



VECTOR CONTROL SERVICES

Ministry of Public Health

Cooperative Republic of Guyana

FINAL

**NATIONAL MALARIA PROGRAMME
STRATEGIC PLAN 2015-2020**

Updated: February 2018

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Acronyms

AMI/RAVREDA	Amazon Network for the Surveillance of Antimalarial Drug Resistance
ACD	Active Case Detection
BCC	Behavior Change Communication
CBO	Community-based organization
CHW	Community Health Worker
CCM	Country Coordinating Mechanism
CCMm	Community Case Management of Malaria
DDT	Dichlorodiphenyltrichloroethane
DTI-R	Diagnosis, Treatment, Investigation and Response
GF	Global Fund
GoG	Government of Guyana
GTS	Global Technical Strategy (Malaria) 2016-2030
IEC	Information, Education and Communication
IVM	Integrated Vector Management
IR	Insecticide Resistance
LLIN	Long-lasting Insecticidal Nets
Malsys	Malaria Surveillance System
Medex	Medical Extension Worker
MDG	Millennium Development Goals (MDG)
MIS	Malaria Information System
MoPH	Ministry of Public Health, Guyana
N/A	Not Available
NHSS	National Health Sector Strategy 2008-2012
NMCP	National Malaria Control Program
NMOTC	National Malaria Oversight Technical Committee
NSP	National Malaria Program Strategic Plan, 2015-2020
PAHO	Pan American Health Organization
PCD	Passive Case Detection
RDC	Regional Democratic Council
RDT	Rapid Diagnostic Test
RHA	Regional Health Authorities
RHO	Regional Health Office
SDG	Sustainable Development Goals (United Nations)
SOPs	Standard Operating Procedures
SWOT	Strengths, Weaknesses, Opportunities, Threats (SWOT Analysis)
UN	United Nations
UNICEF	United Nations International Children Emergency Fund
USAID	United States Agency for International Development
VCS	Vector Control Services
WHO	World Health Organization

Glossary¹

Active case detection: Detection of malaria cases at community and household levels, sometimes in high risk groups. It consists of screening for fever followed by parasitological examination of all febrile patients or the parasitological examination of the target population without prior screening for fever

Adherence: Compliance with a regimen (chemoprophylaxis or treatment)

Adverse drug reaction: A response to a medicine that is harmful and unintended and which occurs at doses normally used in humans

Case investigation: Collection of information to allow classification of a malaria case by origin of infection, i.e. imported, indigenous, induced, introduced, relapsing or recrudescent

Confirmed case: Malaria case (or infection) in which the parasite has been detected in a diagnostic test, i.e. microscopy, a rapid diagnostic test or a molecular diagnostic test

Drug resistance: The ability of a parasite strain to survive and/or multiply despite the absorption of a medicine given in doses equal to or higher than those usually recommended.

Foci (malaria): A defined circumscribed area situated in a currently or formerly malarious area that contains the epidemiological and ecological factors necessary for malaria transmission

Malaria case: Occurrence of malaria infection in a person in whom the presence of malaria parasites in the blood has been confirmed by a diagnostic test

Malaria Control: Reduction of malaria incidence, prevalence, morbidity, or mortality to a locally acceptable level as a result of deliberate efforts.

Malaria elimination: Interruption of local transmission (reduction to zero incidences of indigenous cases) of a specified malaria parasite species in a defined geographic area

Mixed infections: The presence of more than one *Plasmodium* species in a malaria patient detected in a diagnostic test, i.e. microscopy or a rapid diagnostic test

Passive case detection: Detection of malaria cases among patients who, on their own initiative, visit health services for diagnosis and treatment, usually for a febrile illness

Pharmacovigilance: Monitoring the effects of medical drugs approved by the Ministry of Public Health, especially in order to identify and evaluate previously unreported adverse reactions

Presumptive treatment: Administration of an antimalarial drug or drugs to people with suspected malaria without testing or before the results of blood examinations are available

Rechecked malaria case: A person who tested positive for malaria after treatment was completed

Stratification: Classification of geographical areas or localities according to factors that determine receptivity and vulnerability to malaria transmission

¹ For a complete list of definitions of malaria terminologies, visit: WHO malaria terminology – Global Malaria Program / WHO

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The Ministry of Public Health (MoPH) is extremely grateful and would like to take this opportunity to acknowledge the contribution of the following people in the development, compilation and thorough review of this document. It not only charts Guyana's path for the next five years for malaria control, prevention and later elimination but also will directly impact the lives of those at risk and infected by this huge public health problem. The MoPH would like to thank and acknowledge the following persons and Organizations:

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- Dr. Rainier Escalada (Advisor, Policy and Advocacy, PAHO-WHO)
- Dr. Reyaud Rahman (Former Coordinator of Vector Control Services, MoPH)
- National Malaria Oversight Technical Committee (NMOTC) Members
- Pan American Health Organization / World Health Organization (PAHO/WHO)
- Guyana Geology and Mines Commission
- Iwokrama Environmental Protection
- Ministry of Education Representative
- Ministry of Local Government
- Ministry of Amerindians Affairs
- Guyana Forestry Commission
- Guyana Red Cross
- Guyana Police Force
- Guyana Defense Force
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Foreword

Dr. Reyaud Rahman

Director Vector Control Services

Global Fund Malaria Programme

Ministry of Health

Malaria is a major Public Health problem in Guyana, not only does it affect persons in regions 1, 7, 8 & 9 (the known endemic Malaria Regions), but cases are found in other regions, mainly due to the movement of the population.

This disease has dire consequences at the level of an individual and at the national level. When an individual cannot work it invariably means that his / her productivity and earning capacity is undermined. On a broader view it affects our economy due to the large amount of money used for control measures as well as treatment for affected persons. The Vector control Services/ National Malaria Programme has implemented refresher microscopy courses, updated the National Malaria Treatment Guidelines, created health clubs and school committees, trained regional staff on vector control and done vector control work in affected regions. It is noted that technical solutions alone cannot ensure the effective control and subsequent elimination of malaria in Guyana.

Therefore novel ideas are necessary to reach the population at risk and control this public health scorn. It is necessary to support the regions to bolster their activities and lead them in a direction which is effective and productive. It is also important to collaborate with the mining association, ministries and relevant stakeholders to reach, educate and better understand our affected at risk population.

Message from the Minister of Public Health



Dr. George Norton

Minister of Public Health, Guyana

Malaria remains a serious public health problem worldwide. As of 2014, the World Health Organization reported that an estimated 3.3 billion people are at risk of malaria, of whom 1.2 billion are at high risk. Global estimates likewise indicate that there has been 198 million cases of malaria and 584,000 deaths worldwide in 2013. Historically and today, malaria remains a scourge of the poor and vulnerable. It is an obstacle to achieving the UN Millennium Development Goals (MDGs) and the new global targets outlined in the Sustainable Development Goals (SDGs). Guyana has achieved significant progress in the fight against malaria and we believe that the medicines to treat malaria must be well known, managed by health personnel and available to all patients who need them. However, the main problem is often limited access, misuse of those and other medicines.

New medicines against malaria are rapidly becoming available and the ability of a country to quickly access them depends on several prerequisites, including the availability of funds, the ability of human capital and the recognition that behavior, underdevelopment and poverty are the main determinants of disease dynamics. In the implementation of our previous National Malaria Strategic Plan, we strived hard to reach our aim of reducing malaria burden by 70% based on 2010 baseline figures. We have reassessed our position recently and have opted to be even more aggressive to ensure that malaria is indeed dramatically decreased alongside the process of strengthening our malaria surveillance system throughout the country.

In preparing our National Malaria Strategic Plan 2015-2020, we have been guided by the common commitment to decrease by 50% the overall malaria burden by 2020, particularly in Regions 1, 7, 8, and 9 where many of the key affected populations live; and facilitate the elimination of *P. falciparum* local transmission. To achieve these goals, specific interventions are necessary including structural changes in current program management procedures; refinement of the malaria surveillance system to effectively reflect the actual burden of the disease in various localities of the country; reliable and timely diagnosis and treatment; distribution of Long lasting Insecticidal Nets (LLINs) and judicious use of other vector control methods; catalyze appropriate behavior changes; strengthening the relevant health system functions such as supply chain management and outbreak response; etc. Profound changes in these areas of work are the essential ingredients to enable us to effectively serve our people and facilitate the subsequent elimination of this public health problem.

The Government of Guyana has committed resources and reaffirms its willingness to invest and increase budget every year to better support our programme. We are in this battle together and we will win this together!

We recommend this Malaria Strategic Plan, urging all to work with commitment and dedication in health posts and hospitals in Guyana. The information and framework presented in this plan will serve as our country's roadmap to achieve our goals and objectives, even in the most remote or inaccessible villages.

I want to express gratitude and thanks to all who worked on this document. I urge commitment from all, to provide universal access to prevention services, treatment and care to all people, in particular, those living in the regions of Guyana where malaria is a problem.

Executive Summary

Situation analysis: The epidemiology of malaria in Guyana

The National Malaria Eradication Program of Guyana began in the 1950's and attained significant success by 1974 when the number of malaria cases decreased from thousands to just 72 cases in the country. This led to a reduction in funding for the disease and a resulting resurgence with the number of cases peaking to over 84,000 in 1995. But, from 1996 to 2009 there was overall decrease in malaria despite fluctuations in the number of cases and peak periods occurring in between. The disease began to increase again after 2009 and within the period 2010-2012 cases increased from 22,935 to 31,601, thus an increase of 8,544 (37.3%). This was followed by another decrease in 2013-2016 (from 31,479 to 10,979 cases i.e. a decline by 20,500; 65.1%). *Plasmodium falciparum* (*Pf*) and *Plasmodium vivax* (*Pv*) are the main cause of malaria in Guyana. As opposed to the past where *Pf* malaria was predominant, in the last five years, more *Pv* malaria has been detected in the country. While mixed infections are somewhat common, *P. malariae* is rare. The main malaria vector is *Anopheles darlingi* and *An. aquasalis* is considered a secondary vector. The ecology and behavior and insecticide susceptibility of these vectors needs to be updated.

In the last 1-2 years, 11% of the population lived in high transmission areas (>1 case per 1000 population) and 89% in low transmission settings, that is, 0-1 case per 1000 population), (WMR², 2017). Historically, the most vulnerable Regions are 1, 7, 8 and 9 and the most susceptible groups are the Amerindians and Afro-Guyanese, accounting for respectively 34 and 21% on average of all cases in the last seven years. More males (72-78%) than females were infected by malaria within the same period partly due to male predominance in mining /logging and other economic activities in high transmission settings. A small percentage of children <5 (5.31% within the period 2010-2016) and pregnant women were infected by the disease. Thirteen nationwide deaths were reported to the WHO in 2016, 12 in 2015 and 11 in 2014 (WMR). Nevertheless, these statistics show malaria cases and deaths detected in the public sector and exclude most of those in the private sector. The key drivers of malaria transmission are rainfall, tropical rainforest temperatures and human activities such as mining/logging and agriculture which create habitats favorable for mosquito breeding. Populations living around forest, creeks and rivers with limited personal protection are vulnerable to the disease. Other causes of transmission are limited access to healthcare in the hinterland and use of low impact vector control measures.

Response to the situation of malaria, challenges faced and gaps in the malaria program

Governance and program management: With the Minister of Public Health as Chair, a National Malaria Oversight Technical Committee (NMOTC) was set up to actively engage local stakeholders and partners (the public and private sectors, civil society, PAHO and other partners) in governance and program management. Under overall supervision by the MoPH and with support from the NMOTC, the VCS provide oversight and coordination of the NMCP and monitor its performance and progress. A Country Coordinating Mechanism (CCM) was set up to assist with governance and program management in relation to the Global Fund grant allocated to Regions 1, 7, 8 and 9. Both the NMOTC and the CCM have representatives from all sectors and

² World Malaria Report (WMR), 2008-2017: <http://www.who.int/malaria/publications/country-profiles/en/>

levels (national, regional and communities). The decentralization of the VCS/NMCP is progressing but faced with challenges related to availability of human, financial and material/logistic resources. However, Regional VCS offices are functional in the endemic Regions of 1, 7, 8 and 9 while in the non-malaria endemic Regions there are staff members within the RHO focusing on malaria efforts. Gaps that need to be addressed include capacity for planning and coordinating regional malaria activities and attaining national and international targets. This includes designing/tailoring measures to the specific needs of endemic localities and vulnerable populations.

Malaria Information Systems (MIS) and Monitoring and Evaluation (M&E): The MIS is part of the national surveillance system. It produces reports based on daily malaria registers and production forms submitted weekly by public and some private health facilities. The reports analyze the number of cases by age, sex, species and ethnic group as well as Region and communities. However, deficiencies in the MIS have been identified namely: data completeness (*e.g.* records on treatment regimen and place of infection are often incomplete), tardy reporting of cases and underreporting (non-submission of reports). The VCS has designed new tools for health facilities and mining/logging camps to be rolled out in 2018 and which emphasizes reporting of all required information. M&E officers and data entry clerks have been assigned to the malaria endemic Regions 1, 7, 8 and 9 in a bid to improve data quality, reporting and statistical analysis. The VCS is also working with the private sector to standardize reporting tools and increase reporting. A major gap in the MIS and M&E systems is capturing and analyzing data in a holistic fashion, *e.g.* data on vector control, communication, treatment, severe cases, pregnant women, deaths and malaria communities need to be integrated in the MIS and M&E systems to facilitate analysis of data needed for planning and as indicators.

Malaria diagnosis and case management (treatment, tracking of cases, etc.): Diagnosis and treatment is free in public health facilities. Diagnosis is done mainly by microscopy. To increase access to early diagnosis, microscopists have been trained on the use of malaria RDTs in strategically located health posts in remote settings. To further increase access, the VCS piloted community case management of malaria³ (CCMm) in Region 8 where voluntary collaborators in mining/logging and other remote areas were trained to test for uncomplicated malaria using rapid diagnostic tests (RDTs) and treat all positive cases (except pregnant women, infants <1 and severe malaria). CCMm is now being scaled-up in endemic areas. RDTs are also intended to be used after laboratory hours and in outbreak settings. Private sector health facilities do diagnosis using both RDTs and microscopy. Treatment guidelines for the different parasite *spp* and mixed infections were updated in 2016, printed and distributed to health facilities. The first antimalarial dose is given under direct observation by the health worker. Patients are requested to return to the health facility/post to be retested (rechecked) for treatment efficacy. The pilot project on CCMm included other components, namely: surveillance, vector control/distribution of mosquito nets, IEC and behavior change. Its holistic nature provided best practices and lessons to guide aspects of decentralization the process.

³ A WHO initiative to increase access to early diagnosis and treatment of malaria and other common illnesses in areas with limited clinical care

The main challenges in the area of diagnosis are quality control and field supervision to improve the quality of smears and diagnostic results. To address these issues, the VCS is conducting trainings for new and existing quality assurance personnel and focal points at national and regional levels. Self-treatment with medicines not recommended by the MoPH and adherence to treatment guidelines from the MoPH by health facilities and patients have also been indicated as challenges.. Communication and IEC strategies updated in 2018 contains activities and messages to mitigate these issues. However, more supervision and regulation is also needed to address these gaps.

Drugs and medical supplies: Malaria consumables are distributed by the Medicines and Materials Unit of the MoPH directly to the VCS and health facilities based on requisition from the latter. Routine and timely delivery of drugs and medical supplies to the hinterlands especially the remote parts is a major challenge due to logistics and a sub-optimal stock management information system. This actually affects the quality of care and the successful treatment of patients. The capacity for basic inventory management and maintenance of equipment at points of care is limited. As a results stock records are either non-existent especially in health posts or not properly managed. Stock outs of RDTs and laboratory supplies are occasionally reported sometimes lasting more than a week and patients are either requested to return for treatment or referred.

Human Resources for Health: The MoPH did increase the supply of trained health workers through its health science education program. But a major challenge is attrition, out-migration and the ability to maintain qualified health workers in the long term. Vacancies and deficiencies in technical and clinical positions are affecting access to malaria services particularly in levels 1 to 3 service facilities in rural and remote areas as well as decentralization efforts. To improve performance and optimal use of available public health personnel in the area of malaria control and elimination, the VCS/NMCP has included in its operational plan the training of malaria personnel based on the various strategic objectives and technical areas. The Global Fund provided support by hiring a national M&E coordinator and Regional M&E and data entry personnel for Regions 1, 7, 8 and 9. Voluntary collaborators in mining/logging camps and other remote settlements may also close some of gaps/challenges related to human resources and access to early treatment.

Health financing: The GoG provides most of the funding for malaria. The Global fund has provided funding for Regions 1, 7, 8 and 9 since year XXX. Other agencies like PAHO and USAID provide additional funding for specific interventions across the country. The main challenge in terms of funding is the sustainability of financial resources. Resource mobilization and advocacy is needed to ensure continuous funding especially for community-level activities.

