluation:
The activity was rated as not implemented, the ICCM evaluation is integrated with other community health worker's assessments conducted by the Community Health Program Unit under the Maternal and Maternal, Child and Community Health Division. There was no recent assessment because of ongoing restructuration of CHWs program and training on polyvalent model.

Conduct the KAP Survey:
The activity was rated as partially implemented. The program decided to integrate KAP survey into Malaria Indicator Survey (MIS) which will be conducted in Nov-Dec 2023, preparations for the survey are ongoing.

Conduct the HFS:
The Malaria program in collaboration with Impact Malaria conducted the health facility survey, the data collection was concluded, currently data analysis is being done. The objective of this evaluation is to assess malaria care delivery across the study area.

Conduct the Therapeutic Efficacy Survey:
The activity was rated as partially implemented. During the period 2020-2022, the program planned to conduct two therapeutic efficacy surveys (TES), however, due to the decrease of malaria cases, the data collection of the 2020 TES is still ongoing.
Malaria program continued to support the implementation of the TES in Bugarama, Masaka and Rukara sites. A series of consultative meetings with implementing partners and PMI were conducted to find solutions to address the challenges encountered during the implementation of TES enrolling patients due to the decrease of malaria cases seen at health facilities and the main recommendation was to amend the study protocol amendment. From January 2022, the study principal investigator (PI) reviewed TES protocol and made amendments related to TES inclusion criteria, increased respondent age from to less 5 years to 14 years, one TES site was changed from Rukara health center in eastern province where there were no malaria cases to Ngoma health center in southern province. In addition, CHWs were involved in sensitizing the community on the study and TES screening and encouraging them to refer all uncomplicated malaria cases to the study sites. Currently, all study sites completed the first arm of Artemether, Lumefantrine (AL) and started the second arm of dihydroartemisinin/piperaquine (DHA-PPQ).

Strategy 3.4: Strengthen Severe Malaria Notification and Conduct Malaria Death Audits

Malaria is among the diseases under surveillance where cases and deaths are reported on a weekly basis. Analysis and trends in malaria cases by districts are produced on a weekly basis. Data for severe malaria is separated in the HMIS making it clearly differential from inpatient admissions. At community level RapidSMS is used for the notification of all severe cases that they see and refer to the next level, the notification of deaths at community level remains a gap. The SMS notification then triggers a response at the next level for action. Training of health providers (CHWs, HCs, Hospitals) on notification and SMS alerts on death & severe malaria has been conducted as well as the installation of a free call line at MOPDD.The program conducted malaria deaths audit twice a year in all hospitals that reported malaria deaths. We conducted four death sessions for 81 number of deaths and 71 were confirmed in the FY 2021-2022.
The integration of Malaria death audit tools into HMIS has not yet started. However, the death audit tool was developed and approved. The Program will work with the HMIS team to design and develop the tool into the HMIS system as event tracker before the end of the Fiscal year.
The Ministry of Health has the mandate to update the list of active private health facilities into HMIS. The Malaria program will continue to advocate for annual updated lists of private health facilities with the Directorate of Clinical Services within the Ministry of Health and Administrative district to improve reporting completeness of private health facilities.

Strategy 3.5: Improve Reporting from the Private Health Sector

Private sector remains a health system challenge that is cross-cutting throughout the whole health sector. Initiatives are in place to improve the reporting of private facilities. The Program has conducted meetings with Directors of private sector facilities on data reporting and as efforts to strengthen private sector (including health posts) reporting into HMIS it is now mandatory to be part of the reporting structure for

routine reporting before granting approval to open a private facility. HMIS has also created a standardized reporting tool for the private sector.
We have noted a decrease in reporting completeness for private health facilities from 66% in FY 2020-2021 to 60% during the FY 2021-2022, this may be due to Covid 19 pandemic.

Strategy 3.6: Develop and Implement an Operational Research Agenda for Malaria

During the period 2020-2022, the program planned to conduct two Therapeutic Efficacy Surveys (TES), however, due to the decrease of malaria cases, the data collection of the 2020 TES is still ongoing. The activity was rated as partially implemented. The program in collaboration with the University of Rwanda/ School of public health also conducted a study on the effectiveness of IG2 nets compared to standard nets plus IRS.
The program has disseminated Rwanda program best practices and research in international conferences such ASTMH where 10 abstracts from Rwanda were accepted for 2021 and 2022 ASTMHs. In addition, national dissemination was organized for the new net project.
This activity is rated as partially implemented, the program has identified the relevant topics for research, there is a plan for compilation into one document and submit it to the RBC research division for approval. Rwanda Biomedical Centre (RBC) through Research, Innovation and Data Science (RIDS) Division drives health and medical research. The Malaria program has a research collaboration with University of Rwanda / School of public Health and other research institutions. What was not implemented is the finalization and approval of the research agenda document.

SMEOR
Enablers

- Availability of a well-functioning health information management systems (RHMIS), HMIS, RapidSMS/RapitPRO and IDSR under DHIS2 platform.
- There is an integrated health data system (IDSR, ELMIS, HIMS, SISCOM), improved reporting of malaria data and strengthened availability of routine data. Rwanda Health Analytics platform can pool data from different data systems.
- Quarterly Data review meetings are conducted at health facility level, health centers and hospitals levels that help in assessing the malaria situation in the country.
- The Malaria Division collects rainfall and temperature data at the sentinel sites which can be used to enable the program plan for weather changes that would impact malaria, including malaria epidemic preparedness and response.
- Adequate M&E capacity at the national level
- Availability of reporting tools and equipment across all health delivery levels.
- Increased capacity for analysis and interpretation of malaria data at the national level in the production of routine surveillance bulletins, geospatial mapping and regular use of malaria data has resulted in improved quality of data.
- Integrated Supportive Supervision (ISS) and Data Quality Audit (DQA) covering all diseases including malaria is conducted bi-annually at national level.
- Malaria programs conduct ISS and DQA specific for malaria once every six months targeting district hospitals, health centers and the community health workers.
- The Malaria program conducts quarterly district level supervision.

