

STRATEGIC PLAN FOR ELIMINATION OF MALARIA AND PREVENTION OF RE-INTRODUCTION IN BHUTAN 2020-2025

Vector-borne Diseases Control programme

Department of Public Health

Ministry of Health

Royal Government of Bhutan

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Acronyms

ACD	Active Case Detection
ACT	Artemisinin Combination Treatment
ADHO	Assistant District Health Officer
API	Annual Parasitic Index
APMEN	Asia Pacific Malaria Elimination Network
AV	Audio-Visual
BBS	Bhutan Broadcasting Service
BCC	Behavioral Change Communication
BHU	Basic Health Unit
BMHC	Bhutan Medical and Health Council
CAG	Community Action Group
CCM	Country Coordinating Mechanism
CMR	Crude Mortality Rate
DBS	Dried Blood Spot
DHO	District Health Officer
DMS	Department of Medical Services
DMS	District Malaria Supervisor
DoMSHI	Department of Medical Supplies and Health Infrastructure
DOTS	Directly Observed Treatment Strategy
DRA	Drug Regulatory Authority
DT	Dzongkhag Tshogdu
EIA	Environmental Impact Assessment
EMTD	Essential Medical and Technology Division
GDP	Gross Domestic Product
GF	Global Fund
GFATM	Global Fund for AIDS, Tuberculosis and Malaria
GIS	Geographical Information System
GMP	Global Malaria Program
GNHC	Gross National Happiness Commission
GPS	Geographical Positioning System
GR	Geographical Reconnaissance
GT	Gewog Tshogdu
HIA	Health Impact Assessment
HPD	Health Promotion Division
IEC	Information, Education and Communication
IMR	Infant mortality Rate
IRS	Insecticide Residual Spray
IT	Information Technology
IVM	Integrated Vector Management
KAP	Knowledge, Attitude and Knowledge
KGUMSB	Khesar Gyalpo University of Medical Sciences of Bhutan
LAMP	Loop mediated isothermal amplification
LLIN	Long Lasting Insecticide Net
MFA	Ministry of Foreign Affairs
MIS	Malaria Indicator Survey
MMR	Maternal Mortality Rate

MOH	Ministry of Health
MoHCA	Ministry of Home and Cultural Affairs
MP	Malaria Parasite
MT	Malaria Technician
NCDE	National Committee for Disease Elimination
NCHM	National
NEQAS	National External Quality Assurance System
NEWARS	National Early Warning, Alerts and Response System
NMRL	National Malaria Reference Laboratory
NSB	National Statistical Bureau
OR	Operational Research
PACD	Proactive Case Detection
PCR	Polymerase Chain Reaction
PF	Plasmodium Falciparum
PV	Plasmodium Vivax
QA	Quality Assurance
QC	Quality Control
QGIS	Quantum Geographical Information System
RCDC	ROYAL Centre for Disease Control
RDT	Rapid Diagnostic Test
SAARC	South Asian Association for Regional Cooperation
SEARO	South East Asia Regional Office
SOP	Standard Operating Procedure
TAG	Technical Advisory Group
TAGME	Technical Advisory Group for Malaria Elimination
TOR	Terms of Reference
TV	Television
TVET	Technical and Vocational Education and Training
UN	United Nation
VDCP	Vector Borne Disease Control Program
VHW	Village Health Workers
WHA	World Health Assembly
WHO	World Health Organization
WHOPES	World Health Organization Pesticide Evaluation Scheme

Executive summary

A remarkable progress has been made against malaria since the establishment of malaria control program in the country in 1960s. The incidence of malaria and deaths both have decreased drastically over the last few decades; from the historic high of 39,852 cases and 62 deaths in 1994, the malaria incidence was brought down to just six indigenous cases 2018 and two in 2019. This strategic plan presents a roadmap to eliminate indigenous malaria transmission and prevent re-introduction in Bhutan through focus on targeted implementation of preventive interventions, strengthening of technical and managerial capacity of the program, strengthening to develop robust case-based malaria surveillance and response system, and continued provision of quality-assured early diagnosis and treatment. It aims to create an enabling environment for smooth implementation of strategic approaches to malaria elimination through 1) Multi-sectors approach and community ownership to malaria elimination; 2) Strengthening partnerships and collaboration; 3) Integrating malaria elimination activities in health systems; 4) Advocating for national commitment and sustainable elimination program. This revised plan intends to build on the achievements of the previous strategic plan in line with latest external recommendation reports with national revised goals to halt indigenous malaria transmission by 2022 and achieve World Health Organization (WHO) certification of a “malaria free Bhutan” by 2025. This strategic plan is formulated to enable the national malaria program to achieve its strategic goals and targets. It seeks to support on-going advocacy for continued commitment against malaria through sustained investment to prevent its resurgence in Bhutan. The strategic framework is expected to fit within the existing structures of health system and modification of others in its operational and implementation aspects, and defines key strategies and action plans to help the country move towards maintaining malaria elimination and preventing its re-introduction in Bhutan. The strategic plan draws on the evolved consensus of stakeholders from the health and non-health sectors as well as international organizations and officials from district levels. It is based on the recommendations derived from the Ministry of Health, WHO Global Malaria Programme (GMP) and Southeast Asia Regional Malaria elimination action plan. The National Malaria Strategy has following key guiding principles:

1. Use of evidence based strategies conforming to WHO recommendations and adapted to local conditions and needs
2. Universal access to quality malaria diagnosis, treatment and prevention with emphasis on coverage of vulnerable populations
3. Forge national ownership and leadership for malaria elimination through establishment of a Malaria Elimination Commission
4. Develop mechanisms to pursue effective partnerships with line ministries and agencies, local leaders and private organizations for multi-sector approach to malaria elimination
5. Strengthen decentralized malaria elimination with district health taking the onus of malaria elimination and promoting community empowerment for malaria elimination activities
6. Collaborate and networking with local institutions and leaders, neighboring countries, international organizations and agencies
7. Utilize of modern technology and available tools to strengthen malaria elimination strategies and program

The revised strategic plan sets out eight strategic objectives which is to be achieved through implementation of specific strategies and action plans.