Communication: In the absence of focal points for communication at the VCS, the Public Relation Department at the MoPH supports communication activities in collaboration with PAHO and USAID. In 2018, the malaria communication strategy was revised and new plans developed for IEC and LLINs distribution campaigns. The strategy and plans cover health seeking behaviors such as seeking treatment early

and adhering to treatment regimens, personal protection with LLINs and sanitation. The main gap/challenge is the implementation of these tools given the absence of cadres dedicated to IEC for malaria at all levels.

The National Malaria Program Strategic Plan (NSP) 2015-2020

The previous NSP covering the period 2008-2013 was updated in 2014 to serve the next five years (2015-2020). It was revised again in 2018. It defines strategies to help the VCS/NMCP achieve the national goal of reducing malaria by 50% by 2020 relative to 2014. It is based on lessons learned, gaps and challenges in the implementation of the malaria program in the previous years. It aligns with Guyana's NHSS, the Global Technical Strategy 2016-2030 from the Global Malaria Program and the Regional Plan of Action for Malaria Elimination 2016-2020 by PAHO-WHO. The NSP 2015-2020 is a product of concerted a process involving the VCS/NMCP; line Ministries, PAHO, private sector partners and NGOs, civil society and communities. The present NSP (2015-2020) was built on five broad strategic priorities and several strategic objectives.

The five (5) broad strategic priorities

1. Reinforce national and regional capacities in program management and coordination with local authorities, partners, civil society and private health providers to address gaps/ challenges (SO 1,7, 8);
2. Reinforce malaria surveillance and M&E systems, including compliance across all levels (SO 2 & 7);
3. Strengthen facility-based services and increase access in hard-to-reach areas through expansion of the existing network of CHW, *i.e.* community case management of malaria- CCM (SO 3 & 4);
4. Promoting personal protection and reduction of malaria transmission through IVM, (SO 5);
5. Improve IEC and develop culturally appropriate approaches to promote healthy behaviors (SO 6);

To achieve the NSP's goal and priorities, the VCS/NMCP will implement a well-structured malaria response guided by the following specific strategic objectives:

1. Strengthen leadership, governance and promote evidence-based decision-making,
2. Decentralize the VCS/NMCP by training and empowering RHOs and providing resources,
3. Reinforce program and resource management and coordination with all sectors at all levels,
4. Update guidelines, tools and equipment for surveillance/MIS, M&E to improve data quality,
5. Design an early warning system and outbreak preparedness and response plans,
6. Promote early (within 48 hours after onset of illness), reliable and accessible malaria diagnostic services to 100% of suspected cases in all affected areas;
7. Provide easily accessible and timely treatment (within 48 hours after onset of illness) for all persons who are diagnosed with malaria, using the National Treatment Guidelines from the MoPH;
8. Ensure maximum protection from malaria for the affected population through Integrated Vector Management (IVM) and distribution of mosquito nets;

Progress in the implementation of the NSP will be measured jointly by the VCS/NMCP, the NMOTC and the CCM using a performance framework prepared by the MoPH equally in collaboration with stakeholders from

all sectors. The projected cost of the NSP 2015-2022 is about US\$18.5M. Details on the gaps and challenges faced by the VCS/NMCP and strategies and activities to address them have been carefully laid out throughout in the following pages of this document.

Section 1: Introduction

Malaria has profoundly affected the health and well-being of the people of Guyana as well as the economy and development of the country. Despite extensive success of the National Malaria Eradication Program in decreasing the burden of malaria in the country between the 1940's and the 1960's which emphasized the use of DDT, treatment of individual cases, community efforts and elimination of the parasite reservoir, the disease resurged in the mid-70's as a result of decreased financial and political commitment to sustain and further advance the achievements attained in previous years. Since then, the country has been experiencing the same phenomenon of resurgence with the number of malaria cases fluctuating, characterized by occasional peaks.

However, a reported decrease of about 65.1% in confirmed cases reported between 2013 and 2016 prompted strong interest in determining and improving the overall strength of the malaria surveillance system including case detection, treatment and reporting. But, the challenges and context contributing to the malaria situation in Guyana continue to evolve and the disease remains a major public health challenge in the country.

As the international community reinforces its commitment to decrease the burden of malaria throughout the world as outlined in the Global Technical Strategy for Malaria 2016-2030 (1), the Regional Strategy and Plan of Action for Malaria in the Americas 2011-2015 (2), Plan of Action for Malaria Elimination 2016-2020 (24), the Framework for Artemisinin Resistance Prevention, Containment and Elimination in South America (3); and targets set under the United Nations Millennium Development Goals (UN MDG) (4) in 2000 and the United Nations Sustainable Development Goals (UN SDG) for 2030 (5), Guyana likewise renews its interest and commitment towards alleviating its people from the scourge of malaria. The disease is recognized as a priority health problem in the country's National Health Sector Strategy (NHSS) and has received significant attention and funding from the government of Guyana.

The National Malaria Program Strategic Plan 2015-2020 is intended to optimize and build upon the lessons learned from previous periods and recent years of program implementation, address emerging context, and usher the country towards achieving national targets and the UN SDG. Furthermore, the strategic plan seeks to lay-out the foundation for eliminating local transmission of malaria in subsequent years following the Global and Regional Strategies for Malaria in the Region of the Americas.

The National Malaria Program Strategic Plan 2015-2020 takes into account the current context and realities of the country and strongly considers among others the following documents and experiences:

- The National Development Strategy (6) (currently under review)
- The Poverty Reduction Strategy (7)
- Health Vision 2020: A National Health Sector Strategy for Guyana, 2013-2020 (8)
- The National Malaria Control Program Strategic Plan 2008-2013 (9)

- The Amazon Network for the Surveillance of Antimalarial Drug Resistance / Amazon Malaria Initiative (RAVREDA/AMI) Project (10)
- Implementation of the Global Fund Malaria grants (Round 3; Round 7; Single Stream Funding) (11)
- Various PAHO/WHO facilitated consultancies regarding technical, strategic, and programmatic approaches relevant to the malaria situation in Guyana
- PAHO/WHO Regional Strategy and Plan of Action for Malaria 2011-2015 (2)
- PAHO/WHO Regional Plan of Action for Malaria Elimination 2016-2020 (24)
- WHO's Test Treat Track Campaign (12)
- WHO Guidelines on Integrated Vector Management (IVM) (13)
- WHO Global Plan for Artemisinin Resistance Containment (GPARC) (14)
- PAHO Framework for the Prevention, Containment, and Elimination of Artemisinin Resistance in South America (in press) (3)
- WHO Global Plan for Insecticide Resistance Management for Malaria Vectors (GPIRM) (15)
- WHO Global Technical Strategy for Malaria 2016-2030 (1)

The successful implementation or operationalization of the National Malaria Program Strategic Plan will be facilitated by these resources as well as the national operations manual, technical guidelines for diagnosis, treatment and surveillance from the MoPH, a performance framework (M&E plan), advocacy and resource mobilization plan and regional health/malaria program operational plans designed within the context of multi-sector collaboration.

Section 2: Development of the National Strategy and the Role of Stakeholders

National Malaria Oversight Technical Committee (NMOTC): An important milestone accomplished through efforts in the NMCP was the setting up of the National Malaria Oversight Technical Committee (NMOTC) in 2005. The committee is under the aegis of the Ministry of Public Health (MoPH) and is chaired by the Minister of Public Health. The primary responsibility of the NMOTC is to oversee and support the national response to malaria and has likewise proven itself as a most effective channel for consultation, development of ideas, planning and implementation of efforts. The NMOTC provided the mechanism for the multi-sectorial consultation process that led to the development, consolidation, and updating of the current National Malaria Program Strategic Plan (NSP), which began implementation in 2008. Based on the changing and emerging dimensions of the country, best practices, gaps, challenges and new and improved technology, the NSP was revised and updated for the period 2015-2020.

The plan contains new approaches to bring malaria care closer to hard-to-reach populations which represent an important percentage of malaria cases; integrate the private and informal sectors; and strengthen coordination between the NMCP and the Regional Health Offices including the Regional Vector Control Services and Communities. The Terms of Reference of the NMOTC are as follows:

A. Members

Ministry of Public Health:

- Minister of Public Health (Chairperson of NMOTC)
- Chief Medical Officer
- Director of Vector Control Services (VCS)
- Coordinator of the National Malaria Control Program (NMCP)
- Director, Regional Health Services – as of February 2013
- Science and Training Department
- Director of Communicable Diseases
- Representative of the Georgetown Public Hospital Cooperation (GPHC)
- Regional Health Officers of Regions 1, 7, 8 and 9
- Other departments of the Ministry of Health as necessary

The Private Sector:

- Private physicians

Other institutions:

- Guyana Geology and Mines Commission
- Ikwokrama Environmental Protection
- Ministry of Education
- Ministry of Local Government
- Ministry of Amerindians Affairs

- Guyana Forestry Commission
- Guyana Red Cross
- Guyana Police Force
- Guyana Defense Force
- Pan American Health Organization/World Health Organization (PAHO/WHO)
- United Nations Children’s Fund (UNICEF)
- United States Agency for International Development, USAID (through The Amazon Network for the Surveillance of Antimalarial Drug Resistance, RAVREDA/AMI)

B. Aim: To widen the range of participants in the decision-making process and develop an integrated approach to the malaria response in Guyana

C. Activities: Review the implementation of the National Malaria Program Strategic Plan (including activities/projects financed by external resources) and participate in:

1. The promotion of inter and intra-institutional coordination
2. Strengthening integration of malaria activities into the general health services
3. Drug policy decision-making process
4. Identification of *in-vivo* studies for both baseline and monitoring data of anti-malarials
5. Identification of priority areas for anti-malarial activities within the context of national targets, the Plan of Action for Malaria in the Americas 2016-2020 and the GTS 2016-2030
6. Recommendation of topics for field research and innovation in malaria

D. Schedule of meetings: Each semester. The roles and responsibilities of the institutions that are part of the Government of Guyana’s (GoG) governance structure for the NMCP are as follows:

National Malaria Oversight Technical Committee (NMOTC) : The NMOTC is the GoG body responsible for supporting, coordinating, and providing oversight of the national malaria response under the aegis of the Office of the Minister of Public Health. The overall responsibilities of the NMOTC are to:

- Provide guidelines for preparing annual work plans and sub- or micro-projects;
- Review evaluated sub-projects recommended by the Ad Hoc Committee for Reviewing Civil Society Proposals;
- Consolidate work plans and sub-projects for review and ratification by the NMOTC;
- Ensure that all technical needs and resources for implementing agencies are met;
- Ensure transparency and adequate national coverage of interventions;
- Coordinate research, behavioral surveys, and revise and prepare relevant legal documents;
- Monitor input and process indicators monthly and regularly evaluate project outcomes and impact;
- Assist in liaising with external agencies for project management, fiscal monitoring and procurement.

Support by donors and partners: The national response to malaria is enhanced by a partnership and cooperation with international and local institutions listed in Table 1.

Table 1: Donors/Partners involved in malaria response in Guyana

Donor/Partner	Major Area of Assistance
GFATM (Global Fund to fight HIV/AIDS, TB and Malaria)	Consolidation of Malaria Control and Prevention and Strengthening of Local Capacity to Respond to Malaria through Alliances
PAHO/WHO	Technical Assistance. Managing RAVREDA and Member of NMOTC; orientation on Global and Regional technical strategies and initiatives
GoG (Government of Guyana)	
1. Regional Health Authorities	Collaboration in implementation of activities
2. Guyana Gold and Diamond Miners' Association	Memorandum of understanding; orientation on areas / localities of operation / at risk populations
3. Guyana forestry commission	Memorandum of understanding; orientation on areas / localities of operation / at risk populations
4. Guyana Geology and Mines Commission	Memorandum of understanding; orientation on areas / localities of operation / at risk populations
5. Guyana Police Force	Logistical resources and support
6. Guyana Defense Force	Logistical resources and support; training
7. Other line Ministries	Education, Environment and others
UNICEF	Technical (e.g. surveillance, strengthening health services)
CDC	Technical
USAID	Technical and financial support
Brazil	Border Cooperation; collaboration through RAVREDA/AMI
Venezuela	Border Cooperation. Training in diagnosis
Suriname	Border Cooperation; collaboration through RAVREDA/AMI
Cuba	Biological Control of vector through larvicides
GFATM	Consolidation of Malaria Control and Prevention and Strengthening of Local Capacity to Respond to Malaria through Alliances
Institute Pasteur, French Guiana	Technical collaboration as PAHO/WHO Collaborating Center
Other Stakeholders	The private sector, civil society, local leaders, etc. etc.

Following broad-based consultation mechanisms which included a NMOTC and a Consultation Meeting in May 2015 in which various stakeholders participated; follow-up interviews with key informants; a rapid assessment of the country's malaria surveillance system; and in-depth discussions with partners and stakeholders in the country's malaria concept note development for the Global Fund, the National Malaria Program Strategy was updated to mitigate urgent challenges and facilitate achievement of medium and long term goals. The strategy was again revised and updated in February 2018 by national and regional stakeholders and partners, particularly PAHO-WHO.

Section 3: Situation Analysis- Malaria in Guyana and Country Context

3.1. Geographic features

The Cooperative Republic of Guyana has a surface area of 215,000 square km (83,000 square miles) and lies along the north-eastern coast of Latin America. It is bounded on the north by the Atlantic Ocean, on the east by Suriname, on the south and southwest by Brazil, and on the west and northwest by Venezuela. Being the only country where English is spoken in South America and as a result of its historical and cultural heritage, Guyana is more linked to English-speaking Caribbean than it is to countries of the Americas Region (16). The country has 10 Administrative Regions with varying population density and economic activities (7) (Maps 1 and 2), each run by a Regional Democratic Council (RDC) led by a Chairperson. The RDCs are subdivided into Neighborhood Democratic Councils and Communities.



Map 1a: Map of Guyana Source: PAHO, 2009



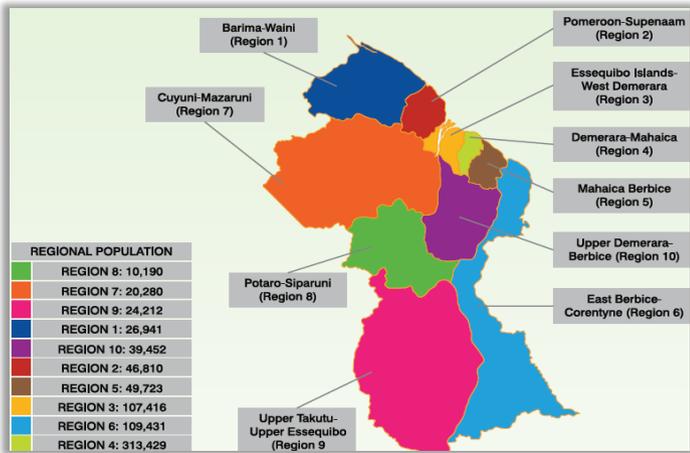
Map 1b: Map of South America showing Guyana

Guyana has four types of landforms, namely: a) the flat, coastal clay belt where most agricultural activity takes place, and which is protected by sea defenses, as they lie about 1.4 meters below sea level; b) the sand belt to the south of the coastal belt, which includes the intermediate savannahs; c) an undulating, central pen plain, which comprises more than half of the country's area and in which is located lush, almost pristine, tropical forests and extensive mineral deposits.

This landform stretches from the sand belt to the southern boundary and also encompasses the Rupununi Savannahs, which border Brazil; and d) the highlands found in the Midwestern area which includes the Pakaraima mountain range (7). The country lies in the tropical belt and has an equatorial climate characterized by seasonal rainfall which occurs from May to June and again from November to January, high humidity and temperature variations (averaging 26.7°C).

3.2. Demographic features

In 2012, the population of Guyana was estimated at **747,884**. About 89% of the population lives in the coastal areas while the remaining 11% are residents of the hinterland (17). But, it is estimated that the actual number of people present in Regions 1, 7, 8 and 9 fluctuates to thrice the baseline population due to influx of people who work in mining, logging and related industries. The majority of the population is concentrated along the coastline (Regions 3, 4 and 6) with 49.9% located in Region 4 alone. Regional growth rates are estimated to be highest in Regions 9 (2.49% per annum), 7 (1.52%), 1 (1.1%), 3 (0.42%), 4 (0.1%) and 8 (0.09%); while the other regions have negative annual growth rates (17). The 2002 census characterizes Guyana as having a multiracial population, namely: Indo-Guyanese (43.45% of the total population), Afro-Guyanese (30.20%) and Amerindians (9.16%) and people of “mixed heritage” (16.73%). People of European and Chinese origin comprise a tiny proportion of the overall population (0.07%) (17).