Constrainers

SMEOR:

- Low trends in completeness and timeliness in private facilities reporting. Overall, the reporting rate for private/public combined is 91%, whereas reporting rate from private facilities is 60% and 98% from public facilities.
- Insufficient data analysis capacity at sub-national / district level; new staff members need training, and all require capacity to use statistical methods with geographic information system applications to inform visualization of data collected at sub-national levels.
- Prolonged delays in implementation of the malaria drug efficacy monitoring studies. With a decline in malaria burden, it now takes longer to enroll sufficient cases extending the duration of TES beyond two years as prescribed by the WHO protocol. Also, additional requirements for clinical trials which require approval from ethical committee (within 30 days review period) and now from Rwanda FDA (60 days review by FDA).

Best Practices (Lessons / Innovations)

- Use of Malaria scorecards as a management tool to monitor performance of key malaria indicators of service delivery at national, district and sector level.
- Rwanda Health Analytics Platform (RHAP), a dashboard on data triangulation, facilitates the identification of data quality gaps in HMIS and correction in real time. This has improved data use for decision making at district level (hospital).
- Quarterly joint data quality audit and integrated supportive supervision with all implementing partners at selected facilities in all districts improved services deliveries and contributed to high quality data reported, data use for decision and ownership at district hospital and health centers.

Key Challenges / Gaps

- COVID-19 pandemic slowdown implementation of planned activities, financial budget constraint due to competing priorities to face the pandemics.
- Financial constraint that slowed the development of Malaria Epidemic Preparedness and Response Plan and its implementation.
- Delay to conclude the Therapeutics Efficacy study due to malaria case decreasing impacted the planning of the next one.
- Lack of an operational research and learning agenda.
- Low trends in completeness and timeliness of malaria reporting from private facilities.
- Although malaria is now a notifiable disease, the IDSR system does not include cases treated at communities for which 55% of cases are currently treated by CHWs.
- Given the lowest organization unit of HMIS is sector, the system does not capture data directly at Cell and Village level where most of malaria cases are managed.
- Data quality issues at community level and private health facilities.

Conclusion

The SMEOR outcome indicators are appropriate and smart for monitoring and evaluating most of the program activities, expected results and impact towards the fixed target and objectives. The Rwanda health management information system (RHMIS) helps in collection, analysis, and use of malaria data for decision-making. In addition to the routine data collection system, however, some planned activities were delayed because of financial constraints and impact of COVID-19 pandemic. Although there is no EPR plan, discussions, and preparation to develop that plan is ongoing. Overall, the review showed the program

scored high on SMEOR outcome indicator targets, except for an indicator on the number of community health facility evaluations which were not done for the reporting period.

Recommendations

- Accelerate the implementation of delayed activities in the remaining period of the strategic plan, including establishment of malaria EPR.
- While a decline in malaria burden is good, the mandatory malaria TES take longer to complete due to low number of cases for recruitment, thus a need to increase the number of sentinel sites to enable recruitment of adequate cases and ensure TES complete within the schedule prescribed by the WHO guideline.

Objective 4: By 2024, strengthen coordination, collaboration, PSM and effective program management.

Policies and Strategies

MOPDD has available a host of MOH- and MOPDD-developed documents to guide the national malaria goals, objectives, strategies, and activities. Key policies are described in the Health Sector Strategic Plan IV 2018/2024, the Malaria Strategic Plan 2020-2024, the national malaria treatment guidelines for case management, the SBC Strategy 2022-2024, and, for vector control, the Integrated Vector Management Strategy and the Insecticide Resistance Monitoring and Management Plan 2019/2024. In the FY 2020-2021, the first edition of the Integrated Malaria guidelines was released, it is a single document gathering all the available national malaria guidelines and recommendations on case management, supply chain Vector control etc. These guidelines have been released to help and guide malaria stakeholders on updated malaria policies and procedures at all levels. A gap identified during the program review was lack of updated malaria surveillance and response guidelines. Development of these guidelines should include participation of other Divisions such as the ESR and PMEBS Divisions given extensive coordination needed with the HMIS platform or existing IDSR system.

MoH developed a Coordinated Procurement and Distribution System (CPDS) document which establishes a streamlined integration and harmonization of program supply chain practices, and improves quantification, procurement, supply plan monitoring and inventory management of all public health commodities including malaria commodities. In addition to the CPDS document, there are also SOPs for quantification of public health commodities.

Program Structure and Management Systems

Refer to section 1.2.2 and 1.2.3

Procurement and Supply Management Indicators

Eight outcome indicators were selected to monitor progress in implementation of the four program management strategies. The indicators were narrowly focused and not useful for determining good outcomes in the broad mandate of the program management objective. Three indicators were focused on a single event related to tendering, meeting, and planning. It was not clear how to calculate the indicator “Proportion of activities implemented as per action plan.” There are two PSM indicators, the “Percentage of CHWs that reported no stock out of ACTs and RDTs” under MSP objective 2 on case management and the “Proportion of public HFs that reported no stock outs of ACTS and RDTs” under MSP objective 4 on program management: Data for health facility stockout indicator is tracked routinely through HIMS. Although 55% of malaria cases are currently treated at community level, there is still a

significant number of cases managed at health facilities therefore any stock outs at this level need to be monitored.

Progress Towards PSM Outcome Indicators

Most of the outcome indicators were met at an achievement rate ranging from 91% to 100% (Table 18).
Enablers

- Strong political will and commitment to malaria control and elimination by the Government of Rwanda and partners
- Strong multisectoral collaboration (Public, private, and CSOs)
- Adequate and sustained funding of the MSP
- Strong coordination of malaria control interventions at all levels
- One national MSP guiding all partners in malaria control.
- Well-functioning procurement and supply chain system in place
- Integration and decentralization of malaria services
- Strong national COVID-19 Response to sustain malaria control efforts.