1. Strategic objective 1: Strengthen targeted and focused preventive malaria interventions
2. Strategic objective 2: Establish rigorous quality assurance program for laboratory diagnosis and ensure prompt and effective treatment and follow up
3. Strategic objective 3: Strengthen services for surveillance for malaria case detection and rapid outbreak response system
4. Strategic objective 4: Strengthen effective collaboration and partnerships to support malaria elimination program
5. Strategic objective 5: Improve program management and performance

6. Strategic objective 6: Intensify advocacy and pursue effective IEC approaches for malaria elimination
7. Strategic objective 7: Conduct operational research on malaria elimination
8. Strategic objective 8: Strengthen Monitoring and evaluation of malaria elimination program

The VDCP under Department of Public Health will take the lead role in implementing the NSP with provision of technical and financial support to districts. De-centralization of implementation to districts in alignment with Government policy will ensure that district health sector are directly responsible to provide funds and human resources for malaria elimination activities in the future. The strategic plan outlines broad activities and projected costs for the period 2020-2025

Acknowledgement

The VDCP, Department of Public Health, Ministry of Health of Bhutan, in close consultation and collaboration with its technical partners revised and updated the National Malaria Elimination and prevention of re-introduction Plan 2020-2025. The revision of national strategic plan has been made possible through the relevant expertise contributions and active participation and collaboration by the key stakeholders and partners. The Department would like to thank the members of Technical Working Groups (TWGs) who collectively reviewed the previous strategic plan and provided the technical, strategic, and implementation advice and inputs in revising the NSP in two different sittings. The NSP revision also sought views and recommendations from field level through consultative workshops with DHO, CMO and DMS from malaria high risk areas whose concerns and inputs are duly incorporated in the revised plan. The draft NSP was also reviewed by Technical Advisory Group for Malaria Elimination (TAGME) and external experts from Global Malaria Program, WHO whose valuable feedback and comments were duly incorporated in the final document. The revision exercise and publication of the NSP was coordinated and led by Dr. Kinley Penjor, Officer on Special Assignment to VDCP and Zoonosis Program, Department of Public Health.

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The Department of Public Health, Ministry of Health would like to express our sincere gratitude for the financial and technical assistance provided by the Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM).

I trust that this document will serve as the main framework for a coordinated and collaborative approach to facilitate Bhutan to achieve malaria elimination and prevention of re-introduction by 2022. It is also meant to

serve as a basis for the development of detailed and costed plans of action at the national level adapted to local realities and the response to the specific needs in Bhutan.

Dr. Karma Lhazeen,
Director,
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COUNTRY PROFILE

Bhutan is a landlocked country of 38,394 square kilometers, nestled in eastern Himalayas bordered by India in the west, south and east (605 kilometers), and China (Tibet) in the north, sharing about 470 kilometers. The entire country is mountainous with flat land limited to southern borders. The country has estimated 72 percent forest cover with rich biodiversity. There are three main geo-climatic conditions - subtropical hot and humid conditions in the southern foothills, cool temperate climate in the central valleys and a virtually snowcapped mountains with cold alpine climate in the north, reaching a height of about 7500m above sea level. Elevations range from 160 meters in the south to over 7000 meters above sea level in the north (Figure 1). The rainfall within these three regions varies with annual precipitation of 2000-5000mm in the south, 600-800 mm in the central region to about 75-200mm in the north. The differences in these geo-climatic features are experienced even within a short distance due to steep mountains and deep valleys. This harsh geo-climatic factor has not only resulted in unique socio-cultural diversities but also give rise to different health conditions which is unique to the locality and often the inaccessibility of these localities call for distinct and innovative health systems and service delivery mechanism. For example, southern foothills abounds with tropical diseases such as malaria and increasingly dengue whereas respiratory diseases are more prevalent in the cold northern region. Further, Bhutan's fragile ecosystem make it very vulnerable to the impacts of global warming and climate change, and susceptible to natural disasters such as floods and earthquakes. It is also located in region identified as one of the global hotspots for emerging and re-emerging infectious diseases (WHO, 2014).