Map 2: Map of Guyana by Region Number, Name, and Population (2012)

Table 2: Regional Population Distribution, Guyana 1980-2012

Region	Absolute Number				Percent			
	1980	1991	2002	2012	1980	1991	2002	2012
Region 1	18,320	18,431	24,275	26,941	2.40	2.50	3.20	3.60
Region 2	42,321	43,455	49,253	46,810	5.60	6.00	6.60	6.30
Region 3	104,700	95,977	103,061	107,416	13.8	13.30	13.70	14.40
Region 4	316,679	296,636	310,320	313,429	41.70	41.00	41.30	41.90
Region 5	54,583	51,851	52,428	49,723	7.20	7.10	7.00	6.60
Region 6	162,673	142,496	123,695	109,431	20.10	19.70	16.50	14.60
Region 7	14,384	14,794	17,597	20,280	1.90	2.00	2.30	2.70
Region 8	4,482	5,616	10,095	10,190	0.60	0.80	1.30	1.40
Region 9	12,868	15,058	19,387	24,212	1.70	2.10	2.60	3.20
Region 10	38,554	39,559	41,112	39,452	5.10	5.50	5.50	5.30
Guyana	759,564	723,673	751,223	747,884	100.0	100.0	100.0	100.0
Coastland	709,510	669,774	679,869	666,261	93.4	92.60	90.50	89.10
Hinterland	50,054	53,899	71,354	81,623	6.60	7.40	9.50	10.90

Note: Coastal regions include: Regions 2, 3, 4, 5, 6 and 10, while Hinterland regions include: Regions 1, 7, 8 and 9.

3.3. Political and socio-economic features

The current social and political environment is relatively calm, thus conducive for malaria control efforts. Yet, marked disparities exist between coastal communities and the hinterland, especially as they relate to access to basic goods and services including healthcare, employment opportunities and income levels (16). This has a negative impact on malaria control and elimination. The economy of Guyana is based on its abundant natural resources, including fertile and productive soil, water resources from many rivers and a continental shelf off the Atlantic coast, diversified mineral deposits- bauxite, gold and diamonds, etc. and a large tropical rainforest with lots of timber. The hydroelectric potential is huge (7). Economic activities especially in Regions 1, 7, 8 and 9 have been creating favorable conditions for malaria transmission in the Latin American nation. The Amerindian population living in the country’s vast interior (hinterland) is the group that is most affected by poverty and issues of equity, access and social inclusion (16). Poverty reduction has been identified by the government as a priority. The 2002 Poverty Reduction Strategy Paper (PRSP) shows how determinants of health outcomes affect the poor and proposed policies to address them. It also evaluated investments and policies for improving the health of the poor. Health and nutrition were key components of the PRSP and the role of health in development was underscored by both the PRSP and the National Development Strategy (7).

3.4. Epidemiological Profile

The National Malaria Eradication Program of Guyana began in the 1950’s and attained considerable success by 1974 when the number of malaria cases decreased from thousands to just 72 cases in the country. With the decrease in mortality and morbidity associated with the disease, the government reduced spending on malaria control resulting in a resurgence of the disease with the number of cases peaking over 84,000 in 1995. The period that followed (1996-2016) saw a downward trend and consequently an overall decrease in the number of cases however characterized by smaller peaks in 1998 (over 50,000 cases), 2005 (roughly 40,000 cases) and 2012 (nearly 32,000 cases); Figures 1 and 2. The Figures demonstrate that after each of the listed peaks, there was a sharp decline in malaria followed by an increase leading to the next peak.

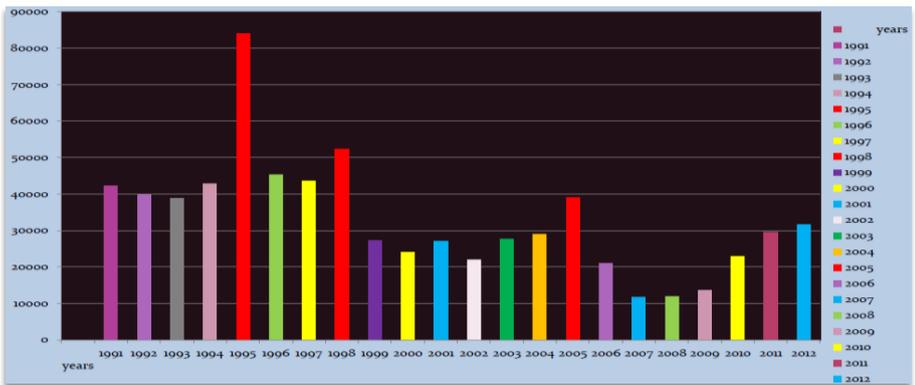


Figure 1: Number of Malaria Cases in Guyana, 1991-2012

Source: VCS/MoPH Guyana, 2013

From 1996 to the third quarter of 2009 there was an overall decrease in malaria despite fluctuations in the number of cases and peak periods occurring in between. The disease began to increase again in the last quarter of 2009 and within the period 2010-2012 cases increased by 8,544 (37.3%; Figure 1). This was followed by a decrease in 2013-2016 (i.e. by 20,500 cases representing a 65.1% reduction in malaria cases). Incomplete data for 2017 showed an increase in malaria cases after 2016 (Figure 2).

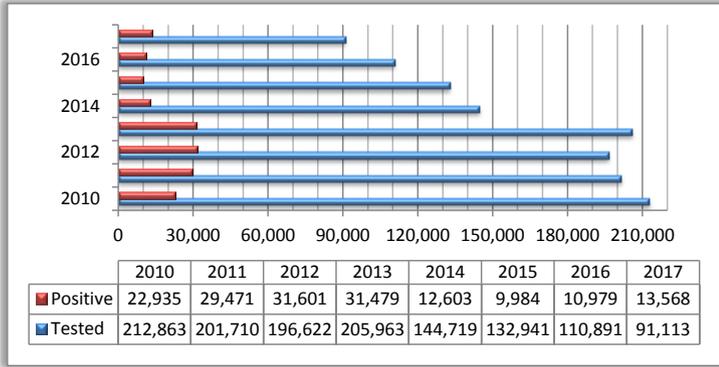


Figure 2: No. of malaria cases, Guyana, 2010-2017 Data sources: VCS/MoPH Guyana, 2017

Distribution of malaria cases by Plasmodium species, 2010-2017:

Three species of *Plasmodium* are known to cause malaria in Guyana, namely: *Plasmodium falciparum* (*Pf*), *Plasmodium vivax* (*Pv*) and *Plasmodium malariae* (*Pm*); the first two being predominant. Mixed infections, i.e. the presence of more than one species in a malaria case are also common. From 2010 to 2012 over 50% of malaria patients were infected by *Pf* and thereafter (2013-2017) more *Pv* infections were detected accounting for more than 53% of cases (Figure 3 and Table 3). However, *Pf* and *Pv* both had similar trends, increasing between 2010 to 2012, decreasing from 2013 to 2016 and then rising again in 2017.

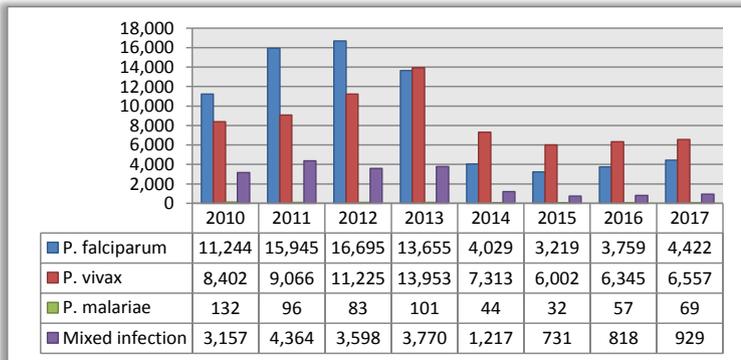


Figure 3: Malaria cases by species

Table 3: Percentage (%) of the different *Plasmodium* and mixed infections in Guyana, 2010-2017

<i>Plasmodium Species</i>	2010	2011	2012	2013	2014	2015	2016	2017
Percentage of <i>Plasmodium falciparum</i> (Pf)	49,03	54,10	52,83	43,38	31,97	32,24	34,24	36,92
Percentage of <i>Plasmodium vivax</i> (Pv)	36,63	30,76	35,52	44,32	58,03	60,12	57,79	54,75
Percentage of <i>Plasmodium malariae</i> (Pm)	0,58	0,33	0,26	0,32	0,35	0,32	0,52	0,58
Percentage of Mixed infections	13,76	14,81	11,39	11,98	9,66	7,32	7,45	7,76

In terms of all Pf and Pv malaria infections in 2014, 62% were coming from 25 localities with the top 5 accounting for nearly 30% of cases (Figure 4). Pm infections were rare averaging 0.4% of all infections while mixed infections appeared more common representing some 11% of positive cases.

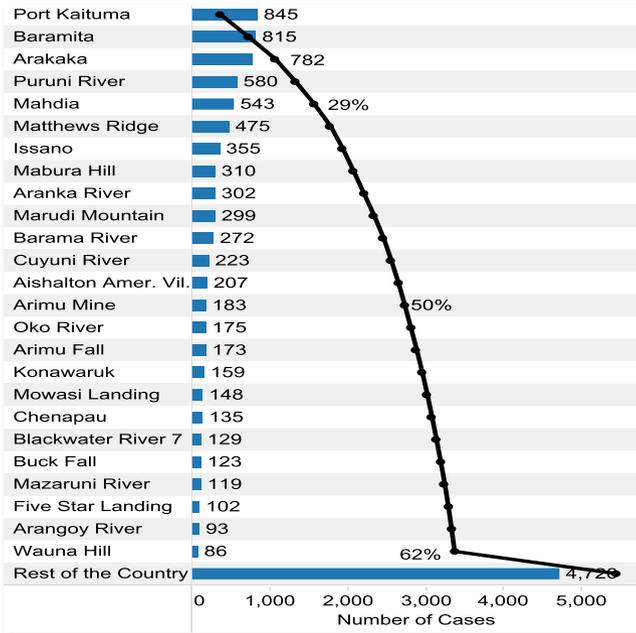


Figure 4: Top 25 localities with Malaria in Guyana, 2014 Source: VCS-MoPH, 2015

Distribution of malaria by Regions, 2010-2017:

Historically and based on where patients were reportedly infected, the malaria endemic Regions in Guyana are 1, 7, 8 and 9 (Table 2) where 85-95% of cases occur. In 2014 about 93% of cases were reportedly infected in these 4 Regions. Nevertheless, the level of endemicity in Region 9, which has a population of 24,212 (2012 est.), has declined significantly with less than ... cases reported every year since 2004 (Table 4 and Figure 5).

Table 4: Total number of new cases reported by Region where infected, 2010-2017

Region	2010	2011	2012	2013	2014	2015	2016	2017
1					3,787	3,633	4,160	4,362
2					1,272	817	980	869
3					173	150	105	81
4					3,276	2,205	2,393	2,714
5					48	43	86	52
6					117	73	58	101
7					1,134	811	1,453	2,164
8					1,080	873	809	1,071
9					826	952	550	208
10					890	427	385	355
Total					12603	9984	10979	11977

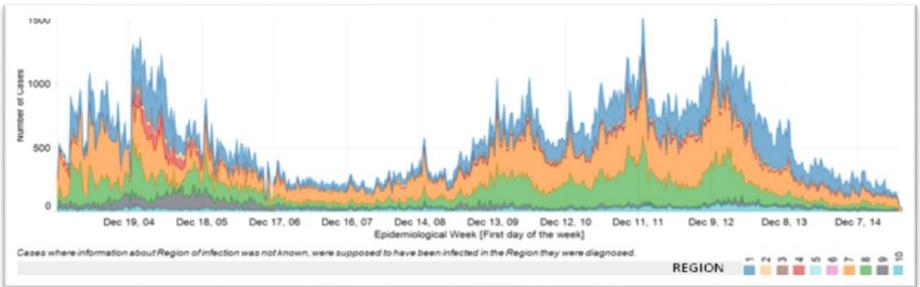


Figure 5: Confirmed malaria cases by Region where infected and Epidemiological week, Guyana, 2004-2014

Distribution of malaria among various population groups, 2010-2017

According to the 2016 World Malaria Report, 11% of the population in Guyana live in high transmission (>1 case per 1000 population) and 89% in low transmission areas (0-1 case per 1000 population). There was an overall decrease in malaria across all the population groups (Figure 6) in 2010-2016. Nonetheless, there was an increase in malaria across all groups in 2017 except among Afro-Guyanese. The most vulnerable group is the Amerindians closely followed by Afro-Guyanese accounting for respectively 34 and 21% of all cases in the same time frame. Most imported cases (93%) came from Venezuela, Brazil (6%) and Suriname (1%).

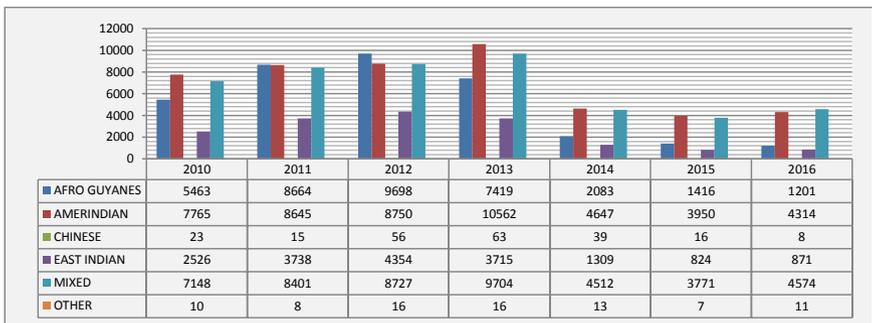


Figure 6: Distribution of malaria by ethnic group

Distribution of malaria by age and sex in Guyana, 2010-2016

The majority of malaria cases in Guyana for the period 2010 to 2016 were between the ages of 18-35 years and male (Figure 7), which is consistent with the predominantly male mining population in Regions 1, 7, 8 and 9. A small percentage of children <5 (on average 5.31% within the period 2010-2016) are affected by malaria. The percentage is even smaller among children <1 (less than 1%). The majority of cases among in almost all age groups are the Amerindians, indicating that there is high transmission in the hinterland. Although people of all age groups are affected and equally considered at risk in malaria elimination settings, those 15 to 49 years of age, or the most economically productive ages of life, constitute the majority of diagnosed cases in the country.

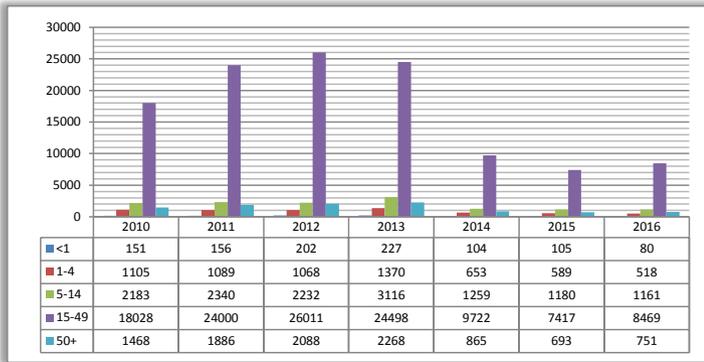


Figure 7: Distribution of Malaria by age group

Malaria is more widespread in males than females (Figure 9). Between 2010 and 2016, 72-78% of positive cases were males. This is equally consistent with the fact that most workers in high malaria transmission settings are men.

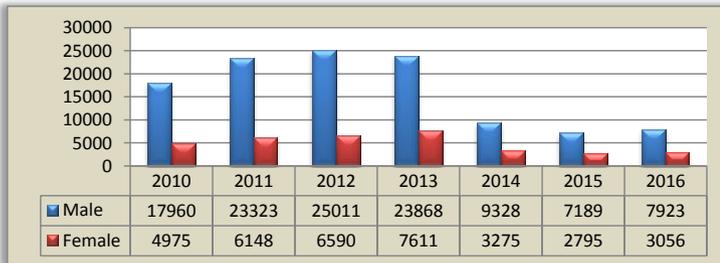


Figure 8: Distribution of malaria by sex

Deaths: A total of 13 deaths were reported in 2016 12 in 2015 and 11 in 2014 (World Malaria Report⁴)

⁴ World Malaria Reports, 2008-2017: http://www.who.int/malaria/publications/world_malaria_report/en/

Distribution of vector mosquitoes: The main vector mosquito that transmits malaria in Guyana is *Anopheles darlingi* while *Anopheles aquasalis* is considered a possible secondary vector. The ecology, behavior, distribution and insecticide susceptibility of these mosquitoes are not well documented in the country.

Factors favoring malaria transmission in Guyana: The tropical rain forests and perennial rainfall in the interior highlands (hinterland)- the malaria endemic Regions 1, 7, 8 and 9 present favorable conditions for the breeding of *Anopheles*. It is a riverine mosquito, generally confined to rural, lowland forested areas. The hinterland is rich in gold and diamond and attracts a large number of mining operations. Human activities such as mining, logging and agriculture contribute to deforestation and other environmental changes create habitats favorable for *Anopheles darlingi*. The larval habitats of the mosquito are natural water bodies such as lagoons, lakes and particularly slow flowing streams or rivers with shaded clear water.

Mining in the hinterland are significantly associated with malaria in Guyana (Figures 9 and 10). An increase in the price of gold corresponds to a rise in mining operations in the country and as a result a large number of people move from the coastal areas in Guyana to the hinterland to engage in mining and related activities. This increases the number of susceptible people at risk. The increase in the number of at risk population subsequently translates to peaks in the number of malaria cases during periods or years when the price of gold peaks. Malaria rates are higher in the areas that border with Venezuela than Brazil and among illegal miners from foreign countries.