Table 18: PSM indicators outcome and target

INDICATORS	Baseline	Year of Baseline	Source	Target 2021-22	Results 2021-22	Achievement %
Proportion of malaria coordination meetings planned at national and district Level	NA	2018/19	MOPDD and HDs	4	4	**100%**
Number of annual plans developed	1	2018/19	Malaria Division Annual Report	1	1	**100%**
Number of Joint review and planning meetings conducted	1	2018/19	Malaria Division Annual Report	1	1	**100%**
Proportion of public HFs that reported no stock outs of ACTS and RDTs	97	2018/19	Malaria Division Annual Report	98	94 (ACT)	**94.5%**
					98 (RDT)	**98%**
Proportion of malaria commodity tenders executed (on time) according to procurement plan	1	2018/19	Malaria Division Annual Report	1	1	**100%**
Proportion of activities implemented as per action plan	62%	2018/19	Malaria Division Annual Report	75	-	**-**
Proportion of disbursed fund versus MSP budget	MPR Report	2018/19	Malaria Division Annual Report	95	93 (97%)	**97%**
Proportion of executed budget versus planned funds	MPR report	2018/19	Malaria Division Annual Report	95	83 (87%)	**91%**

Constraints
- Inadequate funding for some technical areas (outdoor control interventions, SBC, operational research, Capacity building of program staff, etc) including an increase on unit price of key commodities such as LLINs, IRS products)
- Impact of COVID-19 on activity implementation (delays in procurement, IRS and LLINs distribution),
- Lack of malaria program data use at decentralized level.
- The End Malaria Council (EMC) has not been established. No formalized structure for ongoing collaboration with inter-sectoral stakeholders
- Mitigation of malaria commodity risk of expiration
- Long recruitment process for vacant positions on the MOPDD structure (SBC Senior Officer, 3 Supervisors, and 1 Clinical CM)
- Lack of surveillance and response guidelines or clear mechanisms for coordinating with the ESR Division

Opportunities
- Regional collaboration
- Public and Private Partnership
- Available data for decision making and resources mobilization

Conclusions for PM
- Overall, there has been an improvement in the funding of malaria activities during the period under review compared to last MPR.

Action Points for PM

- The MOPDD should strengthen annual review and planning meetings to deliberate and document progress made and outline priorities and milestones for the following year; this will help to critically review the strategy implementation across all objectives.
- MoH to continue to support and coordinate East African Community efforts to develop the structures and operationalization of the Great Lakes cross border malaria initiative.
- The program should continue the establishment of the End Malaria Council
- Enhance and engage decentralized level in data use for timely response.
- Fundraising to maintain current interventions, introduce new interventions to address challenges related to insecticide resistance and outdoor biting vectors, piloting of new approaches for malaria control, investigating the driver of malaria in sectors with persistent high malaria burden, maintain community-based case management, establishing malaria epidemic preparedness and response, monitoring drug resistance in parasites and assessing SP resistance status to inform chemoprevention such as IPT for pregnant women.

Constraints for PSM
- Significant delay in the delivery of commodities resulting in stock outs and sometimes delay in the implementation of activities e.g., IRS.
- Lack of regular PSM supervisory visits to facilities including hospitals and community which would help to address issues at the decentralized level on time. This is mainly due to insufficient funds.
- Due to the decreasing malaria burden, there are challenges related to accurate stocking of commodities, re-distribution of commodities, procurement of commodities in low demand and a potential risk of ACT expiring. For example, low demand for Quinine tablet and injectable formulations

and Artesunate suppository has resulted in challenges getting suppliers willing to provide the relatively small quantities.
- eLMIS data inaccuracies related to delays in recording consumption at health facilities due to workload; incompleteness of data and low utilization of e-LMIS is still a challenge.

Action Points for PSM

- Revise procurement process of commodities to adequately address the risk of commodity expiration and ensure timely and efficient returns of malaria commodities at risk of expiry to the central level.
- Strengthen training and supervisory visits at all levels to address data inaccuracies and low utilization of the eLMIS.
- Finalize and publish CPDS document and quantification SOPs to address issues of lack of funding and delays in disbursements of funds for timely procurement and distribution of commodities.
- Expand the performance-based financing (PBF) to community health workers providing malaria case management services.

Objective 5: By 2024, 85% of the population will have correct and consistent practices and behaviors towards malaria control interventions.

SBC Policy and Guidance

Social and Behaviour Change (SBC) activities on malaria prevention and control are guided by the Health Promotion Policy, (HPP, 2014) mainly building on the principles of community participation, health education, access to health services, advocacy, and partnerships. In 2021, the Ministry of Health/RBC/MOPDD, in collaboration with partners have conducted an in-depth analysis using the Roll Back Malaria (RBM) Matchbox Toolkit as a guide to ensure that the interventions being implemented are addressing the documented barriers, to identify any additional specific human rights or gender barriers in the context of malaria and to provide guidance on specific interventions to address any barriers. The findings of the assessment show that the NMCP Strategy for malaria control among vulnerable groups in the country appears comprehensive, and program data suggest some success in reaching most of the at-risk population, but gaps may persist. These vulnerable groups include Prisoners, Refugees, Pregnant Women, Mothers/Nannies of U5, Rice Farmers, Fishermen, Mining workers, truck drivers, Health Care Providers, Students at School, Hotels Staff and Clients, Female Sex Workers, Security Staff, People with disabilities and travelers, etc.

The Rwanda Malaria SBC Strategy (2022-2024) is anchored on the Rwanda Health Promotion Policy and guides implementation of SBC activities at all levels of service delivery. The communication strategy identifies four strategic approaches, namely.
- Strengthen the Malaria SBC Framework
- Increase Advocacy for High Level Support to Sustain Malaria Prevention and Control Interventions
- Increase Awareness on the Communities' Role in Malaria Prevention and Control and
- Promote Community Engagement in Malaria Prevention and Control Interventions.

During this period 2020-2022, Malaria social behavior change strategies were used at different levels as follows:
- Provincial, District, Sector, and community levels, to promote community ownership in malaria prevention and control which is considered as a key aspect to fast track the current "Zero Malaria Starts with Me/Kurandura Malariya bihera kuri Njye '' slogan.

- District based Malaria SBC supervisors supported health care providers to conduct different malaria health education sessions alongside health facility staff reaching clients. At health facility level, the supervision was helpful to address the problem identified in LLINs distribution and use in ANC and EPI services, Timely care seeking behavior and Malaria prevention measures.
- Messaging on community awareness and ownership about malaria prevention and control interventions were disseminated using different strategies: Radio talk shows, audio spots, Educative Malaria video clips, radio sketches, Urunana radio soap opera episodes, and umuhoza radio magazine; IEC materials including banners, T-shirts, Caps. Interpersonal communication channels were used to reach communities through meetings, home visits and community outreach events to engage communities in malaria prevention and control.
- During the period under review, RBC-MOPDD and partners successfully organized the World Malaria Day and other events at National level every year.

SBC Indicators and Targets

Rwanda MSP 2020-24 outlined four indicators to measure progress of the SBC (Table 19). All four indicators are tracked through biennial or triennial surveys. All indicators have baseline and targets, appropriately phrased and specific, and there measurable.