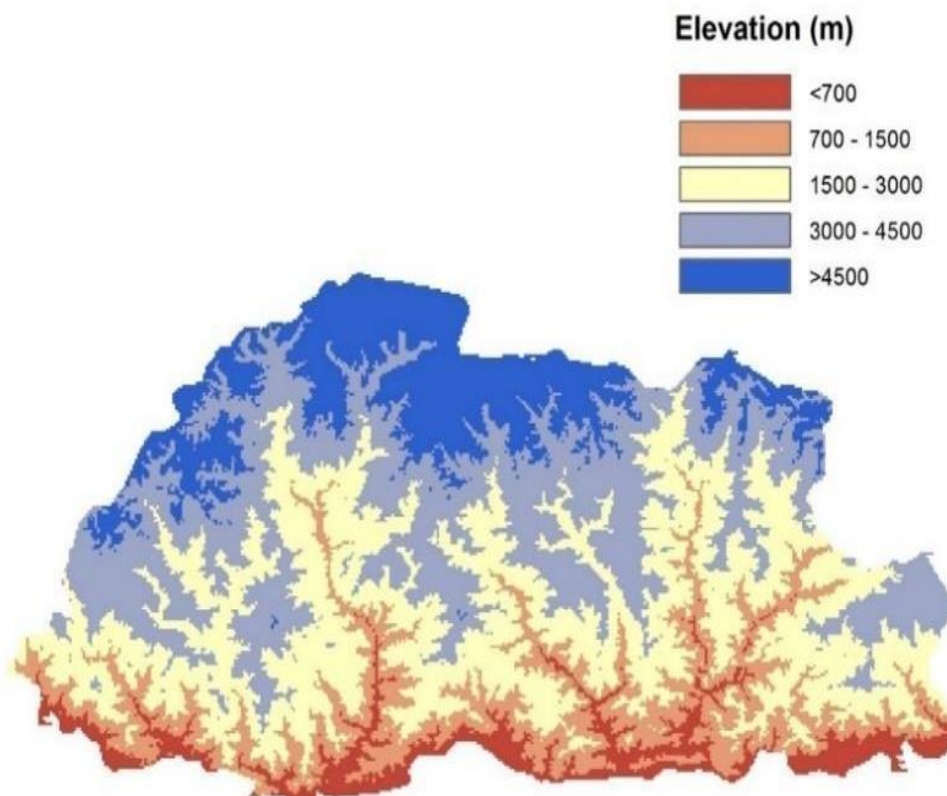


Figure 1: Map of elevation of Bhutan (Source malaria case study)

Political context

Administratively Bhutan is divided into 20 districts (Figure 2) and 205 sub-districts (Gewogs). Each Gewog is further divided into 5-8 "Chiwogs" (Sub-block) which consists of few villages.



Figure 2: Map of Bhutan showing internal administrative boundaries with 20 districts (Source NSB Bhutan)



Figure 3: Administrative flow chart

The form of governance is Democratic Constitutional Monarchy with the King as the head of the state and elected Prime Minister as the head of the government. Bhutan transitioned into the constitutional democracy in 2008. The country has already witnessed three national parliamentary elections with the recent one in 2018. Currently, the Druk Nyamrup Tshogpa (DNT) is the ruling government.

Demography

The Bhutanese total population was recorded at 735,553 in 2017 - 681,720 persons are Bhutanese and 53,833 persons are non-Bhutanese including 8408 tourists. In the last twelve years (2005-2017), Bhutan's total population has increased by 16% and the population density has increased from 17 to 19 persons/km². The Population Growth Rate (PGR) between 2005 and 2017 was 1.3% per annum. There are 110 males for every 100 females. The population is largely rural, with 69 percent living in villages and dependent on subsistence agriculture and livestock rearing for livelihood. The urban population has been increasing from

196,111 persons (30.9%) in 2005 to 274,967 persons (37.8%) in 2017. This could be due to rural-urban migration, increase in the number of urban centers, and the expansion of urban areas. Thimphu city with 114,551 persons is the most populous urban area, followed by Phuentsholing (27,658), Gelephu (9,858) and SamdrupJongkhar (9,325). In 2017, 16,057 day workers were enumerated in the border areas on the census reference day which are not included in total Bhutanese population. There are 163,001 regular households average household size of 3.9.

Socio-economic context

Since the start of planned developments in the 1960s, the country has witnessed a remarkable economic development. Guided by the holistic development philosophy of Gross National Happiness, Bhutan has enjoyed a balanced growth in terms of economy, infrastructural development, spirituality, environment and culture and traditions. The total GDP is estimated at 2.5 billion and GDP per capita has increased from mere USD 331 in 1980 to USD 3438 in 2017. The national poverty rate has been reduced from 23 percent in 2007 to about 8 percent in 2017. The hydropower and tourism sector are main source of revenue for the economy. Recognizing these challenges and weaknesses, attention is paid more on diversification of economy and development of private sectors. Bhutan has identified five jewels of economy- Agriculture, Tourism, Hydropower, Mining and Small and Cottage industries. Hydropower sector alone constitutes about 27% of total national revenue and about 14% of total GDP. Notwithstanding its limited resources and small economy base, Bhutan is considered to be one of the fastest growing economies among the south east countries with the highest growth of 7.99 % in 2016. Bhutan's economy is projected to grow by 6.8% in 2019. Bhutan will transition from Least Developed Country (LDC) status to Middle low income Level Country (MLIC) by 2023 and subsequently will not be eligible for many of the external aids and grants. The government through development of Economic Development Policy 2016, Public Debt Policy 2016 and Fiscal Incentives 2016 envisages smooth transition of the economy. Any developmental activity in the country should be aligned with the principles of Gross National Happiness. The current 12th Five Year Plan, 2018-2023 has already commenced with the theme: "***Just, Harmonious and Sustainable Society through Enhanced Decentralization.***" While Bhutan has been judicious of its natural resources and fastidious of every development, it has also been equally cognizant of gender inequality and violence against women as a universal phenomenon. Therefore, it has always promoted gender inclusive and gender sensitive developmental agenda. Various institutions have been established to promote gender equality and gender protection. With the rectification of the Convention on the Elimination of all Forms of Discrimination against Women (CEDAW) in 1981, Bhutan has addressed gender sensitive issues through various institutions such as National Women's Association of Bhutan, National Commission for Women and Children (NCWC), and Respect, Educate, Nurture and Empower Women (RENEW) among others.