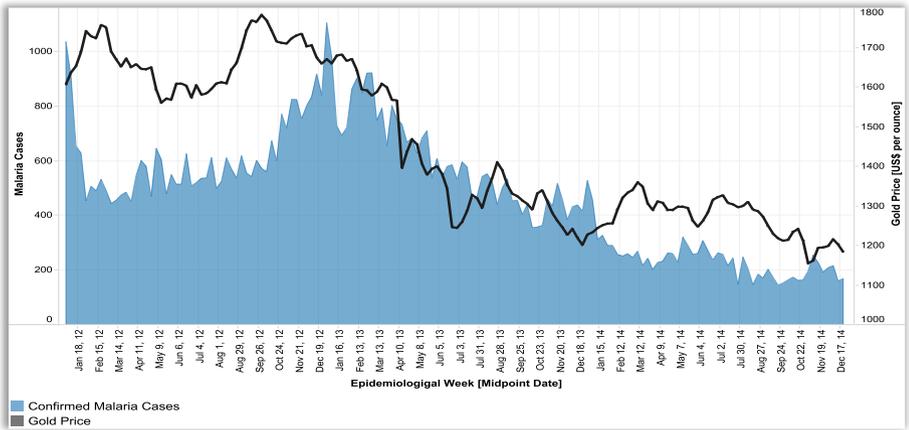


Figure 9: Confirmed Malaria Cases in Guyana compared with International Gold Prices, 2012-2014

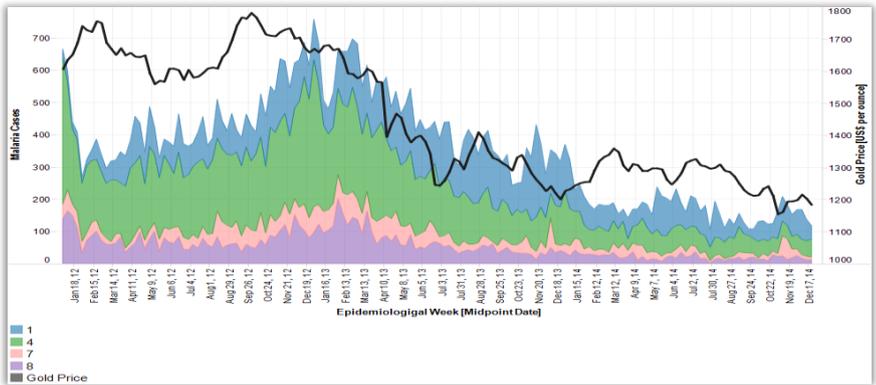
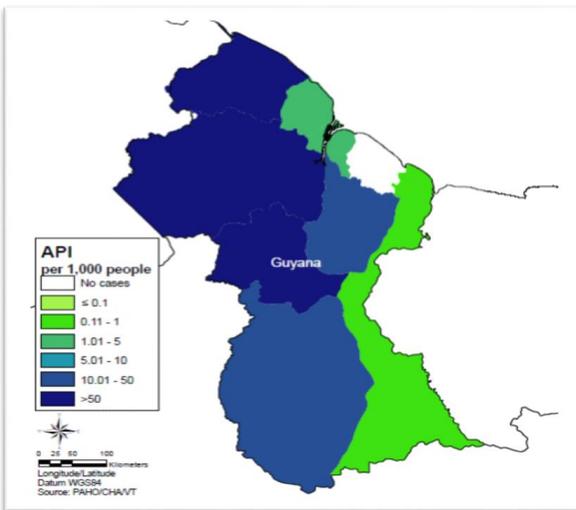


Figure 10: Malaria Cases in Regions 1, 4, 7 & 8 compared with International Gold Prices, 2012-2014

Malaria Stratification

The 10 Administrative Regions were lastly stratified in 2014 based on Annual Parasite Index- API (Figure 11). Region 4 is perceived as almost malaria free and Regions 2, 3, 5 and 6 have moderate to low transmission. While Regions 9 and 10 have moderate to high transmission, Regions 1, 7 and 8 are experiencing very high transmission. In order to properly target response and optimize the use of limited human, financial and material resources in efforts to reduce malaria and facilitate the country’s ultimate goal of malaria elimination, it is imperative to stratify the country, i.e. each of the 10 Regions by locality.



Map 3: Stratification of Malaria by API (Annual Parasite Index), Guyana 2014
 Source: Situation of malaria in the Americas, PAHO 2014

Section 4: Response to Malaria and related Gaps and Challenges

4.1. Vision and mission of the National Malaria Control Program (NMCP)

The vision of the NMCP is to improve health and quality of life while its mission is to reduce the burden of malaria leading to elimination of the disease. These strategic directions inform the national programmatic and operational response to malaria.

4.2. The Health System in Guyana

In 2010, the Ministry of Public Health (MoPH) completed a Health System Assessment using the WHO's six dimensional framework (18), which informed the development of Health Vision 2020. Based on the principles of individual empowerment and social participation, Health Vision 2020 also identified *Strategic Partnerships* as a seventh dimension to the health system. This dimension has great potential to facilitate the achievement of desired health outcomes through enhancing the coverage and delivery of health services and to support sustainable resource mobilization and management in the health system (8).



Figure 11: Health Vision 2020: WHO Health Systems Framework (18)

4.2.1. Health Governance and Program Management

The MoPH is the main steward of all health resources and is mandated through the Ministry of Health Act of 2005 to ensure effective oversight, regulation, coordination and accountability of all health programs such as the NMCP. In collaboration with relevant Ministries notably the Ministry of Local Government and the Public Service Ministry (PSM), the Public Sector Commission (PSC), the central body of the MoPH addresses these responsibilities through its seven programmatic areas: administration of the MoPH (Program One), disease control (Program Two), primary health care (Program Three), regional and clinical services (Program Four), health sciences education (Program Five), standards and technical services (Program Six) and rehabilitation services (Program Seven). Key legislation framing the health sector includes the Ministry of Health Act 2005, the Public Health Ordinance 1934, the Regional Health Authorities Act 2005 and other acts governing health practitioners. Cabinet sub-committees in health and local government continue to offer high level forums for inter-sectoral discussions, coordination and decision-making on health and public policies (8).

The NHSS 2008-2012 (19) planned for the decentralization of healthcare including malaria services to the Regional Health Authorities (RHAs), the restructuring of the MoPH to focus on its leadership role, and the strengthening of human resources and strategic information services. It sets out a plan to provide equitable access to high quality and consumer friendly health services based on: Equity in distribution of health knowledge, opportunity and service; Consumer Oriented Services that are people focused and user friendly; High quality services that represent good value for money; and Accountable provider and government.

Governance and program management at the Vector Control Services (VCS): The NMCP is a unit within the VCS⁵. Under the overall supervision of the MoPH, the VCS provide oversight, regulation, coordination and accountability regarding planning, implementation and evaluation of the NMCP in collaboration with the NMOTC which permits active engagement of national and international stakeholders (including the public, private and informal sectors, civil society, PAHO-WHO, and NGOs/international development partners) in malaria efforts including governance and program management. The NMOTC which was activated two years ago is periodically provided guidance by the VCS on their role to facilitate strong engagement by its members.

A Country Coordinating Mechanism (CCM) that provides oversight in the implementation of Global Fund Malaria grants awarded to Regions 1, 7, 8 and 9 was also set up with members drawn from all sectors and at all levels. For example, mining companies and the Toshaos (community leaders) are progressively assisting with coordinating and advocacy functions in the implementation of malaria program efforts in their respective areas of operation. Community case management of malaria (CCMm) is being jointly coordinated by the VCS/NMCP and mining companies in the various mining districts while the Toshaos are actively involved in community-level advocacy to promote health seeking behaviors and community engagement/participation.

Health and development partners such as PAHO-WHO and USAID are also supporting the VCS/NMCP in terms of coordination and technical support at strategic and operational levels in the malaria response. Some of the activities of the partners are: project oversight, strategic, operational and micro planning, monitoring and evaluation, epidemiological surveillance, quality assurance and resource mobilization.

The VCS and NMCP have been decentralized and integrated into the primary health care system and are now working to: a) improve the implementation of malaria interventions including delivery of malaria services, supervision and monitoring and evaluation by RHA and frontline managers; b) restructure programs to focus on leadership, coordination and technical support to the Regions; c) build human resource capacities in all areas of work and at all levels; d) upgrade strategic information systems; and e) extend malaria services through CCMm to remote locales and mining/logging areas with limited access to basic health care.

Within the public sector, Regional VCS offices have been set up in Regions 1, 7, 8 and 9 and staffed by a VCS Coordinator, a malaria supervisor, a monitoring and evaluation officer and data entry clerks. Under the

⁵ The VCS is made up of several programs including Malaria, Dengue, Lymphatic Filariasis and Entomology and Vector Control among others

overall supervision of the central level VCS in Georgetown and the direct supervision of the Regional Health Office, the Regional VCS coordinates and regulates the implementation of malaria activities at that level. In the remaining regions, there are staff members within the RHOs focusing on malaria efforts.

Gaps and challenges in the area of health governance and program management

Published reports on advances towards the achievement of the MDGs noted that a number of constitutional, regulatory and institutional reforms were implemented by the government and these served to undergird the economic progress made in the last half of the 1990s and prepared the stage for economic progress. Despite these efforts, reports further indicate that such reforms have not resulted in growth due to unfavorable developments in Guyana's external markets, internal political instability, and a protracted and destabilizing crime which, slow the pace of policy implementation and dampening the impact of reforms. These factors further led to slow progress towards the achievement of the MDGs (16).

The MoPH had also listed gaps in the implementation of the NHSS 2008-2012 as follows:

- Inefficient health system strengthening due to poor integration of interlinked elements of the system,
- Limited prioritization of interventions which led to inadequate funding and use of limited resources,
- Poor coordination of available data and strategic information to guide planning and decision-making
- Poor linkage between the strategic and work planning processes and the absence of a monitoring and evaluation framework led to disengagement between the strategic objectives and operational realities.
- Increased financial resources were disease-focused and established or strengthened vertical programs often to the detriment of sustainability and capacity building in those and other services areas (8).

Guyana's topography presents a challenge to transportation and communications in all areas of public services and is particularly onerous for regional health services that are underfinanced and under-resourced. Again, the health system has difficulty in retaining an adequate number of qualified technical personnel in rural locations. These factors have contributed to unevenness in the availability of services identified under the Package of Publicly Guaranteed Health Services (PPGHS). For various social, cultural and economic reasons, the current health services delivery structure also under-serves other segments of the vulnerable populations including men, foreign nationals, frontier and migrant populations, and many in the working population, leading to lost opportunities for prevention and early detection of diseases as well as inadequate care and support (8).

Thus, in terms of decentralization of the NMCP, the main challenges are: availability of technical cadres at the Regional level to coordinate implementation of the program on a day-to-day basis; logistics and infrastructure which affects the timely supply of consumables and diagnosis and treatment; and training of Regional staff in in micro planning, coordination, surveillance, M&E, supervision, quality control for diagnosis and treatment, vector control and IEC among others. This is needed to enable Regional cadres to implement the program confidently with reduced supervision by the central level and to serve as Regional trainers and mentors.

4.2.2. Strategic Information for Health

A robust health information system (HIS) is among the most important elements across all levels and stages of health services delivery. A well-functioning HIS will ensure the production, analysis, dissemination and use of reliable and timely information on health determinants, health system performance and health status (8). After many attempts and substantial resource investment, there are still challenges in terms of implementing an integrated HIS in Guyana.

But, there are many successful “stand alone” systems that are disease focused such as the Malaria Information System (MIS) at the VCS/NMCP which produces useful weekly reports that guide planning and decision-making. The MIS is part of the national surveillance system set up to capture malaria cases detected in public and private health facilities (passive case detection, PCD) as well as through active case detection (ACD). The latter was used to identify and treat malaria patients in remote areas with limited access to health care. But in 2015, the VCS/NMCP shifted from ACD towards community case management of malaria- CCMm (passive surveillance implemented by CHW and volunteers) in remote areas. This resulted in a sharp decline in ACD (Figure 11). The focus of the VCS/NMCP is to decentralize and improve passive surveillance and data quality in health facilities and in remote areas including mining/logging camps. The surveillance module of CCMm was piloted in Region 8 and is now being scaled-up in the endemic Regions (1, 7, 8 and 9).

Within the MIS, data on confirmed and treated malaria cases are recorded in daily malaria case registers and compiled in weekly production forms by health workers in health facilities and in the community settings (e.g. mining camps). Both materials are submitted to the RHO, particularly to the Regional VCS Office (seat of the Regional Malaria Program) on a weekly basis from where they are transferred to the MIS at central level by the M&E Officer for further analysis and dissemination. The daily malaria case registers supposedly captures demographic information, patient’s residence, place patient was infected, type of diagnostic test performed and results, treatment regimen, type of surveillance (active or passive) and case classification (new case or recheck). The weekly production forms contain a summary of persons tested and number of positive cases by species. M&E officers and data entry clerks were recently recruited in Regions 1, 7, 8 and 9 (endemic regions) to improve statistical and epidemiological analysis and data quality.

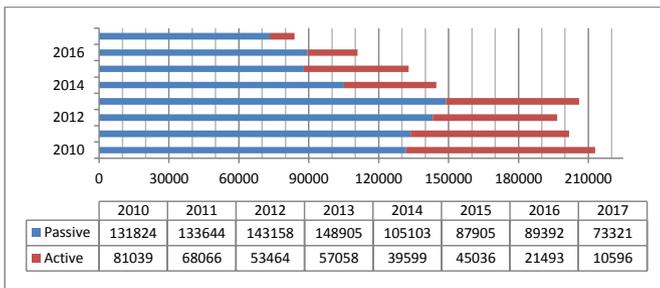


Figure 11: Chart showing number of cases detected by passive and active case detection

To inform the process of updating and finalizing the National Malaria Strategic Plan 2015- 2020, and as requested by the MoPH, a rapid assessment of the malaria surveillance system (Malsys/MIS) was conducted by MoPH and PAHO in August 2015 (21) which highlighted the following salient discussions and findings:

- Reporting completion was 57.8% in 2014 and 61.0% in 2013 with a significant decline in reporting rates seen in the latter part of 2014, especially after week 35. However, data was available in health facilities but due to issues related to logistics, communication, supervision and other factors it was not reported to the MoPH-VCS and consequently not entered into the information system (Malsys/MIS).
- After adjusting for the above mentioned under-reporting by health facilities, the number of cases could be estimated to be around 16,063 in 2014, 36,427 in 2013 and 36,665 in 2012. The actual numbers reported by health facilities were: 12,603 in 2014, 31,479 in 2013 and 31,601 in 2012
- Using PAHO’s method, the following compliance with surveillance parameters was observed in 2014:

Compliance	Region			Total
	8	6	10	
National				42%
Regional Health Office/Hospital	70%	61%	61%	64%
Health Centres and Posts	52%	56%	66%	57%
In Total	56%	58%	64%	59%

- This demonstrates that at national level, in 2014, the surveillance system was 59% efficient in capturing all the information that was produced in the country. A model for estimation of cases based on this would give an estimate of the number of cases to be 19,005 for 2014.
- The 56% decrease in cases from 2013 to 2014 after adjusting for underreporting can be attributed to decline in Gold prices and consequent decrease in mining activities and people exposed to risk of malaria. Anecdotal evidence supports the fact that malaria declined in 2014 compared to 2013 although its scale is debatable.
- The cases reported by epidemiological week peaked in early 2013 (January) and then continued to decline throughout 2013 and into 2014 after having risen by almost 4 times since November 2008 till the January 2013 peak (180 cases/week versus 800 cases/week) accompanied with an 2.3 fold increase in international gold prices in the same period (US\$758/ounce versus US\$1755/ounce).
- A regression model reveals that when controlling for time and seasonal variations, international weekly gold prices and number of people protected with LLINs were a significant predictor of weekly malaria incidence when analysed for the 2006-2015.
- Changes in gold prices affected malaria incidence with a lag of 12 weeks, which is logical considering that it takes a few weeks for movement of people to mining areas, two weeks for development of infection after biting and another week before they are diagnosed of malaria. For every \$10 increase in gold prices, there would be 6 more malaria cases per week and for every 1000 people protected by LLINs, there would be 7 less cases per week. However, these estimations would be used with caution as they are affected by underlying assumptions and prone to change with improved quality of surveillance data and on data about interventions.

Gaps and challenges in the area of strategic health information including surveillance/MIS

Data completeness: Surveillance and M&E tools (registers, forms, etc.) are not completely filled with key variables needed for quality control, accountability, planning and decision making and are left blank in the MIS namely: data on the negative malaria cases, place of infection of positive cases, malaria in pregnancy, consumables like RDTs, medicines and laboratory supplies, coverage of LLINs/bed nets, treatment data inclusive of treatment regimen, doses and possible side effects, severe cases and number of malaria-related deaths. Cases diagnosed and treated in the private sectors and a part of miners and loggers treated outside the public health system are not being adequately captured by the MIS, and this should be a concern of national interest for monitoring the malaria cases; that the national established treatment guideline is followed.