Table 19: Baseline and targets of the SBC outcome indicators

Outcome Indicator	Baseline	Target	Target	Result
		2020/21	2022/23	2021/22
Proportion of women who recognize fever as a symptom of malaria	81% MIS 2017	90%	95%	No data
Proportion of women who reported mosquito bites as a cause of malaria	87% MIS 2017	90%	95%	No data
Proportion of the population who recognize signs of malaria	91.3% KAP/MIS	95%	95%	No data
Proportion of the population who knows the mode of transmission of malaria	95% KAP/MIS	95%	98%	No data

Progress Towards SBC Outcome Indicators

The SBC objective that, by 2024, 85% of the population will have correct and consistent practices and behaviors towards malaria control interventions, is based on four outcome indicators and targets listed above (Table 18) measured through biennial or triennial surveys. The 2017 MIS provides a baseline for these indicators, however, no survey (either MIS or KAP) was conducted for the reporting period, therefore there is no data to report on progress made.

Enablers

- Availability of policies and guidelines - Health Promotion Policy, (HPP, 2014), The Rwanda Malaria Communication Strategy (2017-2020), Malaria SBC Strategy 2022-2024
- Strong leadership and ownership by MOH, RBC and implementing partners.
- Strong collaboration and involvement of key stakeholders including CSOs that aim at minimizing duplication of efforts.
- Existence of the National Health Promotion TWG that meets on a regular basis to discuss and provide updates on implementation of malaria activities.
- Existence of Malaria TWG that meet on a regular basis.
- Involvement and ownership of Local Government (Community meetings, Umuganda, Urugerero, Parents' forum).
- Existence of media and media institutions for communication including community level radio stations
- Existence of community structures and gatherings e.g Umuganda, Umugoroba w'umuryango, inteko z'abaturage, e.tc
- Community outreach interventions such as mother and child health week, theater performance, songs by celebrities.
- Presence of CHWs, traditional healers, FBOs and other opinion leaders to enhance community participation and ownership.
- Existence of IVM trained Team at sector level.
- Existence of Malaria Matchbox results and recommendations that guide the interventions targeting malaria high risk groups.

Constraints

- Inadequate funding for SBC activities for regular and sustained implementation of SBC activities at all levels
- Irregular undertaking of KAP Surveys to track progress in key malaria indicators, including those related to desired health seeking behavior and utilization of malaria services.
- The outbreak of COVID-19 pandemic that hampered the smooth implementation of SBC activities.
- Among the constraints, there was no data to track progress because KAP survey and MIS were not conducted since 2017 to evaluate the status of SBC.

Lessons

- The involvement of different stakeholders in Malaria SBC Implementation is key for community active participation and sustainability toward malaria elimination.
- SBC activities focusing on affected small groups is key to promote adoption of desired behavior change within targeted communities.
- Malaria (RBM) Matchbox Toolkit finding generated evidence to address barriers to update of malaria services targeting key population at higher risk of malaria in Rwanda context.
- Were helpful to identify additional specific interventions in the context of malaria and to provide guidance on specific interventions to address any barriers.

Conclusions

- During implementation of the strategic plan, different strategic approaches and communication channels were used to reach different target audiences. The main approaches and channels included both interpersonal and mass media communication channels. However, the impact of SBC activities on the behavior of the population affected by malaria could not be measured due to lack of data.
- Strengthen targeted SBC and produce standard tools and IEC materials.

Recommendations

- Scale up behavioral change communication intervention and sustaining advocacy at all levels (national, district and community) for increased use of malaria interventions.
- Strengthen district and sector specific social behavior change communication planning and implementation and leverage the community strategy to deliver community-based malaria control activities.
- Enhance private and non-health sector engagement to undertake SBC for malaria with clear mandate and guidelines.
- Support community engagement for social accountability for malaria.

CHAPTER 6: LESSONS AND RECOMMENDATIONS

6.1 Lessons Learned

Malaria Prevention - Vector control

- As both a management and mitigation strategy to preserve available insecticides for use in malaria vector control, Rwanda has been using entomological evidence to inform targeting of public health insecticides used for IRS and different types of ITNs (standard LLINs, PBO-ITN and ITN with dual-active ingredients), as well as monitoring the quality of interventions deployed.
- Malaria vector species composition remains heterogeneous, but in many areas where IRS is conducted, *An. arabiensis* has replaced *An. gambiae* s.s as the major malaria vector. This has implications for malaria epidemiology and control, given that this vector predominantly rests and feeds on humans outdoors. Amongst others, its control requires interventions targeting larval habitats and preventing outdoor transmission.
- Community involvement in vector control and surveillance is critical to generate data to inform programmatic decisions, participation in deployment of interventions as well as promoting compliance and use.

Case Management

- The home-based management of malaria has significantly increased the proportion of malaria cases attended at the community level and subsequently contributed to an early care seeking leading to a decrease in severe malaria and deaths due to malaria.
- While the quality assurance and control of malaria management is routinely conducted in public facilities, the private sector has not been covered due to inadequate funding. The revised malaria treatment guidelines, 4th version 2020 has been distributed and training provided to health care providers at both public and private facilities. The dissemination of and training on national malaria treatment guidelines that involved both public and private health providers will contribute to overall improvement on malaria management, including the private service providers.
- The engagement of different malaria stakeholders in planning and implementation of the integrated supervisions contributed largely to improvement of management of malaria cases. This approach contributed to promoting efficient use of resources and prevented duplications of activities.
- The CHWs are effectively providing home based management of malaria, which is supported by training, supervision and appropriate tools and commodities. There are more than 50,000 registered and trained CHWs working as volunteer with a heavy workload considering 55% of cases are treated at community, hence a concern for sustainability.
- There is an ongoing effort to formalize CHWs as part of the district-based community workforce, this will address concerns around sustainability. A new draft of the community health policy and a ministerial order are in the process of approval; among other changes, it will bring a polyvalent model to deliver a wider range of health services and reduce the number of CHWs per village as well as a shift from incentives to a salary.
- Rwanda has a well-functioning supply chain management system supported by eLMIS with clearly defined distribution and redistribution mechanisms to mitigate the risk of malaria commodities expiring. However, due to decreasing malaria burden there is a risk of malaria commodities

expiring and it is increasingly becoming difficult to procure malaria commodities that are in low demand such as quinine tablets and injectables. During the period under review, malaria commodity stock outs was reported, and the problem to some extent addressed by redistributing commodities from facilities with low consumption. To improve stock management of malaria commodities at community level, consider revising the stock monitoring system to include data elements on the CHWs reporting stock outs.