National Health Systems

Basic education and healthcare services are provided free by the government in Bhutan. The overall literacy rate is 71.4% and average life expectancy is 70 years. Due to prioritized investments of the government in public health sector, the burden of infectious diseases has drastically reduced in the past decades. As of 2017, the MMR was 89, IMR has declined from 40.1 to 15.1, the CMR has been reduced from 21.5 to 19.0, and the U5MR from 61.6 to 34.1 (**Table 1**). The IMR is higher in rural areas (17.5) than in urban areas (12.0) where as both CMR and U5MR are higher in urban areas than in rural areas. The improvement in childhood mortality indicators are attributed to improvements in health infrastructures (both preventive and curative infrastructure), improved service coverage, and access to skilled health workers. Universal childhood immunization was achieved in 1990 and immunization levels have been maintained over 95% since 2010.

There has been also an impressive progress in the reduction of diarrheal and conjunctivitis cases in recent past. The cases of diarrhea reported by health facilities decreased by 3.08% and conjunctivitis by 6.20% annually on an average for the past five years.

Table 1: Basic demographic indicators

Indicator	Year	Value	Source
Population	2017	735,553	PHCB 2017
Number of males	2017	380,453	PHCB 2017
Number of females	2017	346,692	PHCB 2017
Population density per km ²	2017	19	PHCB 2017
Life expectancy at birth for males	2017	68.8	PHCB 2017
Life expectancy at birth for females	2017	71.7	PHCB 2017
Crude mortality rate	2017	6.7 (Per 1000)	PHCB 2017
Under-five mortality rate	2017	34.1 (Per 1000)	PHCB 2017
Infant mortality rate	2017	15.1 (Per 1000)	PHCB 2017
Maternal mortality rate	2017	89 (Per 100,000)	PHCB 2017

Modern health care in Bhutan formally began in the 1960's with the start of First Five Year Plan with only two hospitals and eleven dispensaries for the whole country in 1961. Under the dynamic and visionary leadership of the Kings, the modern health system progressed and developed rapidly over the last 5 decades which today have 211 Basic Health Units, 52 sub posts and 551 ORCs at primary level, 26 hospitals at secondary level and three referral hospitals at the tertiary level, spread across the country (**Figure 4 & 5**). Today approximately 95 percent of the population live within three hours walking distance from the nearest health facility.

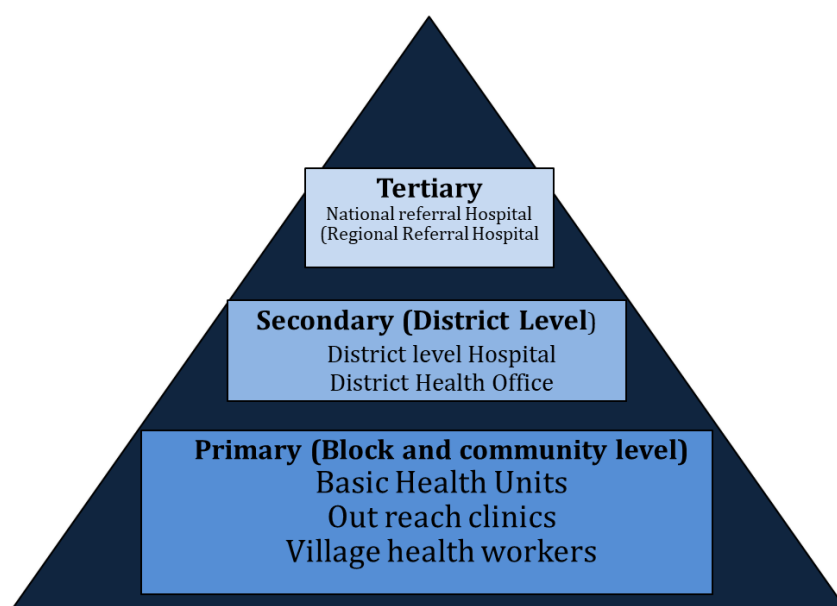


Figure 4: Pyramid of health care delivery system

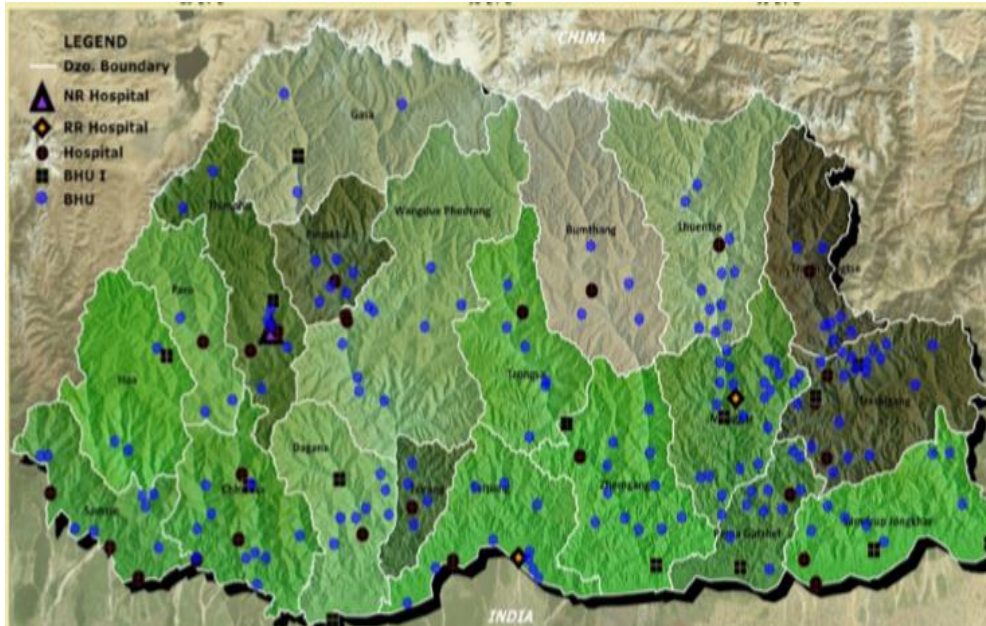


Figure 5: Health facilities (Annual Health Bulletin, 2018)