Human resource: M&E officers and data entry clerks at national and regional levels were recently recruited and are in need of training. Five regions all with low transmission do not have M&E officers and clerks.

Underreporting: This is a long standing problem referring to: a) malaria cases that are occurring but not being detected by the health system, and b) cases that are detected and treated but because of deficiencies in the surveillance and M&E systems are not being notified and thus not included in the national database/MIS. Based on a 2015 assessment by PAHO-WHO, Guyana had a 41% underreporting rate. As a result of registers not completely filled or not submitted, many cases detected in health facilities were not counted by the MIS.

Timeliness: Reports also indicate that occasionally registers with malaria cases are submitted to the MIS late, several months after the official submission deadline, also leading to missed cases and data gaps

Supervision: Due to issues related to availability of funds, methodology and logistics, field supervision has slowed in the last 1-2 years while M&E visits only recently begun in Regions 1, 7, 8 and 9.

4.2.3. Drugs and Medical Supplies

Nationally, drugs and medical supplies are the largest component of the health budget, averaging 17% in 2007-2011. In 2008-2012, the Government spent over G\$58 billion (US\$287 million) on drugs and medical supplies. Given the scarcity of fiscal resources and the critical role of medicines in realizing Guyana's health goals, these resources must be rationalized, including through the Essential Drugs List and used optimally, through strengthened procurement and supply chain management practices (8). A list of essential medicines is published regularly and there is a national drug formulary committee which works on the preparation of the Guyana National Formulary to include medicines and other supplies and equipment inclusive of malaria (16).

There is a unique national procurement and supply chain management system in the country managed by the Medicines and Materials Unit (MMU) that covers malaria commodities located at the MoPH. The MMU had introduced an inventory management system at the Hospitals in Georgetown, Linden, New Amsterdam and Suddie that was scheduled to be implemented in all regional hospitals since the end of 2009. The system allows for a more efficient distribution and readily available malaria drugs and medical supplies. The system for procurement is initiated by the stakeholders in the Hinterland to quantify adequately its stock balances.

The stock balances on Malaria supplies and commodities are then sent to the central level for procurement, taking into consideration, lead time from request to delivery. Donors and the MoPH have specific procedures for the acquisition and management of stock that must be fully complied with by the VCS/NMCP, Regional Malaria Programs and other program implementers. The procurement, storage and transportation of RDTs, medicines, laboratory supplies, mosquito nets and insecticides must comply with MoPH requirements. Quantification and forecasting will be done to avoid stock shortages and maintain security stock.

Gaps and challenges in drugs and medical supplies

Routine and timely delivery of drugs and medical supplies to the hinterlands especially the remote parts is a major challenge due to logistics and a sub-optimal stock management information system. This actually affects the quality of care and the successful treatment of patients. The capacity for basic inventory management and maintenance of equipment at points of care is limited. As a result stock records are either non-existent especially in health posts or not properly managed. Stock outs of RDTs and laboratory supplies are occasionally reported sometimes lasting more than a week and patients are either requested to return for treatment or referred to the next health facility.

4.2.4. Service delivery

The Government of Guyana considers health to be the right of every citizen. The responsibility for the health of the people of Guyana lies with the MoPH. The Minister of Public Health is the political head of the MoPH, the Permanent Secretary is the accounting officer and the Chief Medical Officer (CMO) is responsible for all technical and professional aspects. The Ministry of Local Government and Regional Development is responsible for managing finances allocated by the central government and for providing services at the regional level through the RDCs which receive technical and professional guidance from the MoPH. The Private sector functions independently but is regulated by the Health Facilities Licensing Regulation (2008), which mandates standards of care and practices. In 2005 the passage of the Regional Health Authorities Act and the Ministry of Health Act changed the traditional role and functions of the MoPH from that of a provider of health care to mainly that of regulator. In order to effectively carry out this function the MoPH needs considerable strengthening of the structural and governance arrangements, the establishment of a sector accountability framework, enhancement of the human resources planning capacity, improved management capacity of the central ministry and the decentralized entities.

The service delivery model is founded on Primary Health Care principles of equitable distribution of services, inter-sectoral collaboration and community participation (16). Service delivery in Guyana is managed by the RDCs through five levels of care:

- Level 1: Health posts strategically located in remote areas and run by CHW providing primary and basic curative and preventive care for malaria and other common diseases. The MoPH has also trained volunteers to do CCMm in mining/logging camps as they have limited access to health services.

- Level 2: Health centers and clinics staffed by medical extension workers or public health nurses, nursing assistants, a dental nurse and midwife. They provide maternal and child care, infectious disease, preventive and rehabilitative care, outpatient services, dentistry and pharmacy services.
- Level 3: Community Hospitals serving populations of 10 000 or more; provide limited surgery and inpatient care, more outpatient care, radiological and more advanced laboratory services. They are capable of gynecology and preventive and curative dental care.
- Level 4: Regional hospitals providing emergency, surgical, obstetrical and gynecological care, dental services, diagnostic services and specialist services in general medicine and pediatrics, sophisticated laboratory services an x-ray facilities, pharmacies and dietetic expertise.
- Level 5: The National Referral Hospital (937 beds in the Capital, Georgetown) providing a wider range of diagnostic and specialist services at in-patient and out-patient levels; the Psychiatric Hospital in Canje; the Geriatric Hospital in Georgetown; and a children's rehabilitation centre.

The national referral system is expected to work through and with these facilities to ensure that patients are moved to the appropriate level of care based on their health needs (8). An inventory of health facilities is presented in Table 5 although latest information indicates that these numbers have significantly decreased. The MoPH is in the process of updating the country's list of functional health facilities.

Table 5: Public and Private Health Facilities, 2010

Institution	R e g i o n										G-town	Total
	1	2	3	4	5	6	7	8	9	10		
Health Post	43	19	29	8	1	3	24	16	51	18	0	212
Health Centre	3	11	13	25	14	23	3	5	3	12	15	127
District Hospital	4	1	3	1	2	2	2	2	2	2	0	22
Regional Hospital	0	1	1	1	0	1	0	0	0	1	0	5
Private Hospital	0	0	0	0	0	1	0	0	0	0	6	7
National Referral Hospital	0	0	0	0	0	0	0	0	0	0	1	1
Regional Referral Hospital	0	0	0	0	0	2	0	0	0	0	0	2
Geriatric Hospital	0	0	0	0	0	0	0	0	0	0	1	1
Rehabilitation Centre	0	0	0	0	0	0	0	0	0	0	1	1
Diagnostic Centre ²⁹	0	1	1	1	1	0	0	0	0	0	0	4
Total	50	33	47	36	18	33	29	23	56	33	24	382

Source: Inspectorate Department, Ministry of Finance (2010)

Malaria service delivery: Malaria diagnosis and treatment

The network for diagnosis follows the five levels service delivery (categories of health facilities described above). Malaria diagnosis and treatment is delivered free of charge in all public health institutions thanks to funding from the GoG and the Global Fund. Diagnosis is performed principally by microscopy in all public

health facilities including health posts operated by trained CHW. The CHW are trained microscopists assigned to strategically located health posts in remote settings with the objective of increasing access to diagnosis (and treatment). Following the introduction of community-based response to malaria by the WHO, the use of malaria rapid diagnostic tests (RDTs) was successfully piloted in Region 8 within the context of community case management of malaria (CCMm). It is being scaled-up to increase access to and coverage of diagnosis and treatment of uncomplicated malaria in Communities with difficult access to basic healthcare such as remote settlements and mining camps. RDTs are also intended to be used in some public health facilities but after laboratory hours, holidays and on weekends as well as during outbreaks. Some private health facilities use RDTs for routine malaria diagnosis.

The percentage of people diagnosed for malaria through active case detection (ACD) decreased from 59% of all slides examined per year in 2007 to 26% in 2014 due to the increase in the number of people examined by passive case detection- PCD (73,000 to 105,103). In 2015 and 2016 respectively 45,036 and 21,493 cases were identified by ACD also representing an overall decline between 2014 and 2016. The decrease in ACD is further explained by the strategic positioning of health posts in remote areas (where ACD use to take place) charged with providing routine facility-based PCD and treatment for uncomplicated malaria. The proportion of confirmed cases being detected through active surveillance- ACD in 2014 (5.7%) has remained similar to that in 2013 (5.6%).

Ideally quality assurance (QA) for microscopy involves review of 100% positive slides and 10% of negative slides by the QA unit at the Regional VCS/Malaria Program while the central level QA unit assures overall supervision in the country. Due to the absence of a strong intermediate level QA unit, the central level has been conducting the exercise across the country.

Treatment guidelines from the MoPH for uncomplicated and severe malaria are standardized and have been distributed to all health facilities. But, CHW in health posts and diagnostic posts in mining/logging areas are not authorized to treat pregnant women, infants below six months old and severe cases. These categories of patients are referred to health facilities that have a medical doctor or medex for treatment. While data on severe cases is not reported to the MIS, the number of annual deaths due to malaria has been less than 15 in the last three years. The first-line treatment for confirmed uncomplicated malaria is as follows: artemeter plus lumefantrine (AL/Coartem™) for *P. falciparum* malaria and mixed infections and chloroquine + primaquine (CQ+PQ) for *P. vivax* and *P. malariae* malaria. The first dose is taken under observation by the health worker at the health facility. The VCS has been monitoring adverse drug reactions and drug resistance for Coartem™.

Gap and challenges in the area of diagnosis and treatment

Diagnosis: In the last four years QA results have demonstrated that the quality of blood smears needs to improve. False results were also indicated as a major concern. Many health facilities did not comply with submitting slides regularly for quality control. Nonetheless, routine QA has not been systematic and periods of

inactivity were reported. To address these challenges, in the beginning of 2018, the country began re-building Regional capacity for conducting QA and as part of the process of decentralizing of the NMCP. The VCS has also been conducting a series of training and refresher courses for new and existing laboratory personnel to improve the quality of smears and diagnostic results. A QA scheme for RDTs has not yet been developed. Another major challenge is enforcing standardization in the private sector for microscopy and RDTs. Again, with the introduction of RDTs, caution and rational use should be emphasized so that it does not replace microscopy. Limited access to diagnosis and treatment is still a critical gap and it partially explains why underreporting (i.e. malaria cases not being detected by the health system) is existing.

Treatment: The daily malaria case registers and MIS and M&E databases do not contain information about treatment regimen. Despite the availability of free treatment in public health facilities including strategically located health posts in remote areas, self-treatment is estimated to be happening. This has implications on the effectiveness of malaria drugs because failure of self-treatment sometimes leads to the patient seeking clinical care. Although all confirmed cases reportedly received first-line treatment following treatment guidelines from the MoPH, it is likely that some patients are occasionally treated using monotherapy (Chloroquine only) for *P. vivax* malaria. This also has implications on the effectiveness of treatment. Recent studies suggest drug resistance- a K13 gene mutations in Guyana, French Guiana and Suriname, i.e. reduction in the artemisinin sensitivity. Other related concerns include presumptive treatment and the use of medicines not recommended by the MoPH in the private sector. Thus, adherence to national treatment guidelines remains a challenge. Again, limited capacity building and refresher training of clinicians and CHW on proper case management and as a priority intervention in all sectors has also been indicated.

In all, an inventory of health units with microscopy needs to be revised with the Regions to include public and private sector hospitals/health centres and diagnostic posts in remote settlements and mining/logging camps not being included. Stock management also needs to be improved to ensure that health facilities have sufficient unexpired medicines and security stock.

4.2.5. Human Resources for Health (HRH)

In 2010, the MoPH concluded an action plan for strengthening human resources in Guyana for 2011-2016 (20). The Action Plan noted that HRH is challenged by urbanization, high attrition rates and out-migration, vacancies and deficiencies in technical and clinical skills particularly affecting Levels 1 to 3 service facilities, and weaknesses in human resource information systems, management and development. Worker motivation is adversely affected by existing working conditions, including lack of incentives and inadequate infrastructure. These challenges are compounded by the absence of an HR information system to inform decision-making. The MoPH has succeeded in increasing the supply of trained health workers through its health science education program.

Training programs exist under the Georgetown Public Hospital Corporation (GPHC), the University of Guyana and the Cuban government collaboration providing Cuban doctors to offer services in the health sector and training new doctors in Cuba. Notwithstanding, there is a continuing need for improved training methodologies and modalities to safeguard quality and ensure specialist skills are available as needed. Further there is a need for improved leadership and coordination with the Public Service Ministry (PSM) as well as the Ministry of Local Government and Regional Development (MOLGRD) to ensure the timely hiring and retention of HRH (21).

To improve performance and optimal use of malaria personnel, the VCS will continue training relevant staff members on skills needed for their work but based the various strategic objectives. Voluntary collaborators will also be engaged in remote and mining areas to increase access to good quality case management.

4.2.6. Health Financing

There is no national insurance system but there is a mandatory national insurance scheme for state employees aged 16-60 and those self-employed. Public health services are financed by government with support from the donor community. Over the years, the health sector received important increases in allocation from the general national budget and in 2007 received about 10% of the total recurrent government budget. This compares well with other Latin American and Caribbean countries. In 2005, the total Government expenditure in health was US\$34.2 million and per capita expenditure increased over time from US\$45.00 in 2005 to US\$67.00 in 2007. However, this is still much less than many other countries in the western hemisphere (16). Until 2013, the lack of reliable data on health financing largely undermined the capacity for effective health planning. However, the MoPH's recently completed Health Financing Review of 2013 provides a complete review of the health financing structure in Guyana, and a description of the level and trend in key health financing indicators.

In 2008, Total Health Expenditure (THE) was GYD 23.6 billion with public expenditure comprising 54% (12.6 billion), and donor and private sector comprising 34% and 12% respectively. Government funding targeted the overall support of the NHSS 2008-2012 including significant capital investments, predominantly in new hospitals. Development partners also provided significant funding for vertical disease-based programs with the majority going to HIV/AIDS, malaria and tuberculosis. During the period of the NHSS, the level of donor funding decreased at an average rate of 15% per year while public expenditure increased at an average real rate of 6%. At the end of the period, THE stood at GYD 26.9 billion, of which public expenditure comprised 69% and donor and private sector spending comprised 18% and 15% respectively. Private sector spending was notable for being the only source that showed consistent real growth at an average of 4% per year, whereas real public expenditure growth fluctuated between -4.4% and 12.2%, and real growth in donor funding was consistently negative, ranging from -5.4% to -23.4% (8).

Private health insurance demand increased over the period but the National Insurance Scheme saw a decrease in demand for/compliance with their service mandate. Government policy to support decentralization of health

services was supported by an average real growth rate of 14.8% in its allocation to the regions. In the Regions, the average real growth rate of health expenditure per capita varied between 5 and 10%. Out-of-pocket (OOP) expenditure as a proportion of THE remained well below the level of catastrophic health expenditure although household expenditure on health did go up as the amount spent on private insurance deductibles increased. As a proportion of Gross Domestic Product (GDP), the THE fluctuated between 5% and 7%. As a proportion of total government expenditure, General Government Health Expenditure fluctuated around 9.5% (8).

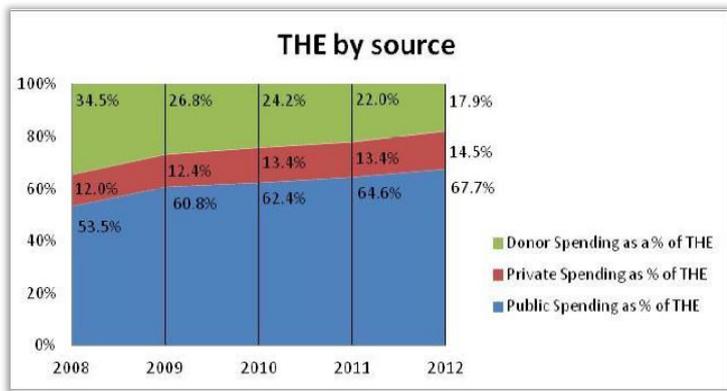


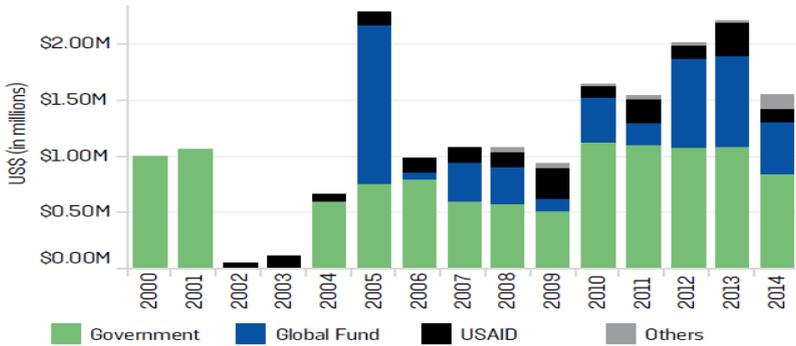
Figure 12: Total Health Expenditure by Source, 2008 - 2012

Funding for malaria

The GoG provides the highest funding for malaria (Figure 9). The Global Fund has provided support since 2005 to Guyana. The AMI/RAVREDA project funded by USAID through PAHO has also supported the country particularly in technical cooperation plan that included the surveillance network for antimalarial resistance monitoring initiatives and has continually provided funding from 2002 to 2015 (22). Since 2015 a new Grant between PAHO and USAID has made it possible for continuous technical support to be provided to Guyana.