- Routine monitoring of therapeutic efficacy of antimalarials confirms the efficacy of the ACT drugs for malaria treatment. However, due to a decline in malaria burden there is now a challenge of finding the cases to enroll, as such, the TES takes longer to complete. Also, the status of SP resistance and the extent of spread of mutations linked to Artemisinin resistance is not fully known. The implication here would be to increase the number of sites used for TES, plan for SP resistance monitoring and increase surveillance of parasite for ACT resistance.

SMEOR/EPR

- There is a well-functioning HIMS with high report completeness and timeliness from public health facilities and community health workers. There's an ongoing digitization of community health packages in health facilities including malaria, with modules for e-learning and reporting. However, there is low utilization of data for decision at some decentralized level, mainly health centers and health posts.
- Prioritize and secure funding to develop EPR technical guidance and integration of EPR into the broader malaria surveillance, M&E activities across the national, district, and sector levels.
- There was no malaria specific research agenda to feed into the national health research agenda and no annual research dissemination conferences contributing to inadequate sharing of malaria research findings.
- Malaria data completeness and timeliness of reporting rates are high from public health facilities at 98%; however, reporting rates from private health facilities remain low at 60%.
- TES takes longer to complete due to the low number of cases available for recruitment into the study, this is due to a general decline in malaria burden in the country.
- Population based malaria indicator surveys are used to track key malaria indicators. No malaria indicator survey was conducted for the report period as planned, for this reason program performance for some of key indicators could not be determined.

SBC

- Targeted SBC activities focusing on affected groups is key for fast adoption behavior change within communities. Hence the need for continued use of existing community platforms including monthly Community Work (Umuganda and other community gatherings) to disseminate important messages on malaria prevention and control. Strengthen targeted SBC to increase knowledge on malaria and improve uptake of interventions.
- Strengthen the multisectoral collaboration toward sustained malaria SBC activities, this is because the involvement of different stakeholders in malaria SBC implementation is critical for community active participation for optimal delivery and utilization of malaria services.
- Advocate for increased funding to support regular and sustained implementation of SBC activities at all levels to maintain SBC interventions and ensure sustainability.
- Strengthen human resource capacity for SBC at all levels.
- Conduct regular operational research and population-based studies particularly the malaria KAP surveys to track progress towards the desired health seeking behavior and proper use of malaria interventions.

Program Management

- MOPDD operates within an environment of strong political will and committed funding for malaria control and elimination by the Government of Rwanda and partners. The malaria program has skilled and committed human resources, and development partners are engaged to assist with technical aspects of the program delivery. However, some already approved key positions within the program unfilled and a new position on PSM is needed.
- There has been an improvement in the funding of malaria activities during the period under review resulting in tremendous achievement in reducing the malaria burden in Rwanda.
- While the period under review revealed progress in reducing malaria burden, there have been challenges to fully realize the potential of the program to implement planned activities; this includes inadequate funding and impact of COVID-19 pandemic related to sourcing products, increase in unit prices of some commodities and implementation of some activities.
- Program relay on external source of funding especially for commodities. The program needs to activate resource mobilization technical working group and mobilize resources from other sources to cover the potential funding gaps considering the need to maintain the gain already made and projected increase in unit cost of key commodities (IRS & LLINs).
- There is no formalized structure for ongoing collaboration with intersectoral stakeholders. The technical working groups meet only intermittently on ad hoc basis and thus operate sub-optimally.
- The bulk of malaria case management is now delivered at the community level through volunteer community health workers (55% treated by CHWs) resulting in high workload not matching the current compensation.

6.2 Action Points

A malaria-free future is feasible in Rwanda considering significant reduction in malaria burden observed during the 2020 – 2022 review period. To achieve this goal, the review recommends the following strategic directions:

- Advocacy for establishment of sustainable and innovative financial resource mobilization mechanisms to enable implementation of the MSP interventions at full scale. This is critical considering the declining trend in external resources and projected high cost of new interventions (new generation LLINs and IRS formulation) planned for deployment in the next phase of MSP 2020-2024. Thus, mobilization of adequate resources (local and external) is required to scale up and sustain effective coverage of malaria interventions.
- Use of the sub-district / sector or village level stratification to identify different areas of malaria burden to better target interventions and maximize impact.
- Explore the use of new malaria control tools and approaches for management of mosquito insecticide and behavioral resistance (outdoor transmission), and parasite resistance.
- Strengthening malaria service delivery through a robust refresher training and supportive supervision that includes private sector facilities to maintain competency of health workers in diagnosis and malaria case management as well as reporting of malaria data to national HMIS.
- Maintain the capacity of the national reference laboratory to continue supporting malaria diagnosis QA/QC activities.
- Revise procurement, distribution, and re-distribution process of commodities to adequately address the risk of commodity expiration and stockouts.

- Enhance stock management of malaria commodities at all levels including the community given that more than 50% of cases are now managed at community level. To track malaria commodity stocks at community level, consider including data element on the number of CHWs who reported no stock out.
- Develop a malaria epidemic preparedness and response (EPR) strategy that includes an early warning, detection, preparedness, and early response to achieve the desired outcomes.
- Develop an operational malaria research agenda to inform programming needs and evidence-based deployment of interventions. Ensure priority research and surveys to track the progress in key malaria indicators are conducted regularly to inform evidence-based decisions.
- Build capacity in M&E and data utilization at the decentralized level.
- Leverage all levels of the health care including the community and private and non-health sectors to scale up advocacy communication and social mobilization for malaria with a clear mandate and guidelines, for increased use of malaria interventions.
- Conduct malaria Knowledge, Attitude and Practices (KAP) survey to track progress in uptake of malaria services and to inform the revision of IEC/SBC material and messaging.
- Develop standard messages for adaptation and contextualization by the district and other stakeholders and factor in finding from the malaria matchbox analysis and KAP.
- Strengthen capacity at malaria program – fill approved positions and train existing staff for key competency particularly epidemiology, entomology, and supply chain management.
- Review the CHWs Performance-Based Financing (PBF) and adaptation to epidemiological status of reduced malaria burden.
- Enhance coordination and collaboration of RBC divisions and units and relevant partners through TWGs with clear mandate and scope of work.
- Advocate for increased funding to support implementation of SBC activities and including interventions to address barriers to access malaria services and key populations at high risk of malaria identified through malaria matchbox analysis and malaria KAP studies.
- Strengthen multi-sectoral and inter-sectoral engagement at national, district and sector levels for improved program planning, implementation, monitoring, and coordinating towards achievement of program goal and objectives.
- Continue to support the operationalization of the East Africa Community Great Lakes cross border malaria initiative as a mechanism for sharing information, joint planning and responding to cross-border malaria challenges.
- Establish the End Malaria Council (EMC) as part of integrated disease council, a country-owned forum to convene senior leadership from Government, the private sector, and community leaders to support the National Malaria Control Program (NMCP) and the implementation of the malaria strategic plan.