Article 9, section 21 of the constitution of Bhutan guarantees “The provision of free access to general and public health services in both modern and traditional medicines ensuring access, equity and quality health service” for its citizens in the country. The Ministry of Health has adopted a broad vision to become “A Nation with the best health”. **Figure 6** shows the organogram of the Ministry of Health. In its pursuit of constitutional mandate and this vision, the Ministry of Health is endeavoring continuously towards strengthening the health care system and has put forth the following missions:

1. To provide quality healthcare services in both traditional and modern medicines
2. To prevent, control, eliminate and eradicate diseases
3. To rehabilitate and promote healthy living
4. To ensure sustainable, responsive, equitable, accessible, reliable and affordable health services

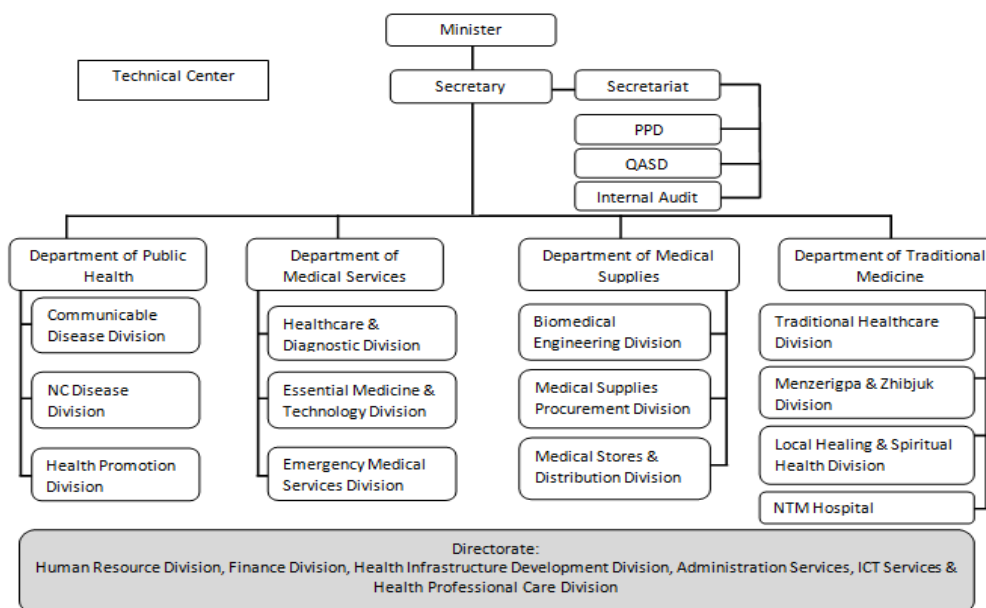


Figure 6: Organogram of Ministry of Health (Source: <http://www.health.gov.bt/about/organogram>)

The organizational objectives are addressed through sound administrative structure and integrated healthcare delivery system. The health care services are delivered through three tiered system namely; the primary, secondary and tertiary providing preventive, promotive and curative services. The primary level constitutes the outreach clinics and the Basic Health Units (BHU). The outreach clinic provides preventive services such as family planning, health education and other basic treatments to communities at regular intervals. The BHU is the established primary level health care facility providing preventive and treatment facilities that are common in the rural areas. These Basic health workers are supported by the community-based Village Health Workers (VHWs), who voluntarily contribute their time and effort to improve community health. The treatment and management levels moves upwards to district hospital and BHU-I which have MBBS doctors and inpatient services. The higher level of care at regional referral hospitals and national referral hospital provide specialist care and services (**Figure 4**). This structured hierarchical referral systems not only regulates and manages the flow of the patients but also ensures effective utilization of health resources and services. With wide coverage of health facilities across the country, more than 95% of people have reasonable access to health services living within 3 hours walk from the nearest health facility and 81.5 % of the population seeking help from the health professionals as the first line of treatment (National Health Survey 2012). The Outreach clinics (ORCs) are conducted by health centers to provide health services to population in remote area located in geographically difficult locations.

Vector-Borne Disease Control Program

The VDCP is a central program under Communicable Diseases Division (CDD), Department of Public Health (DoPH), Ministry of Health. The program office is located in Gelephu district away from the Ministry of Health in Thimphu with some degree of financial and administrative independence. It is mandated for planning, implementing and monitoring activities on vector-borne diseases in the country. The program implementation is supported by decentralized district health services which have District malaria supervisor and Malaria technicians in all the endemic districts to oversee implementation of program activities at the district level. The program provide logistics, technical and training supports to districts. The program also collaborate with other allied health agencies like Khesar Gyalpo University of Medical Sciences (KGUMSB), Drug Regulatory Authority, Royal Centre for Disease Control (RCDC) to develop standards, capacity building and conduct research on malaria. The malaria elimination program is guided by National Committee for Disease Elimination (NCDE) and Technical Advisory Group for Malaria Elimination (TAGME). At the central program the current staff strength is 26 including daily wage workers. The organogram is as shown below (**Figure 7**). The DMS/MLTs are responsible to plan and implement control measures solely for vector-borne disease including malaria in the malaria risk areas. In addition, malaria related activities are also carried out in an integrated manner by village health workers at the village level, Health Assistants at the basic health units, and District Health Officers at the district level. The malaria prevention and control program was guided by the National Strategic Plan (NSP) 2015-2020 which had the following five broad objectives:

1. To intensify vector control and other preventive measures against malaria.
2. To provide early diagnosis and prompt treatment of malaria.
3. To strengthen surveillance system.
4. To strengthen technical and managerial capacities for efficient and effective control of malaria leading towards malaria elimination.
5. To sustain political and inter-sectoral support geared towards malaria elimination.