The NOMTC will assist the VCS in monitoring available funds and assist in preparing updates on resources contributed by donors, technical partners and others for financing the National Malaria Program Strategic Plan; monitor the activities of implementing partners; identify and report constraints in program implementation; and provide quarterly updates on budget implementation (expenses). The committee has financial and technical partners as members. The establishment of rigorous control structures, technical and financial auditing, the adoption of strict financial management procedures, coordination meetings and regular external supervision will ensure transparent management of allocated resources.

Figure 13: Funding for Malaria in Guyana, 2000-2014



Source: Situation of Malaria in the Americas, PAHO-WHO 2014 (22)

4.2.7. Partnerships and Collaborations for Health

Working collaborations and partnerships with various stakeholder groups and representatives have been organized particularly in addressing key infectious diseases - HIV, TB and Malaria. Inter-sectoral initiatives / collaborations on program development and joint implementation of projects concerning areas of mutual interest have also been convened to streamline overlapping mandates. Current key partners include the Ministries of Education, Agriculture, Local Government and Regional Development, and Amerindian Development. The CCM, which was established under the Global Fund to fight AIDS, Tuberculosis and Malaria, exists as a model from which lessons can be applied to improve the effectiveness of inter-sectoral and multi-stakeholder actions in other issue areas including NCDs. Other mechanisms for inter-sectoral coordination exist but are often inadequately utilized. The Cabinet Subcommittee on Health and the Cabinet Subcommittee on Local Government are for the Ministry of Health to coordinate in ensuring the effective management and implementation of health services. Public-private partnership arrangements have also been developed on a case by case manner to support the delivery of critical and advanced services such as HIV/TB care, open heart surgery, radiation therapy and dialysis.

While there have been some successes with planning and executing multi-stakeholder actions, bureaucratic, political and capacity challenges still impeded the full realization of the potential of collaborations and partnerships in health. There is also need to promote a more effective collaboration with the mining sector in relation to malaria control and elimination. The government is often challenged in taking ownership and leading programs due to overcommitted human and other resources. These experiences can contribute to articulating a more strategic approach to partnerships in health and identifying the principles that should guide such engagements (8).

4.3. Entomological Surveillance and Vector Control

The World Health Organization recommends two main interventions for vector control and personal protection namely Indoor Residual Spraying (IRS) and Long-lasting Insecticidal Nets (LLINs); while larva source management is proposed as a supplementary intervention, not to replace IRS or LLINs. The MoPH has adopted LLINs as the main method of vector control with universal distribution ongoing in endemic communities. But, the MoPH also authorizes the use of larva source management where feasible, and of IRS as part of outbreak response. In the subunit, led by a biologist/entomologist, several vector control technicians are available to support field actions. The entomology laboratory is progressively being equipped and personnel have been trained on basic entomology and vector control all in collaboration with USAID and PAHO. These partners also support with the provision of equipment for entomology and vector control, but capacity building is needed to ensure proper use.

Challenges in the area of Entomological Surveillance and Vector Control

The bionomics of the principal and secondary vector mosquitoes (*An. darlingi* and *An. aquasalis*) as well as susceptibility to insecticides has not been well studied. There is need to set up a framework for entomology and vector control and to support continuous capacity building and institutional strengthening. The program also needs to develop a national IVM strategy based on the NHSS and Regional budgeted operation plans. These plans should take into consideration mobile populations in endemic regions particularly miners and loggers. Human resources in the regions are insufficient. Computerized data and systematic data collection does not exist and there is inadequate communication between vector control actors and the MIS. These basic adjustments are needed to facilitate mobilization of human resources to perform the required vector control and entomology monitoring/surveillance activities, to routinely support planning and decision making.

4.4. Communication including Information, Education and Communication (IEC)

The main strategy in the area of communication has been to promote health seeking behaviors through IEC. The VCS/NMCP has conducted several activities related to IEC including mass media campaigns and street theatres covering the following areas:

- Seeking of early malaria treatment within 48 hours of onset of symptoms at a health facility,
- Personal protection: proper use, maintenance and retention of mosquito nets (LLINs),
- Personal hygiene and sanitation around habitations or dwellings,

These topics have been consistently promoted as the main methods of protecting oneself and families from malaria. Many IEC materials such as gadgets, leaflets, brochures and posters targeting various population groups were developed and disseminated widely. Special emphasis was placed on affected and vulnerable populations in the hinterland regions, including gold and diamond miners, loggers and traders. Annual commemorative events such as **World Malaria Day, Mosquito Week, Malaria Day in the Americas, and local cultural festivals** were used to provide information on malaria and sensitisation to available malaria services at community health posts, diagnostic posts in mining/logging camps and health centers. The outcomes of IEC activities have not measured recently.

Gaps and challenges in the area of Communication

The VCS does not have a communication unit or focal points. The Public Relations department at the MoPH central level provides limited technical assistance to the VCS. However, communication/IEC declined in the last few years.

4.5. Analysis of Strength, Weaknesses, Opportunities and Threats (SWOT)

The SWOT analysis (Table 6) analyses the internal strengths, weaknesses, opportunities and threats that affect the NMCP in one way or the other. The strengths and opportunities present available and potential resources that creates a favorable environment for program implementation.

Strategic Objectives	Strengths	Weaknesses	Opportunities	Threats
Strategic Objective 1: Reinforced technical and program management capacity and coordination among authorities and partners	<ul style="list-style-type: none"> -Interest/commitment by the GoG and MoPH -Significant funding from the GoG -An active Global Fund (GF) grant (R. 1,7, 8,9) -A NMOTC has been set up and functioning -Organized Regional Health Offices (RHOs) with some resources that can be synergized 	<ul style="list-style-type: none"> -Gaps in technical and program management capacities -Sub-optimal coordination between the MoPH-VCS and RHOs -Insufficient regulation of management, diagnosis, treatment, vector control and surveillance/reporting of malaria cases -Strategies for addressing malaria in at risk areas not well defined 	<ul style="list-style-type: none"> -Guyana is eligible for a another GF grant under the new funding model -Some funding from PAHO and partners -Well-functioning health and related programs provide best practices and enabling resources for malaria efforts 	<ul style="list-style-type: none"> -Sustainability of sufficient funding by all sources (local and foreign) -Attrition of key technical staff
Strategic Objective 2: Reinforced malaria surveillance processes, monitoring and evaluation systems	<ul style="list-style-type: none"> -Existence of a Malsys/MIS (Malaria Surveillance System /Malaria Information System) which can be optimized and synergized -GF grant reprogrammed and successfully used to pilot focused malaria efforts and decentralization in Region 8; it included a strong surveillance and M&E component as well as diagnosis, treatment, community case management of malaria (CCMm), IEC and distribution of mosquito nets/LLINs 	<ul style="list-style-type: none"> -Technical and management problems related to the Malsys/MIS affects evidence-based targeting of measures mainly in at risk areas -Limited supervision and M&E of the malaria response at all levels -Operational and systems research not given adequate attention -Surveillance and M&E databases not capturing several important variables needed for planning and key decision making -Tardy reporting, underreporting (41%) and compliance (59%) -Capacity to stratification Regions by locality for better targeting of interventions and rational allocation of limited resources 	<ul style="list-style-type: none"> -Learning from well-functioning disease-specific surveillance systems in the country -The pilot project in Region 8 provides best practices and lessons learned that can guide decentralization and better targeting of interventions in at risk areas -NMOTC has potential to help with M&E and guiding program implementation 	
Strategic Priority 3: Equitable access to good quality and timely malaria case management	<ul style="list-style-type: none"> -Extensive network of public health facilities and CHW nationwide including remote areas -Some capacity to conduct therapeutic efficacy studies and drug resistance monitoring -CCMm framework to work with communities and mining areas to increase access to treatment -Qualified quality control staff at VCS central -Integration of malaria into primary health care 	<ul style="list-style-type: none"> -Limited capacity of RHOs to respond to malaria -Reduced quality control in the Regions and outdated SOPs -Gaps in training of CHW and clinicians on early case detection, treatment guidelines and malaria priorities -Periodic stock-outs of diagnostic and treatment supplies -Limited pharmacovigilance and capacity to respond to drug resistance (updates needed from Cox) -Deficient facilities in remote areas and for mobile populations 	<ul style="list-style-type: none"> -Ongoing guidance and technical support from PAHO and other partners on universal access to early and quality diagnosis and case management including CCMm and community-based surveillance -Integration of malaria in CME and CHW training packages offered by the MoPH 	<ul style="list-style-type: none"> -Limited compliance by the private sector in terms of diagnosis, case management and training of staff
Strategic Priority 4: Reinforced application of IVM/Entomological surveillance	<ul style="list-style-type: none"> -MoPH and GF invests significantly on LLINs -GF grant covers key vector control gaps -Anopheles control integrated with other mosquito control programs at the VCS 	<ul style="list-style-type: none"> -Knowledge gaps on insecticide resistance and vector bionomics -Sub-optimal use of vector control as a tool to fight malaria -Capacity to implement IVM and surveillance at all levels -Limited infrastructure for malaria entomology activities 	<ul style="list-style-type: none"> -New WHO guidelines on IVM is available to guide the Program on vector control -MoPH-VCS and Regions have personnel who can be trained as IVM technicians 	<ul style="list-style-type: none"> -Insecticide resistance -Changing human and mosquito behavior
Strategic Priority 5: Reinforced capacity on IEC and behavior change	<ul style="list-style-type: none"> -Technical support from the Public Relations (PR) Department at the MoPH central -Communication strategy revised, IEC strategy developed and a LLIN campaign plan designed 	<ul style="list-style-type: none"> -Implementation of the revised/enhanced IEC/BCC strategy -Addressing human and related behavioral risk factors -Involvement of civil society and the private sector in scaling up awareness on prevention and treatment programs -Dissemination of targeted information and awareness on preventive methods and services available for malaria 	<ul style="list-style-type: none"> -Well-functioning IEC programs on a many health issues exists in various regions of the country from which the NMCP can learn. -Technical support from PAHO and USAID on the implementation of the revised/new strategies and action plans to sensitize locales 	<ul style="list-style-type: none"> -Sustainability of IEC/BCC programs due to the absence of focal points for malaria communication

Section 5: Guiding Principles and Strategic Framework

5.1. Guiding Principles

Going forward, the successful implementation of the National Malaria Control Program (NMCP) is to be guided by the following set of principles:

- Malaria is preventable and curable,
- Government is determined and committed to aggressive actions to reduce and eliminate malaria, recognizing that the disease contributes significantly to poverty,
- Government believes that success in the fight against malaria depends on a strong public health approach combined with multi-sector partnerships,
- Government and private enterprises recognize that the private sector bears a level of responsibility to cooperate and to facilitate prevention and treatment actions among their workers and the families of workers and people of the communities in which they operate
- Government accepts that while targeted actions could lead to acute reduction of malaria in vulnerable and affected areas, the involvement of local governments and empowered Regional Health and Malaria Programs is essential for sustaining reduction,
- The success of the NMCP is dependent on the interest, support and participation of local communities and NGOs/CBOs who must be involved in the planning, implementation and evaluation of the program,
- Elimination of the human reservoir of *P. falciparum* malaria by providing universal and equitable access to early diagnosis and prompt treatment. This includes DTI-R⁶ / T3 (Test, Treat, Track) model both at facility level and through CCMm,
- Concentrating efforts in reducing malaria transmission in key malaria foci
- Focused efforts on understanding the dynamics of malaria transmission at local levels; this entails basic epidemiological, social, ecological and spatial analysis investigations with technical support from the central level and technical partners like PAHO,
- Malaria prevention is key and, thus, maximum use must be made of high impact vector control interventions and complementary technologies that can reduce human-vector contact,
- Education about malaria through communication and information.
- Good governance and integration of the malaria response with other health priorities,
- Regionalization/decentralization of planning, decision-making and resource management,

⁶ DTI-R (Diagnosis, Treatment, Investigation and Response) is a model designed and promoted by PAHO based on the WHO's T3 (Test, Treat, Track); it presents strategies and activities for increasing universal and equitable access to early diagnosis and case management in health facilities and at community level, case investigation and an integrated response to confirmed cases and communities around them

5.2. Strategic Framework of the National Malaria Strategic Plan 2015-2020

5.2.1. Strategic goal: The strategic goal of the National Malaria Strategic Plan 2015-2020 is to reduce the malaria burden in risk/affected populations leading towards elimination of local transmission. The achievement of the strategic goal is essential in reducing the socio-economic impact of malaria on individuals, families and communities, mitigating the negative contributions of the diseases to poverty and thus, contributing to national development and improved quality of life for people in all affected communities. This aligns with the National Health Sector Strategy 2013-2020 (8) and UN SDG #3(5).

5.2.2. Overall Strategic Objective: The main strategic objective of the National Malaria Strategic Plan 2015-2022 is to further reduce malaria morbidity and mortality in the country by 50% relative to 2014, with initial focus on the elimination of local transmission of *P. falciparum* and to proactively address the evolving challenge of artemisinin resistance in the Guyana Shield. These main objectives will be monitored and measured using the following impact indicators:

- Total number of confirmed malaria cases disaggregated by parasite species; gender; age group; place of infection, and occupation among others, (Target: Reduce malaria morbidity by at least 50% by 2020 relative to 2014),
- Number of annual malaria-attributed deaths, (Target: Reduce malaria-related deaths by at least 75% by 2020 relative to 2014),
- Confirmed malaria cases (microscopy or RDT) per 1000 persons per year⁷: (Target: reduce annual rate to <1 case per 1000 population in Regions 2, 3, 5, and 6 and 1 case per 1000 in Regions 1, 7, 8, 9, 10 by 2020 relative to 2014),
- Malaria test positivity rate⁸ (microscopy + RDTs): Target: Slide positivity rate- SPR of 1-5% by 2020 in Regions 1, 7, 8, 9 and 10,
- Number of regions which are verified as free of local malaria transmission, (Target: 10%)

Other indicators of performance and progress may be examined such as the reduction in transmission dispersion or impact of interruption of transmission (“reduction in active foci”)

5.2.3. Specific Objectives (SO):

- Create space for reinforced malaria program management, coordination and collaboration with authorities and partners in the malaria affected regions; reinforce coordination with the private health care providers; and facilitate strengthening of platforms for the involvement of relevant citizens, groups, the informal sector and economic partners;
- Reinforce the malaria surveillance, data management, and monitoring and evaluation (M&E) system towards enabling the MoPH-VCS and the RHOs to effectively respond to malaria challenges across various levels;

⁷ Confirmed cases during 1 year/population under surveillance) x 1000

⁸ Proportion of blood smears+RDTs found positive for *Plasmodium* among all blood smears+RDTs examined x100

- Promote early (within 48 hours after onset of illness) and reliable diagnosis through the provision of easily accessible diagnostic services to 100% of suspected malaria cases in all affected areas, using appropriate technologies, such as quality assured microscopy and rapid diagnostic tests (RDTs);
- Reduce morbidity and mortality by providing easily accessible and timely treatment (within 48 hours after onset of illness) for all (100% of) persons who are diagnosed with malaria, using the National Treatment Guidelines, based on latest available evidence regarding anti-malarial drug resistance patterns
- Ensure maximum protection from malaria for at least 85% of the affected population through Integrated Vector Management (IVM) which promotes use of appropriate vector control methods (e.g. long lasting insecticidal nets (LLINs), indoor residual spraying (IRS), other environmental and biological measures, etc.);
- Promote behavior changes that reduce risks for malaria transmission and reduce *Anopheles* breeding sites, suspicion of disease, and accessibility to diagnosis and treatment through various interventions, including Information, Education, and Communication (IEC) methods;
- Reinforce implementation of relevant health systems strengthening mandates and policies in malaria efforts; including those that pertain to decentralization / integration of health programs, strengthening of surveillance processes, monitoring, and evaluation, supply chain management, country capacity strengthening, program management, research and innovation, outbreak response, access of vulnerable populations to health services, among others
- Strengthen leadership, governance and accountability at all levels to facilitate regionalization and decentralization of the NMCP, collaboration with all sectors and a structured and organized malaria response,

5.2.4. Priorities: The above main and specific objectives of the Nation Malaria Strategic Plan 2015-2022 will be achieved through **five broad strategic priorities:**

1. Strengthen national and regional capacities in program management; facilitate coordination and collaboration with authorities and partners in the malaria affected regions and with private health care providers and other sectors towards addressing key challenges including those among vulnerable groups / target population (i.e. mobile populations, miners, Amerindians, women and children, etc.) (SO1,7, 8);
2. Reinforce malaria surveillance, monitoring and evaluation systems across all levels to facilitate effective planning and decision-making specifically in addressing challenges among vulnerable groups / target populations (i.e. mobile populations, miners, Amerindians, women and children, etc.) (SO 2 & 7);

3. Strengthen the health services at local level through expansion of the existing network of community health services in order to ensure free early diagnosis and good quality treatment against malaria in the target localities. (SO 3 & 4);
4. Reduce host-vector contact by simultaneously promoting personal protection and reduction of malaria infection and transmission through Integrated Vector Management, (SO 5);
5. Strengthen the process and availability of appropriate IEC information through consultation and development of relevant messages on prevention, reduction, and ultimately elimination of malaria. (SO 6);

To optimize results and promote sustainability of achievements, corresponding focus will likewise be placed on local capacity building, innovative approaches and operational research, in the implementation of activities for all five strategic priorities. The main activities that will help in the achievement of the five strategic priorities are listed in Table 7 and organized by stratum (that is the level of malaria transmission in the 10 Regions).