ANNEXES

Annex 1: Composition of External MTR Validators

Technical support for the Malaria Program Review (MPR) was provided by the World Health Organization (WHO), the Global Fund and US President Malaria Initiative. A team of six external reviewers were available to support the MTR. The team supported the local MTR team in conducting field validation (1 to 3 March 2023), convening a plenary session to share validation findings, review a draft Aide Memoire, and pulling out key findings and actions (6 – 9 March 2023) for consideration in the phase of malaria program planning. The WHO external validation team presented the key findings in the MTR dissemination meeting held on 10 March 2023 at Kigali Conference Centre, where the Aide Memoire was signed by the representatives from Rwanda MOH, PMI/USAID and CSO as well as the MOPDD-RBC.

Title and Names	Role	Institution
RN. Jasper PASIPAMIRE	WHO External Validator	WHO, Zimbabwe
Dr. Assefash ZEHAIE KASSAHUN	WHO External Validator	WHO, Eritrea
Dr. Jules MUGABO SEMAHORE	WHO Local Validator / Coordination	WHO, Rwanda
Dr. Naomi LUCCHI	US PMI Local Validator	US PMI, Rwanda
Mr. Kennedy OGORO	Global Fund External Validator	GF LFA, Kenya
Dr. Emmanuel A. TEMU	International Consultant, MTR lead	Global Fund, Switzerland
Dr Aimable MBITUYUMUREMYI	Program Manager, MTR Coordination	MOPDD-RBC

Annex 2: The Validation Teams and Field Visits Wrap-Up Meeting 6 -8 March 2023, WHO Board Room, Kigali, Rwanda

Title and Names	Role/Position	Institution
Dr. Emmanuel A. TEMU	Consultant, MTR lead	Global Fund, Swiss
RN. Jasper PASIPAMIRE	WHO External Validator	WHO, Zimbabwe
Dr. Jules MUGABO SEMAHORE	WHO Local Validator	WHO, Rwanda
Dr. Naomi LUCCHI	US PMI Local Validator	US PMI, Rwanda
Dr Emmanuel HAKIZIMANA	Vector control Unit	MOPDD
Dr J Damascene NIYONZIMA	Case Management Unit	MOPDD
Dr Jean Louis MANGARA	Malaria Prevention / LLINs	MOPDD
Dr Aimable MBITUYUMUREMYI	Program Manager	MOPDD
Dr Augustin GATERA	Technical Officer NCD/MH	WHO, Rwanda
Dr. Assefash ZEHAIE KASSAHUN	WHO External Validator	WHO, Eritrea

Annex 3:Composition of Validation Teams and Sites Visited, 1 to 3 March 2023

The WHO validation team that included program staff, local implementing partners and CSO visited sites distributed in four districts and conducted interviews/ observations at different level of service delivery.

MALARIA BURDEN / INTERVENTIONS	SITES	VALIDATION TEAMS	DISTRICT REPRESENTATIVES MET OR INTERVIEWED
EAST / BUGESERA			
High Burden Blanket IRS , routine ITN, SBC interventions	BUGESERA RMS Branch NYAMATA DH NTARAMA HC Health Post (Private) Community	1. **Dr Naomi LUCCHI CDC (PMI)** 2. Dr J Damascene Niyonzima, MOPDD 3. Donatien Ntagara Ngabo, MoH 4. Godfrey KARERA, VectorLink/PMI 5. Donata TWIZEYEMUNGU, SFH 6. Munganyinka Aurore, ASOFERWA	1. **Didier NDABANA**, Malaria Focal Person 2. Francois NDIBWIRENDE 3. Estestaing UWONKUNDA, Mentorship Malaria 4. Justin IRAKARAMA, M&E DH 5. Donatien NGABO MOH 6. Laetitia UWIMANA CHW 7. Leverien BARIBUTSA CHW 8. Betty UMUHOZA, Store Manager Ntarama HC 9. Henriette MUKAMUHIRE, Data manager Ntarama HC 10. Angelique MUREKATETE, Lab Technician Ntarama HC 11. Claudine UWAMARIA, RMS Branch Manager
NORTH / MUSANZE			
Low Burden Standard LLINs mass campaign and routine distribution, SBC intervention, IVM	MUSANZE RMS Branch RUHENGERI RH NYAKINAMA HC Health Post (Private) Community	1. **Dr Jules MUGABO (WHO)** 2. Dr Jean Louis MANGARA, MOPDD 3. Modeste HARERIMANA, Impact Malaria 4. Deo NDAGIJIMANA, PFTH 5. Prosper KARENZi, URUNANA	1. **Dr.Philbert MUHIRE**, DG Ruhengeri 2. Ambroise ZIGIRINSHUTI, M&E Ruhengeri RH 3. Theoneste HABINGOMA, Data Manager Ruhengeri RH 4. Ruth ABIMANA, Community Health Supervisor 5. Jean de Dieu MANIRIHO, RMS Branch Manager 6. Marie Rose Ingabire CHEO, Nyakinama HC 7. Philomene MUDAHOGORA, CHW
SOUTH / MUHANGA			
Moderate Burden IG2 Net mass campaign and routine distribution, SBC intervention	MUHANGA RMS Branch KABGAYI DH Kabgayi HC Health Post (Private) Community	1. **Jasper PASIPAMIRE (WHO Expert)** 2. Phocas MAZIMPAKA, MOPDD 3. Claire ABIMANA, Ingobyi-USAID 4. Narcisse KANEZA, RICHEverard Billy	1. **Dr. Jean Baptiste MUVUNYI** (DG Kabgayi DH) 2. Sr. Immaculee KANTENGWA (M&E Officer) 3. Aimable HISHAMUNDA (Community Heealth Supervisor) Kabgayi DH 4. Sr MURAGIJEMARIYA, Libelee Head of Kabgayi HC