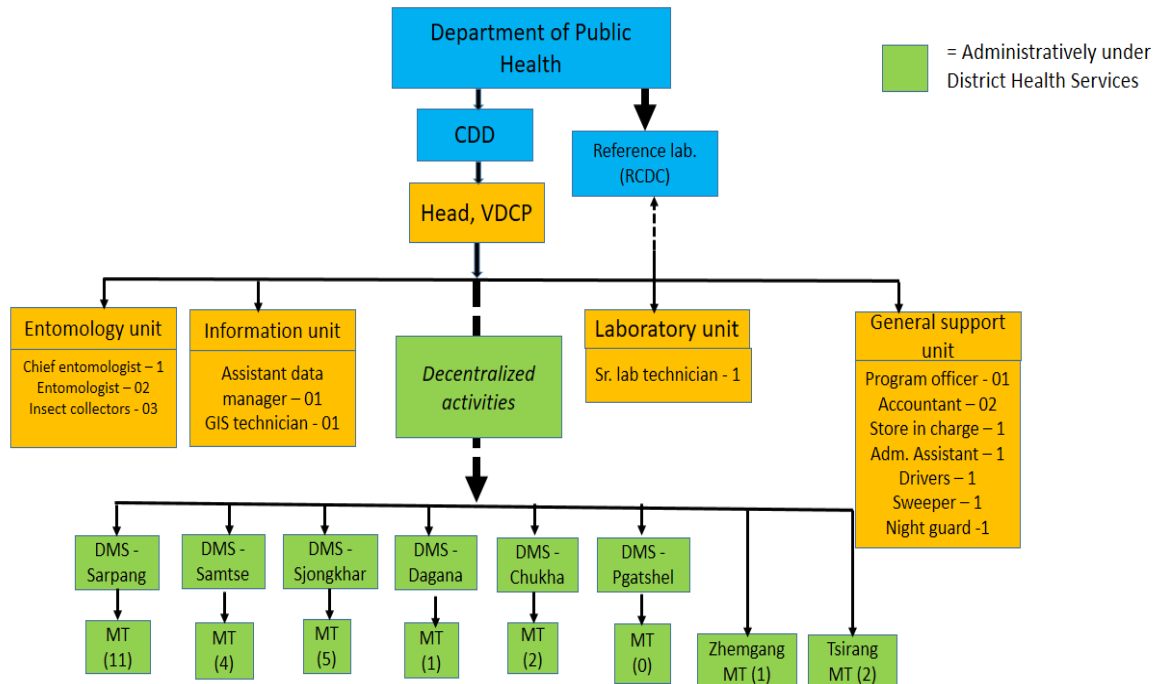


Figure 7: Organization of national VDCP services

Epidemiology of malaria

Bhutan has two species of malaria parasites namely *Plasmodium falciparum* (pf) and *Plasmodium vivax* (pv). This disease is transmitted by Anopheles mosquitoes of which *An. minimus*, *An. fluviatilis* and *An. dirus* were assumed to be the malaria vectors in Bhutan until recently. However, over the recent years, these species have not been recorded and *An. pseudowillmori* and *An. culicifacies* are suspected to be the vectors because of their behaviour (both endo and exo-phagic and anthropophilic) and their relative abundance during the peak transmission season. The malaria transmission occur all throughout the year but two peaks occur during spring from April-May with the onset of monsoon season and other peak in autumn i.e. (August-September) when the monsoon rain becomes less frequent before onset of cool dry winter (Figure 8). The farmers and students are found to be the most affected population group which is attributed to their occupation and behaviors that expose them to vectors at night without any preventive measures. During the April month, farmers usually start to till their land for rice plantation and other crops and in August, it is harvest time. Additionally, Bhutanese in non-malaria areas often travel or migrate to the southern malaria risk areas for commercial or other purposes, and therefore, all the population may be considered at risk for malaria. Besides this, the movement of populations is very high in the southern bordering towns for commercial purpose.