Table 7: Priority activities by transmission intensity within or in entire Regions

Stratum 1: Zero local transmission /cases)	Stratum 2 ($\leq 1/1000$): Low transmission areas	Stratum 3: High transmission areas	
		SPR 1-5%	SPR >5%
Region 4	Regions 2, 3, 5 and 6	Regions 9 and 10	Regions 1, 7 and 8
T3⁹ for imported cases	T3 including community case management of malaria (CCMm)	T3 including CCMm	T3 including CCMm
Vigilance, alert and early warning systems	Passive and active surveillance	Passive and active surveillance	Passive surveillance
Environmental management	Universal coverage of LLIN in malaria foci (85-100%)	Universal coverage of LLIN in malaria foci (85-100%)	Universal coverage of LLINs (85-100%)
IEC/BCC	IEC/BCC	IEC/BCC	IEC/BCC

5.3. Description of Activities

The activities in Table 6 reflect the future direction of the program and were designed based on the gaps and challenges and SWOT analysis all listed above. They are also based on the policy and strategic orientation, new and emerging epidemiological trends and programmatic developments within the VCS/NMCP and recommendations from PAHO/WHO.

⁹ T3 = Test, treat and track

Strategic Priority 1: Reinforced technical and program management capacity and coordination among authorities and partners at national and regional levels	<p>-Continuously train malaria personnel at all levels in the public sector on technical, managerial, programmatic, coordination and leadership skills</p> <p>-Train key private sector stakeholders on the priorities for malaria for the period 2015-2020 (e.g. mining associations and private medical personnel)</p>	<p>-Conduct accurate inventory of needed capacities so appropriate training and technical support can be planned and implemented</p> <p>-Collaborate with the MoPH and partners to provide opportunities for training on programmatic, technical, leadership and managerial competencies among malaria personnel at all levels of work</p> <p>-Train program managers on the National Strategic Plan (NSP) and how to design operational and micro plans based on the NSP</p> <p>-Conduct workshops on the operations manual for malaria and the management of CCMm programs involving all sectors at all levels</p>	<p>-Percentage of malaria personnel trained at least once on their malaria-specific responsibilities during the past year; disaggregated into public and private sectors (Baseline = not available; Target = 50%)</p> <p>-Training and workshop reports including evaluations by participants</p>
	<p>-Facilitate joint and coordinated planning at all levels of work with relevant stakeholders and collaborating agencies</p>	<p>-Update the operational manual for malaria control and elimination</p> <p>-Continuously revitalize the NMOTC as a mechanism for joint planning, coordination, implementation and M&E of interventions</p> <p>-Assist RHOs to develop operational /micro plans and supervision and M&E schemes and tools based on the NSP 2015-2020</p> <p>-Collaborate with the private, NGO and informal sectors and engage local communities to facilitate universal coverage and equitable access to early diagnosis and case management at facility and community levels (CCMm using the DTI-R/T3 model)</p>	<p>-Reports on NMOTC activities</p> <p>-Percentage of biannual operational plans developed by RHOs validated by the VCS central (Baseline = 0%; Target = 100%);</p> <p>-Percentage of RHOs with approved annual or quarterly plans (Baseline = 0%; Target = 100%)</p> <p>-Operational manual to guide malaria program implementation at all levels</p>
	<p>-Facilitate joint and coordinated implementation across all levels of work and among relevant stakeholders and collaborating agencies</p>	<p>-Strengthen the integration of the malaria program into the primary health care system in terms of service delivery and training</p> <p>-Liaise with other health programs such as maternal and child health to foster integrated management of malaria/health</p> <p>-Mobilize resources to ensure availability of resources to facilitate implementation, field supervision, quality control and M&E</p> <p>-Enforce via RHOs adherence to diagnosis and treatment guidelines</p>	<p>-Percentage of annual and monthly Implementation reports from RHOs shared with the VCS (Baseline = 0%; Target = 100%)</p>

	<p>development partners, the donor community, private medical practitioners, miners, loggers, the tourism industry and other related sectors in addressing malaria challenges</p>	<p>linkages with private medical practitioners particularly in reinforcing capacities for and adherence to national guidelines for malaria diagnosis, treatment, case tracking/follow-up and reporting</p> <ul style="list-style-type: none"> -Optimize the use of malaria advocacy platforms such Malaria Day in the Americas to mobilize financial and material resources and promote implementation of malaria priorities by all sectors -Collaborate and engage the private and informal sectors in CCMm efforts integrated with surveillance, IEC and LLINs distribution (the DTI-R/T3 model) to address malaria in vulnerable populations 	<p>shared with VCS by private sector associations /institutions (Baseline = 0%; Target = 100%)</p> <ul style="list-style-type: none"> - Proportion of private clinical health facility reports received over the reports expected during the reporting period (Baseline = data not available; Target = 100%)
	<p>-Facilitate optimal coordination with Guyana Shield countries in terms of addressing malaria challenges in the border areas and across countries</p>	<p>-Sustain engagement of the country in important malaria networks (i.e. AMI/RAVREDA, Guyana Shield Countries- Brazil, Venezuela and Surinam, etc.) to manage border malaria and drug resistance</p>	<p>Percentage compliance to recommendations in the Framework for Artemisinin Resistance Prevention, Containment and Elimination in South America (3) (Baseline = 50%; Target = 100%)</p>
	<p>-Identify and bridge knowledge and operational gaps pertaining to program management, governance and coordination</p>	<ul style="list-style-type: none"> -Organize quarterly coordination and M&E meetings at national and Regional levels to assess performance, progress, gaps and challenges in implementation and ways to improve -Monitor the strategic direction of the implementation of the national strategic plan; detect and correct undesirable trends and distortions in implementation while ensuring it aligns with NHSS -Assess the role and engagement of private sector and localities 	<ul style="list-style-type: none"> -Reports from coordination and M&E meetings and field visits -M&E reports (monthly, quarterly and annual)
	<p>-Mobilize local and foreign resources to in partnership with partners/stakeholders</p>	<p>-Mobilize human and financial resources to ensure sufficient funding for decentralization and for implementation and research gaps</p>	<p>-Reports on advocacy and mobilization activities at VCS-central</p>
	<p>-Facilitate decentralization of the NMCP based on the pilot experience in Region 8</p>	<p>-Scale-up malaria control including CCMm in Regions 1,7, 8, 9, 10 and reorient efforts towards elimination in Regions 2, 3, 4, 5, & 6</p>	<ul style="list-style-type: none"> -RHO Implementation plans -M&E, progress and performance reports

Strategic Priorities	Strategic Objectives	Strategic Approaches / Activities	Indicators
Strategic Objective 2: Reinforced malaria surveillance, monitoring and evaluation systems	-Provide continuous training of public and private sector personnel in surveillance and M&E systems including required data and indicators at all levels	-Train clinicians, CHW, MIS and M&E staff on daily malaria case registers/forms, production forms and M&E platforms to close gaps in compliance (completeness, timeliness, underreporting, legibility, etc.) -Improve weekly data analysis at RHOs and health facilities and utilization for planning, decision-making and early detection peaks and outbreaks -Build capacity of RHO and CHW on community-based surveillance -Increase capacity of the MIS unit for data analysis, stratification and risk mapping; and application of relevant software	-Percentage of clinical, MIS and M&E personnel trained on their job related responsibilities during the last year (Baseline=80%; Target=100%) -Number of CHW trained on community-based surveillance (a component of CCMm)
	Develop a supervision scheme and M&E framework both with tools for field visits and indicators	-Conduct monthly and quarterly supervisory and M&E visits as follows: Visits from central level to RHOs and health facilities and from RHOs to health facilities; all visits must involve technical persons from RHO	-Monthly and quarterly supervision and M&E reports
	-Facilitate systematic routine malaria data collection, analysis, dissemination and utilization for planning and decision-making at all levels of work	-Develop an operational manual and guidelines for surveillance including outbreak preparedness and response -Update and disseminate all data collection and reporting forms to capture all required data; includes a zero weekly reporting from the local through regional to central level (zero cases and inactivity are reported as such) -Enforce use standard national reporting forms in all sectors and integrate the private sector into the MIS (to capture cases from all sectors) -Strengthen the capacity of the MIS and M&E units by offering appropriate updated tools (computers, software, internet, phone cards, etc.) -Establish a data feedback mechanism with all reporting sites -Maintain weekly data analysis at health facilities, RHOs and at national level and production of a weekly or monthly malaria bulletins -Set up an alert and early warning systems to facilitate rapid reporting and response to malaria peaks and outbreaks at each level of the MIS	-Number of regions consistently reporting data to the MoPH-VCS (as required including impact indicators listed in the NSP) (Baseline = 0; Target = 10) -Proportion of complete public sector health facilities reports received during the reporting period (Baseline = 57.8%; Target = 100%); -Proportion of private sector health facility reports received during the reporting period (Baseline = N/A; Target = 100%) -Percentage of mining/logging camps

	<ul style="list-style-type: none"> utilization to assess gaps/challenges, progress and performance -Mandate reporting of all positive malaria cases and M&E indicators into the MIS using standardized surveillance forms and M&E platforms -Strengthen and scale-up the network of CHW and diagnostic posts in mining/logging areas to improve surveillance among mobile populations 	reporting to the VCS as requested during the reporting period (Baseline = 0%, Target = 100%)
Identify and bridge knowledge and operational gaps in surveillance, M&E	<ul style="list-style-type: none"> -Collaborate in designing, implementing and disseminating results of special surveillance related studies among targeted groups -Study and understand the complex transmission dynamics of malaria and how it relates to geographic factors, /seasons, population movements, limited access and fluctuations in gold prices, etc. in endemic Regions -Conduct epidemiological assessments or investigations to understand why malaria cases increased in 2017 from 2016 	-Study or survey results
Scale-up and improve community-based surveillance with CHW/volunteers in remote areas	<ul style="list-style-type: none"> -Train CHW on complete data collection, compilation and timely reporting of all required variables using appropriate tools -Train CHW on all variables needed for supervision and M&E purposes 	No. of health posts set up in remote areas without health facilities
Conduct case and foci investigations	<ul style="list-style-type: none"> -Carry out case investigations in very low to zero transmission settings (<1 malaria case per 1000 population) where cases were detected -Conduct active surveillance based on criteria and foci investigations in very low transmission areas, where feasible 	<ul style="list-style-type: none"> -Percentage of cases investigated (Baseline = 0; Target = 100%) -Reports on active case detection and foci investigations

<p>Universal and Equitable access to quality assured diagnosis, proper treatment, case tracking and follow-up</p>	<p>relevant personnel in the public and private sector on malaria diagnosis, case management and supervision at all levels of work</p>	<p>coordinate and regulate service delivery including passive and active case detection, treatment and rechecking of treated cases</p> <ul style="list-style-type: none"> -Design a training and supervision scheme to maintain capacity for quality assurance at national and regional levels -Work with the private sector to trained staff to diagnose, treat and report malaria using national guidelines and tools -Integrate malaria in the MoPH training package for CHW -Train health workers (clinicians, CHW and volunteers in mining /logging areas) on diagnostic and the new treatment guidelines 	<p>and algorithms (Baseline =N/A; Target = 100%)</p> <ul style="list-style-type: none"> -Percentage of lab technicians trained on quality assurance (Baseline = N/A; Target = 100%) -Percentage of CHW/volunteers trained on RDTs and related algorithms in mining/logging/remote areas (Baseline = N/A; Target = 100%) -Proportion of health workers trained on treatment (Baseline = N/A; Target = 100%)
	<p>Facilitate universal access to good quality confirmatory diagnosis of malaria in health facilities and among vulnerable populations in hard-to-reach communities</p>	<ul style="list-style-type: none"> -Update SOPs and diagnostic algorithms to guide diagnostic testing by microscopy and RDT at all levels of work -Promote microscopy in health facilities and RDT through CCMm in remote areas with limited capacity for microscopy -Participate in training and certification by PAHO and partners to improve national capacity for microscopy and quality assurance -Decentralize quality assurance (QA) by setting up regional reference labs, QA and feedback mechanisms to all labs -Enforce monthly submission of 100% positive slides and 10% negative slides by all microscopists to reference laboratories for quality control; includes direct and indirect quality assurance -Maintain a pool of national and regional quality control inspectors to assess the effectiveness of diagnostic procedures in the Regions (includes supervision, monitoring and evaluation) -Set up a quality control program for RDTs 	<ul style="list-style-type: none"> -Number of confirmed malaria cases (Microscopy plus RDT) (Baseline = 19,005 based on estimated cases, not actual; Target: 50% reduction) -Proportion of confirmed malaria cases that receive a parasitological test at public sector health facilities (Baseline = 100%; Target = 100%) -Proportion of confirmed malaria cases that receive a parasitological test outside the public health system (Baseline = N/A; Target = 100%) -Proportion of treated malaria cases that were confirmed by RDTs in mining/logging areas (Baseline = N/A; Target = 100%) -Proportion of health posts/diagnostic laboratories participating in the national quality assurance programs (Baseline = N/A, Target: 100%)

	<p>prompt, appropriate, and good quality treatment among confirmed malaria patients; and</p> <ul style="list-style-type: none"> -Strengthen the foundation for malaria case management in elimination and prevention of re-establishment of local transmission settings 	<p>treatment of <i>P. falciparum</i>, <i>P. vivax</i> and <i>P. malariae</i> cases, mixed infections, and rechecked / relapsed cases</p> <ul style="list-style-type: none"> -Strengthen the referrals system especially for pregnant women, infants/children below 6 months old and severe cases) -Conduct training workshops for public and private sector health facilities on the new treatment guidelines across the country, with focus on mixed infections and primaquine for <i>P. falciparum</i> -Ensure refresher courses for clinicians and CHW on dispensing drugs and in the use of the new treatment protocols and guidelines -Enforce adherence to national treatment guidelines for all (100% of) confirmed cases in the private and public sectors 	<p>first-line antimalarial treatment according to national policy at public sector health facilities (Baseline = 19.7%; Target = 100%);</p> <ul style="list-style-type: none"> -Proportion of confirmed malaria cases that received first-line antimalarial treatment according to national policy at private clinics and facilities (Baseline = data not available; Target = 100%) -Proportion of inpatient malaria deaths (Baseline = 11; Target = 0)
	<p>Promote identification and bridging of key knowledge and operational gaps pertaining to malaria case management</p>	<ul style="list-style-type: none"> -Conduct a survey to evaluate the availability of personnel, qualified personnel in microscopy , microscopes and diagnostic kits for microscopy across the endemic regions -Conduct therapeutic efficacy studies and antimalarial drug resistance monitoring (using PAHO/WHO guidelines) -Reinforce pharmacovigilance efforts on antimalarials; and response capacities for potential development of drug resistance 	<ul style="list-style-type: none"> -Study and evaluation reports -Results of therapeutic efficacy and pharmacovigilance studies
	<ul style="list-style-type: none"> -Strengthen and extend community case management of malaria (CCMm) to other localities and mining /logging areas -Facilitate planning, implementation and evaluation of 	<ul style="list-style-type: none"> -Progressively scale up CCMm implemented by CHW and voluntary collaborators, extending it to remote and mining /logging areas with current or historically high malaria transmission and where access to health facilities is limited -Conduct assessments of localities targeted for CCMm (characterization of the area, understanding the local malaria transmission dynamics, identification of gaps/challenges in the 	<ul style="list-style-type: none"> -Number of CHW and community volunteers trained on CCMm, (Baseline = N/A) -Number of CCMm programs

	<p>supervision of CHW and voluntary collaborators</p>	<ul style="list-style-type: none"> -Strategically position health posts with microscopy or RDTs at points where mobile populations traverse regularly -Design supportive supervision schemes with indicators that will systematically monitor compliance of CCMm guidelines as well as national guidelines for diagnosis, treatment and reporting 	
	<p>Facilitate the consistent availability of malaria commodities and diagnostic and treatment guidelines in all health facilities</p>	<ul style="list-style-type: none"> -Build capacity for proper stock management: quantification, basic forecasting, security stock and accountability/reporting at national, and Regional levels and at all points of care -Train and provide guidelines to health workers in remote areas on basic inventory management for malaria commodities -Guarantee continuous availability of reliable, unexpired diagnostic and treatment supplies and prevention of stock outs through strengthened supply chain management -Disseminate diagnostic algorithms and treatment guidelines to all health personnel and CHW/voluntary collaborators; ensuring that all consultation rooms and health posts each has copies. -Develop a robust system for the distribution of all malaria consumables integrated with QA and supervision processes. -Conduct trainings on Logistics Management systems 	<p>Proportion of health facilities without stock-outs of key commodities during the reporting period (Baseline = data not available; Target = 100%)</p>