		SENGA BENIMANA (RICH)	5. Nyiraminani SYLIVIE Data Manager Kabagayi HC 6. Leoncie MANISHIMWE CEHO Kabgayi HC 7. Karemera GRATIEN CHW 8. Nyirabahutu BELTHILDE CHW 9. Mediatrice MUKASHEMA, CHW 10. Jean Pierre NSHIMYUMUREMYI, RMS Branch Manager
KIGALI / KICUKIRO			
Moderate Burden PBO ITN mass campaign, routine ITN, SBC intervention	KICUKIRO RMS Branch MASAKA DH MASAKA HC (TES) Health Post (Private) Community	1. Team 1 and 3 2. WHO Experts	1. Dr Jean Damascene HANYURWIMFURA, DG Masaka DH 2. Jean Damascene MAGAYANE, M&E Officer Masaka DH 3. Philomene RUBAYIZA, Community Health Supervisor 4. Beatrice UWIMANA, Data Manager Masaka HC 5. Sr UWAMARIYA Berthilde, Head of Masaka HC 6. Goderive GAKINAHE, RMS Branch Manager 7. Drocelle MUJAWAYEZU, In charge of CHWs

Annex 4: Composition of the MTR Desk review groups and thematic areas

MPR Thematic area		Team composition (Role)	Institution
MTR Planning and Coordination	1	Dr Aimable Mbituyumuremyi	RBC/MOPDD
	2	Dr Emmanuel A. Temu	GF Consultant
	3	External Validation	WHO experts
SMEOR + EPR	1	KABERA Michee (Group Lead)	RBC/MOPDD
	2	Dr Pascal Ngiruwonsanga	Gakoma DH
	3	Adeline Kabeja	ESR
	4	Muhashyi Anastase	RBC/MOPDD
	5	Marcel Manariyo	Impact Malaria
	6	Dr Beata Mukarugwiro (Co-chair)	USAID
Case Management (CM): includes diagnosis & treatment, IPTp, SMC, PSM supply of antimalarials, TES, QA of ACT/RDT/microscopy, pharmacovigilance	1	Dr Jean Damascène Niyonzima (GL)	RBC/MOPPD
	2	Olivia Gwira	PSM
	3	Anicet Rucogoza	NRL
	4	Dr Evariste Mushuru (Co-chair)	CHUB
	5	Dr Naomi Lucchi (Secretary)	US PMI/CDC
	6	Modeste Harerimana	Impact Malaria
	7	Nkanika Nenette	RBC/MOPDD
Vector Control (VC): covers ITN, IRS, LSM, IVM, entomology monitoring, insecticide resistance	1	Dr Emmanuel HAKIZIMANA (GL)	RBC/MOPDD
	2	Yvette Muyirukazi	RBC/MOPDD
	3	Dunia Munyakanage	RBC/MOPDD
	4	Alphonse Mutabazi	RBC/MOPDD
	5	Beatus Cyubahiro	RBC/MOPDD
	6	Joyce Icyimpaye (Co-chair)	GHSC-PSM
	7	Dr Mangara JL N (Secretary)	RBC/MOPDD
Advocacy, Communication & Social mobilization (ACSM) – cross cutting	1	Epa Habanabakize (GL)	RBC/HCC
	2	Deo	Profemme Twese Hamwe
	3	Prosper	URUNANA
	4	Lilian	SFH
	5	Kaneza	RICH
	6	Claire Abimana (Co-chair)	Ingobyi
	7	Dr Kaendi Munguti (Secretary)	USAID
Program Management + Costing and Financing + Procurement and Supply Chain Management (PSM)	1	Dr Aimable Mbituyumuremyi (GL)	DM MOPDD
	2	Sabine UMUHIRE	MOH
	3	Innocent Habimana	CCM
	4	Dr Gilbert Biraro	SPIU
	5	Diane Sakindi	SPIU
	6	Theoneste Habimana	SPIU
	7	Dr Jules S. Mugabo (Co-Chair)	WHO
	8	Dr Noella Umulisa (Secretary)	Impact Malaria

Annex 5: MTR Desk Review Workshop Agenda and Participants

AGENDA - RWANDA MID TERM REVIEW OF MALARIA STRATEGIC PLAN 2020-2024
Desk review workshop 20th to 24th February 2023, La Palisse Hotel, Nyamata, Bugesera District Rwanda

Objective: Desk review of program thematic area, analysis of capacity of program to implement planned activities and performance towards program outcome indicators and targets for 2020-2022 comparing with a baseline of 2019/20

Participants: Desk review Thematic focus group drawn from malaria program and implementing partners (NGO, US PMI/CDC, WHO, CSO and private sector). The workshop was facilitated by Dr Emmanuel Temu, GF consultant supporting the Rwanda MTR.

Tentative Agenda	**Rwanda MTR Desk Assessment Workshop, Kigali 20 - 24 Feb 2023**		
Dates	**Session**	**Description / activity**	**Responsible**
20-Feb-23	AM	Rwanda MTR: Recap - where we are & Analysis implementation of MSP activities	Dr E Temu & Dr Aimable
	PM	Draft MTR report Chapters: 1 - Introduction; 2 - Epidemiology / Entomology Impacts, Group review & feedback	Dr E Temu & Groups
21-Feb-23	AM	Group work - Chapter 4 - Analysis of capacity to implement MSP activities by thematic areas	All groups
	PM	Group work - Updating Desk Review report and drafting Presentation summary of findings	All groups
22-Feb-23	AM	Group work - Updating Desk Review report and drafting Presentation summary of findings	All groups
	PM	Finalization of report and Presentation - Summary of desk review findings by thematic focus	All groups
23-Feb-23	AM	Finalization of report and Presentation - Summary of desk review findings by thematic focus	All groups
	PM	Group presentation - Summary desk review finding by thematic focus & plenary discussion	All groups
24-Feb-23	AM	Draft Chapter 6 - MTR Conclusion & draft recommendations - Group review	Dr E Temu & Groups
	PM	Closure MTR Workshop	Dr Temu & Dr Aimable

Conclusion: The workshop provided an opportunity to review the draft on program progress towards epidemiological/entomological impact, discuss desk review findings by thematic areas, and group review of a draft conclusion and proposed and future strategic direction, and executive summary of MTR.