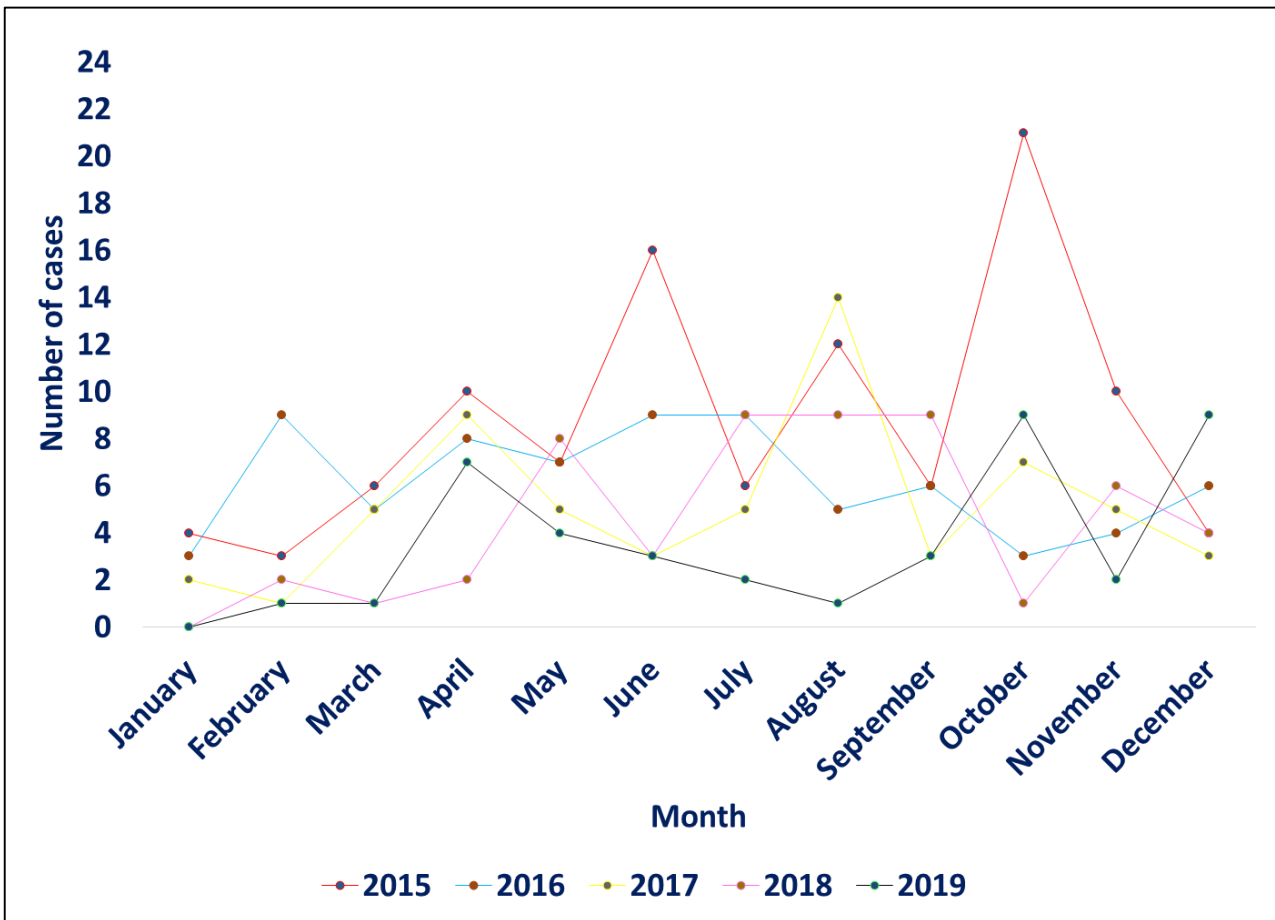


Figure 8. Seasonal trend of malaria from 2015-18

Bhutan saw impressive decline in overall incidence of malaria with API below 1/1000 since 2009, prompting the country to move into the elimination phase (Figure 9). With implementation of malaria elimination program, the estimated population living in malaria risk areas in the country is revised to about 150,000 in 2019 compared to over 300,000 in earlier years (Figure 11). Based on micro-stratification of malaria transmission risk, there are gewogs with no malaria cases reported in the past few years but due to high receptivity and vulnerability and other factors, potential of outbreak exists if control measures are not put in place.

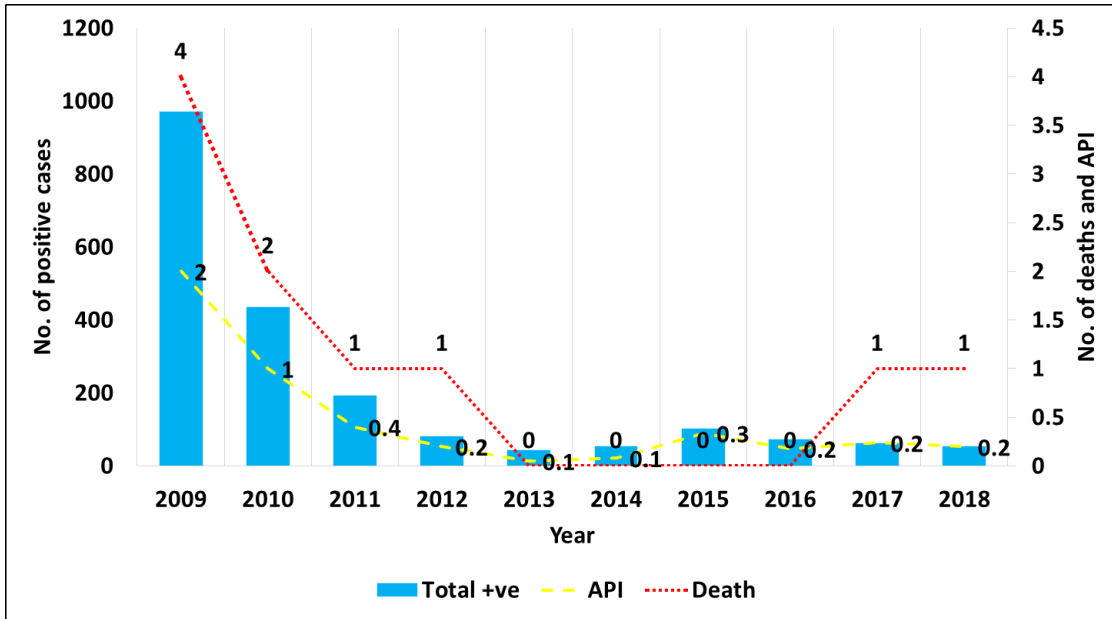


Figure 9: The trend of annual malaria metrics from 2009-18

The annual proportion of imported malaria cases of the total detected in the country has been increasing over the years, posing elimination challenges. In 2019, there were 42 total malaria cases reported in the country with only 2 indigenous cases that is gradually decreased (**Figure 10**).