Strategic Priority 4: Reinforced implementation of Integrated Vector Management (IVM)	-Institutional strengthening	-Streamline the Malaria Entomology and Vector Control unit -Design an IVM strategy and an insecticide resistance (IR) monitoring and management plan following WHO guidelines -Collaborate with other vector-borne disease programs to optimize the use of vector control as another tool to fight against malaria	-IVM and IR monitoring strategy and plan -Number of Regional Health Departments that are implementing IVM based on PAHO/WHO guidelines. (Baseline = 0; Target = 10)
	-Facilitate continuing capacity building on competencies relevant to IVM among at all levels of work	-Train national and regional health department technicians on IVM -Build technical capacity for entomological surveillance and data analysis for evidence-based planning and decision-making	-Number of technicians trained -Number of cadres trained on entomology and vector control
	-Optimize the distribution and use of LLINs in malaria affected communities	-Design and implement LLINs distribution and post-distribution plans targeting at least 85% coverage of the target population; -Carry out mass distribution of LLINs in high transmission areas and in malaria foci in moderate to low transmission areas	-Percentage of the target population that slept under a LLIN the previous night (Baseline = 79%*; Target = 85%) -Percentage of the target population reporting ownership of at least one LLIN (Baseline = not available, Target: 85%)
	Optimize the application of other evidence-based and well-targeted vector control modalities through IVM	-Employ larviciding (where feasible) only as a supplement to LLINs -Employ IRS during emergency situations -Promote new technologies recommended by PAHO-WHO	-Activity /response reports
	Reinforce entomological surveillance	-Set up and maintain a national insectary and entomology laboratory	-Reports on entomological surveys and studies
	Promote identification and bridging of key knowledge and operational gaps and data management, sharing and utilization pertaining to IVM	-Conduct periodic insecticide resistance studies -Study and update the ecology and behavior of vector mosquitoes -Develop and integrate an entomology and vector control database and data collection, analysis and reporting systems into the MIS -Monitoring coverage, quality and impact of vector control measures	-No. of Regions doing insecticide resistance monitoring (Baseline = 0; Target = 5)

*Baseline data is actually for Percentage of children under age five who the previous night slept under a mosquito net

Strategic Priority 5: Reinforced capacity on IEC (Information, Education, and Communication) and promote behavior change	<ul style="list-style-type: none"> -Strengthen understanding of malaria and its challenges among vulnerable populations, decision makers and program implementers -Facilitate behavior change especially among vulnerable and affected populations, 	<ul style="list-style-type: none"> -Design culturally-appropriate BCC approaches and tailored messages to guide human behaviors towards the reduction of risk and prevention from malaria, -Reinforce engagement of civil society, CHW, mass media, local channels, e.g. Churches and the private sector in scaling up awareness on malaria prevention and treatment programs including CCMm services -Use Malaria Day, Malaria Week and similar events to increase awareness on malaria prevention and services -Promote seeking of early clinical care, adherence to treatment and follow-up appointments, avoidance of self-medication and retention and proper use of LLINs -Design special messages and behavior change tactics for mobile populations in Regions 1, 7, 8 and 9 	<ul style="list-style-type: none"> -Percentage of persons in at risk areas reached by IEC on LLINs (Baseline = N/A; Target: >85%); -Percentage of the population who cited at least two (2) methods of personal protection (Baseline: not available, Target: 85%) -No. of Regions observing the commemoration of Malaria Day / Week (Baseline = 4; Target = 10) -Percentage of cases who sought treatment <48 hours after the onset of symptoms (Baseline = 50%; Target = 100%)
	<ul style="list-style-type: none"> -Facilitate training on communication for CHW, clinicians, health managers and communities 	<ul style="list-style-type: none"> -Conduct trainings on IEC, BCC and IPC related to personal protection and seeking clinical care early -Train Toshaos/local leaders on community-level advocacy to support all IEC/BCC efforts 	<ul style="list-style-type: none"> -Percentage of health personnel trained on IEC, BCC and IPC (Baseline = N/A, Target: 85%)
	<ul style="list-style-type: none"> Promote identification and bridging of key knowledge and operational gaps pertaining to on IEC, BCC and IPC among others 	<ul style="list-style-type: none"> -Conduct qualitative surveys (e.g. KAP) to identify barriers to personal protection and access to treatment (includes socio-cultural factors and knowledge gaps); -Assess the rate of use and retention of of LLINs -Assess early treatment seeking behaviors 	<ul style="list-style-type: none"> -Study results

N/A=not available BCC=Behavior change communication IPC=Interpersonal communication

Section 6: Monitoring and Evaluation

The monitoring and assessment of the National Malaria Program Strategic Plan will be linked and aligned with the country's MIS. In this regard, progress reports will be developed based on information available at the end of each year or in shorter durations (e.g. by semester, quarterly, monthly, or weekly) as deemed operationally feasible and appropriate. With a view to determine strengths and weaknesses of the overall implementation, causal factors of successes and failures, and future actions, an end of period evaluation will be conducted. Baseline and targets for the indicators outlined as strategic targets and priorities are subject to agreement between stakeholders, using the MIS as an important reference. The MoPH-VCS, with support from PAHO, will also engage actively in monitoring important indicators which are included in the WHO World Malaria Report and as recommended in the WHO Malaria Surveillance Guidelines

M&E will also be decentralized and will use a unique channel for information sharing and communication within the MoPH and with technical partners and the private sector. The framework is standardized, based on indicators in the National Malaria Strategic Plan agreed upon by the MoPH and all stakeholders and integrates data from all sectors. The indicators will be collected using routine data collection systems such as the entomological surveillance systems, MIS, surveys (e.g. KAP) and regular reports on day-to-day activities. Targets for the National Malaria Strategic Plan are set on an annual basis and are not cumulative.

Operational research: Overall, operational and systems research generates information that can be used as indicators of the level of performance and progress made health programs such as the NMCP. It also generates evidence that guides planning and decision-making. Some operation research priorities are:

- **Management:** Implementation research with a focus on decentralization of the NMCP
- **Treatment:** Therapeutic efficacy and drug resistance studies, i.e. drug efficacy monitoring and pharmacovigilance of optimal treatment outcomes for all malaria patients.
- **Diagnosis:** Continuous research on sensitivity and specificity of RDTs recommended by the MoPH and quality of microscopy at operational level
- **Entomology (Anopheles spp that transmit malaria):** The bionomics (biology and ecology) of *Anopheles darling* and *An. aquasalis*; Seasonal prevalence and density (adult and larval) of *Anopheles*; Geographic distribution and mapping of *Anopheles*; Insecticide resistance; and Residual effectiveness of insecticides in of the LLIN
- **Vector Control:** Pilot implementation and evaluation of vector control interventions including appropriate new but complementary technologies; and Evaluation of efficacy and impact of routine vector control interventions.
- **Human Behavioral research:** Retention, use and maintenance of LLINs by the population; and Health seeking behavior related to KAP (Knowledge, Attitudes and Practices) studies.

Table 9: Performance framework for the National Malaria Strategic Plan

Indicator	Baseline (2014)	Data Source	2018	2019	2020
Strategic Priority 1: Reinforced technical and program management capacity and coordination among authorities and partners at all levels					
Percentage of malaria personnel trained on at least once on topics relevant to their work	N/A	Training reports	40%	50%	50%
Percentage of RHOs with biannual malaria work plans validated by VCS-MoPH central	0	Validated plans	100%	100%	100%
Percentage of RHOs with quarterly/annual work plans validated by VCS-MoPH central	N/A	Validated plans	100%	100%	100%
Percentage of RHOs who submitted quarterly/annual reports to the VCS-MoPH central	N/A	Submitted reports	100%	100%	100%
Proportion of private sector personnel trained on NSP and malaria priorities	N/A	MIS	30%	50%	50%
Strategic Priority 2: Reinforced malaria surveillance, monitoring and evaluation systems					
¹⁰ Percentage of clinical, MIS, M&E and CHW trained in their job responsibilities	N/A	Training records	40%	50%	80%
Number of RHOs who submitted required supervision and M&E reports to VCS-MoPH	N/A	MIS /M&E	10	10	10
Proportion of public health facility reports received over the reports expected	57.8	MIS /M&E	80%	100%	100%
Proportion of private health facility reports received over the reports expected	0	MIS /M&E	50%	80%	100%
Proportion of mining camps and areas with CCMm activities reporting to VCS-MoPH	N/A	MIS/M&E	100%	100%	100%
Number of M&E officers and related staff trained on data collection and management	Not available	Training report	4	10	10
Strategic Priority 3: Equitable access to good quality and timely malaria case management					
Number of malaria cases confirmed and treated in the country	19,005 (est.)	MIS	12,470	11,225	10,100
Proportion of confirmed cases that received a parasitological test in the private sector	50%	MIS/M&E data	60%	75%	100%
Proportion of confirmed cases that received a parasitological test in the public sector	100%	MIS/M&E data	100%	100%	100%
Proportion of confirmed malaria cases that received first-line antimalarial treatment according to national policy at public sector and private sector health facilities	19.7	MIS/M&E data	80%	90%	100%

¹⁰ Should be disaggregated into public and private sectors

Proportion of confirmed malaria cases that received first-line antimalarial treatment according to national policy at public sector and private sector health facilities	N/A	MIS/M&E data	80%	90%	100%
Proportion of health facilities without stock-outs of key commodities	N/A	M&E reports	60%	90%	100%
Percentage of confirmed cases fully investigated (in elimination settings)	N/A	MIS reports	25%	60%	100%
Percentage of microscopists/CHW trained on microscopy/RDT for malaria	N/A	Training reports	30%	50%	50%
Number of lab technicians trained on quality assurance nationwide	N/A	Training reports	10	10	15
Proportion of health posts/laboratories participating in the quality assurance programs	N/A	Quality assurance	50%	80%	100%
Percentage of malaria cadres and health providers trained on treatment guidelines	50%	Training reports	50%	60%	100%
Strategic Priority 4: Reinforced implementation of Integrated Vector Management (IVM)					
Percentage of population that slept under an insecticide-treated net the previous night	79% ¹¹	Survey reports	50%	60%	85%
Number of Regional Health Offices implementing IVM based on PAHO guidelines	0	M&E reports	2	5	10
Number of Regional Health Offices monitoring insecticide resistance	0	M&E reports	2	4	4
Percentage of targeted households/population reporting ownership of at least one LLIN	N/A	Survey reports	60%	85%	85%
Strategic Priority 5: Reinforced capacity on Information, Education, and Communication and promote behavior change					
Percentage of persons in at risk areas reached by IEC messages on LLINs (personal protection) and seeking treatment early, within 48 hours of onset of malaria symptoms	N/A	M&E, IEC/LLIN campaign reports	50%	85%	85%
Percentage of the population who cited 2+ methods of personal protection	N/A	Survey reports	50%	70%	85%
Percentage of public and private health personnel trained on IEC	N/A	Training reports	20%	60%	85%
Number of endemic regions observing the commemoration of Malaria Day / Week	N/A	M&E reports	4	4	4

N/A = Not available

¹¹ Based on rates among persons <5 only

Section 7: Financial Investments and Gap Analysis

The Government of Guyana continues to incur increasing levels of spending on malaria. Spending is incurred across several levels and over different government agencies. This is further explained in details below. At the level of the MoPH, allocation of government funds is done primarily through the Disease Control budget, under Vector Control Services. Direct Malaria Program spending through Disease Control was US\$305,000 in 2011, US\$379,000 in 2012 and was not expected to be less than US\$415000 in 2013. The funds are primarily allocated to human resources, drugs, training, prevention, care, treatment, and transport. It should be noted that Government has placed significant emphasis on decentralization over the past 5 years with greater ownership at the regional levels through the Regional Health Authorities. As such, a significant portion of the Regions' allocation to health is focused on malaria. Health facilities inclusive of health posts and health centers in the regions provide malaria services to patients/target population ranging from prevention efforts to clinical management that include services from the multidisciplinary team which carries out clinical laboratory services (diagnosis, preparation of smears, and other laboratory services). The regional health services also provide inpatient services to all malaria-infected persons requiring same.

In addition, the Ministry of Public Health through its Health Promotion, and Epidemiology Programs, supports the implementation of malaria interventions through prevention education, training, monitoring and evaluation and surveillance activities. The Ministry's Materials Management Unit deals with a significant portion of procurement functions relating to the Program. The Health Planning Unit, MIS Unit, Budget, Finance, Accounts & Audit Department take on strategic planning, information management and fiduciary roles in the implementation of the national program. Other Government Ministries in the public sector contribute to the National Malaria Control Programme through logistical and compliance support depending on their respective reach:

- a. Ministry of Education (teachers, in-school youths in the malaria-affected regions)
- b. Ministry of Amerindian Affairs (Amerindians in hinterland communities)
- c. Ministry of Local Government and Regional Development (Logistical and Compliance Efforts)
- d. Ministry of Natural Resources and Environment

It should also be noted that a significant amount of semi-autonomous agencies contribute to the National Malaria Program. Like the Ministries, much of support is in the form of logistics and ensuring compliance. These agencies include: a) Guyana Geology and Mines Commission, and b) Guyana Forestry Commission. The National Malaria Program depends on these agencies to help in logistics in terms of transporting staff to the targeted mining and logging camps for example. In addition, these agencies assist in ensuring all persons are tested for Malaria. They also provide the program with critical information including possible outbreaks as well as new mining camps that may not be known to the Program. The malaria funding needs

and budget of the country has been estimated based on the information, analysis and framework presented in the NMSP 2015-2020; and is presented accordingly in Table 4.

Table 4: Overview of the National Malaria Funding Needs and Budget

National Malaria Program Budget, 2015-2020 (by Strategic Priority / Lines of Action)							
	2015	2016	2017	2018	2019	2 020	Total
Strategic Priority 1: Strengthen country capacity in facilitating coordination with authorities and partners in the malaria affected regions; with private health care providers and other sectors towards addressing key challenges including those among vulnerable groups / target population	\$ 375,305.00	\$ 202,571.00	\$ 393,402.00	\$ 188,618.00	\$ 293,358.00	\$ 420,582.00	\$ 1,873,836.00
Strategic Priority 2: Reinforce the malaria surveillance, monitoring and evaluation systems across all levels to facilitate effective planning and decision-making	\$ 12,327.00	\$ 12,327.00	\$ 12,327.00	\$ 12,327.00	\$ 12,327.00	\$ 12,327.00	\$ 73,962.00
Strategic Priority 3: Strengthen the health services at local level through reactivation and expansion of the existing network of community health services in order to ensure early diagnosis and correct treatment against malaria in the target localities	\$1,483,127.00	\$1,187,060.00	\$ 1,259,934.00	\$ 1,638,877.00	\$1,389,197.00	\$ 1,480,692.00	\$ 8,438,887.00
Strategic Priority 4: Reduce host / vector contact by simultaneously promoting protection and reduction of malaria infection and transmission through Integrated Vector Management	\$ 435,116.00	\$ 454,451.00	\$ 431,649.00	\$ 339,740.00	\$ 422,427.00	\$ 523,774.00	\$ 2,607,157.00
Strategic Priority 5: Strengthen the process and availability of appropriate IEC information through consultation and development of relevant messages on prevention, reduction, and ultimately elimination of malaria	\$ 764,894.00	\$ 809,736.00	\$ 900,563.00	\$ 938,837.00	\$ 996,415.00	\$ 1,012,374.00	\$ 5,422,819.00
Grand Total	\$3,070,769.00	\$2,666,145.00	\$ 2,997,875.00	\$ 3,118,399.00	\$3,113,724.00	\$ 3,449,749.00	\$ 18,416,661.00

Section 8: Implementation and Management

The Minister of Public Health is the overall coordinator of malaria prevention and response. The VCS is the technical body of the MoPH responsible for the Ministry's response and for the coordination, governance and technical oversight of the implementation of the National Malaria Program Strategic Plan. The VCS, through the NMCP, provides technical assistance and guidance to other implementing agencies, line ministries and units at the central level with support from the NMOTC and CCM. The MoPH granted authority and legitimacy to the VCS to define, redefine priorities and help mobilize resources for the NMCP.

The RHOs have the shared responsibility of implementing the malaria response and activities with VCS in their respective Regions. In terms of field operations, public and private health facilities, CHW and civil society will take the lead in day-to-day implementation of the malaria response. The organogram of the VCS and a representation of the relationship of responsibilities and accountabilities across the VCS and Regional Health Departments are presented in Annex 1A and 1B respectively. It shows the main actors involved in the implementation of the National Malaria Program Strategic plan including the VCS/NMCP, National Reference Laboratory, Directorate of Epidemiology/Surveillance and Entomology and other ministries, Regional Malaria Programs under the supervision of Regional Health Departments, implementing NGOs and PAHO.

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