Annex 6: Participants of MTR Desk review Workshop.

ATTENDANCE LIST

MALARIA PROGRAM MID TERM REVIEW WORKSHOP

La Palisse Hotel, Nyamata, Bugesera District, 24 to 28 February 2023

N°	NAMES	POSITION
1	Dr NIYONZIMA Jean Damascene	RBC
2	HARERIMANA Modeste	IMPACT MALARIA/JHPIEGO
3	Dr Aimable MBITUYUMUREMYI	RBC
4	SAKINDI Diane	RBC
5	NSENGIMANA Vital	RBC
6	KAGANWA Georgette	RBC
7	MUNYAKANAGE Dunia	RBC
8	MUTUYEMUNGU Mary	RBC
9	MANARIYO Marcel	JHPIEGO
10	Pauline SEBATUNZI	RBC
11	Dr Jean Louis MANGARA NDIKUMANA	RBC
12	Dr Emmanuel TEMU	GF
13	KAMUNEZA Serge	RBC
14	NDAGIJIMANA Deogratias	PPTH
15	MANIRARORA Jeanne d'Arc	CARITAS
16	TWIZEYEMUNU Donata	SFH/RWANDA
17	KAMALI Paul	CHARIS
16	Dr MUGABO SEMAHORE Jules	WHO
17	RUDASINGWA Vedaste	NDERA HOPITAL
18	MUHASHYI Anastase	RBC
19	ABIMANA Marie Claire	USAID/INGOBYI PROJECT
20	Kennedy Ogaro	LFA/GF/
21	ICYIMPAYE Joyce	GHSC-PSM
22	KABERA SEMUGUNZU Michee	RBC
23	Dr UMULISA Noella	IMPACT MALARIA/JHPIEGPO
24	KARENZI Prosper	URUNANA
25	Dr Naomi Lucchi	US PMI/CDC Country Advisor

Annex 7: Capacity of program to implement planned activities by MSP objectives and strategies, 2020-22

MSP Objectives	Strategies	Fully Implemented		Partially Implemented		NOT Implemented		TOTAL
		No.	%.	No.	%	No.	No.	No
Objective 1: By 2024, at least 85% of the population at risk will be protected with preventive interventions.	Strategy 1.1: Sustain and extend IRS in high malaria incidence districts	13	100%	0	0%	0	0%	13
	Strategy 1.2: Universal coverage in LLINS (mass distribution and routine distribution through EPI, ANC, PPP	13	93%	1	7%	0	0%	14
	Strategy 1.3: Introduction of innovative Integrated vector control tools to supplement the core interventions	7	100%	0	0%	0	0%	7
	Strategy 1.4: Community based environment management through community works/ meetings	6	100%	0	0%	0	0%	6
Objective 2: All suspected malaria cases are promptly tested and treated in line with the national guidelines.	Strategy 2.1: Strengthen the quality of malaria diagnosis at all levels including private sector	22	73%	3	10%	5	17%	30
	Strategy 2.2: Strengthen prompt and correct simple malaria treatment at all levels including private sector	26	76%	0	0%	8	24%	34
	Strategy 2.3: Strengthen referral and case management of severe malaria cases at health facility level	9	75%	3	25%	0	0%	12
	Strategy 2.4: Strengthen mechanisms to maintain competency of health workers in malaria case management at all levels including private sector	0	0%	0	0%	3	100%	3
	Strategy 2.5: Ensure quantification and distribution of quality assured malaria consumables and commodities	7	78%	2	22%	0	0%	9
	Strategy 2.6: Strengthen early detection and treatment in pregnant women	11	92%	0	0%	1	8%	12
Objective 3: By 2024, strengthen surveillance and reporting to provide complete, timely and accurate information for appropriate decision making at all levels.	Strategy 3.1:Strengthen malaria routine surveillance and epidemic preparedness and response (EPR) at all levels	3	60%	1	20%	1	20%	5
	Strategy 3.2:Strengthen capacity building in data management, data quality, analysis and use at all levels	15	100%	0	0%	0	0%	15
	Strategy 3.3: Conduct community and health facilities evaluation	4	40%	4	40%	2	20%	10
	Strategy 3.4: Strengthen severe malaria notification and conduct malaria death audits	5	63%	1	13%	2	25%	8
	Strategy 3.5: Improve reporting from the private health sector	5	45%	0	0%	6	55%	11
	Strategy 3.6: Develop and implement an operational research agenda for malaria	7	58%	5	42%	0	0%	12
Objective 4: By 2024, strengthen coordination, collaboration, PSM and effective program management.	Strategy 4.1: Mobilization of adequate financial resources	6	100%	0	0%	0	0%	6
	Strategy 4.2: Strengthen the Intra and Inter Sector Collaboration and Coordination for malaria control at all levels	4	67%	2	33%	0	0%	6
	Strategy 4.3: Synchronization and alignment of malaria commodities procurement and supply management	12	100%	0	0%	0	0%	12
	Strategy 4.4: Strengthen Regional collaboration	2	67%	1	33%	0	0%	3
	Strategy 4.5: Strengthen human resources, material capacity of the malaria programme	12	80%	1	7%	2	13%	15
	Strategy 4.6: Conduct coordination and planning sessions for the malaria program and key stakeholders	6	100%	0	0%	0	0%	6
Objective 5: By 2024, 85% of the population will have correct and consistent practices and behaviors	Strategy 5.1: Strengthen SBCC malaria framework	12	100%	0	0%	0	0%	12
	Strategy 5.2: Increase awareness on community role in malaria prevention and control interventions	15	88%	2	12%	0	0%	17
	Strategy 5.3: Advocate for high level support to sustain malaria prevention and control interventions including social marketing	20	100%	0	0%	0	0%	20
	Strategy 5.4: Promote community engagement in malaria prevention and control interventions	7	100%	0	0%	0	0%	7
MSP	**Overall**	**249**	**81%**	**26**	**9%**	**30**	**10%**	**305**

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