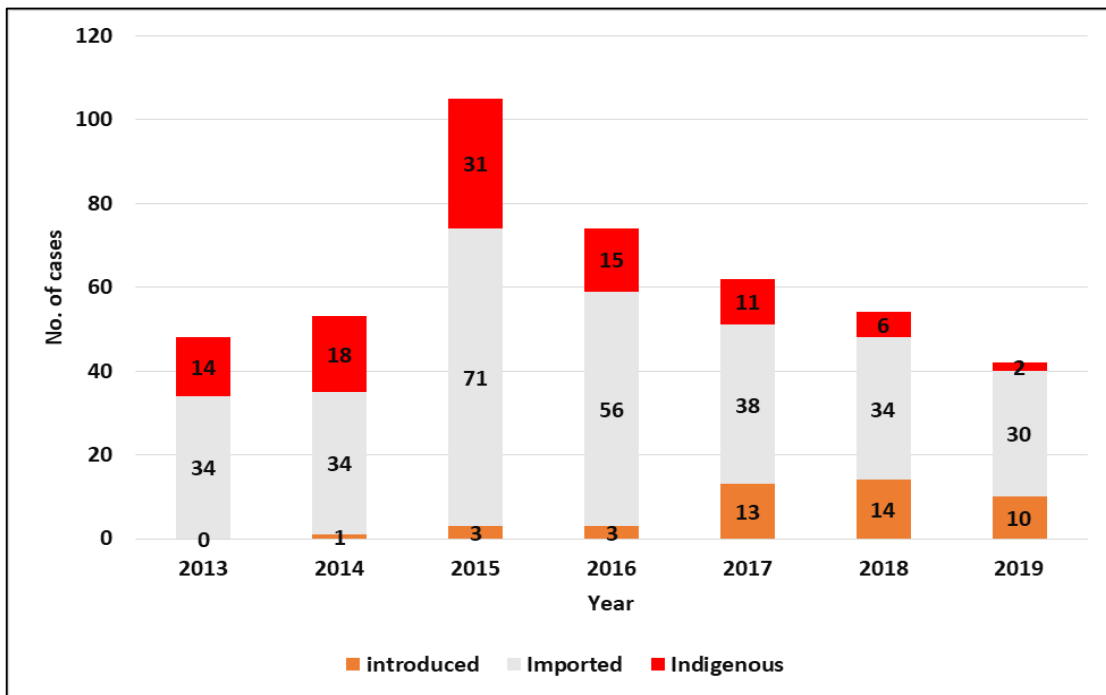
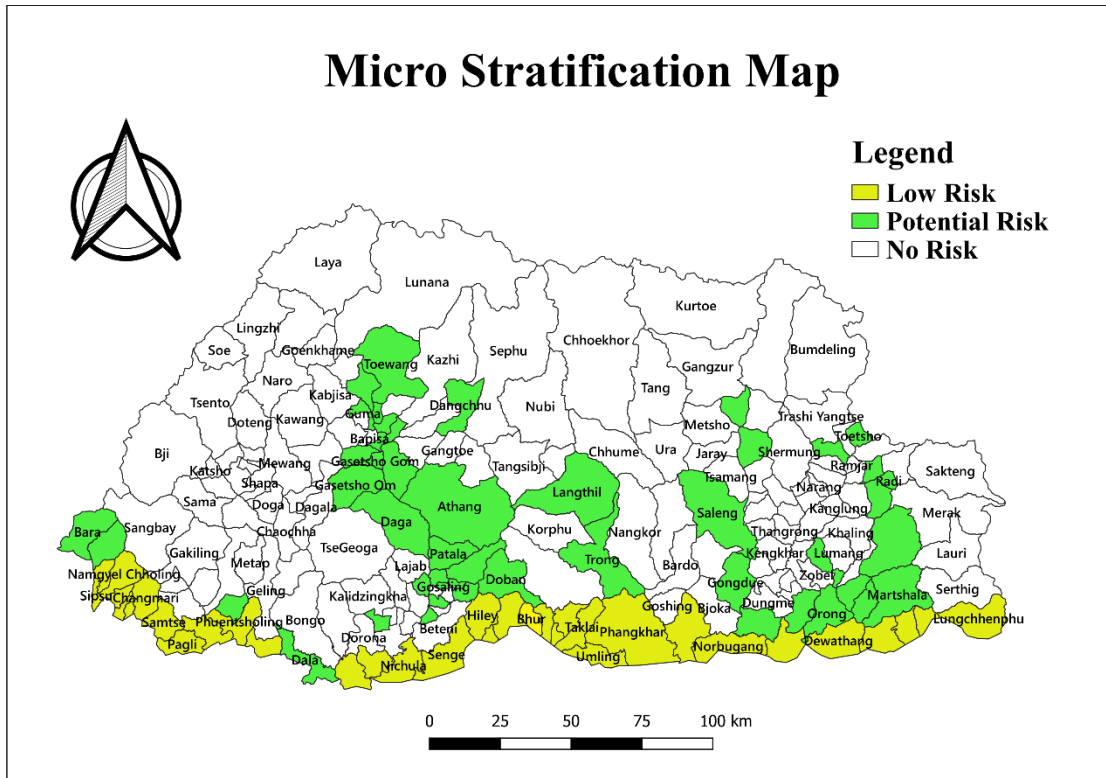


Figure 10: Classification of malaria cases for 2016-18

Micro-stratification using GIS based case mapping was conducted in 2013 for cases from 3 years (2011-2013), districts having direct border with India, vector prevalence and climatic factors that favor vector survival at the district level. With revised stratification, on the basis on evidence of local malaria transmission within

the last 3 years, receptivity and vulnerability of gewog and sharing of direct border with India, the country is stratified into free, potential and low risk areas at the gewog “Block” level. The “No risk areas” are those gewogs that are non-receptive to malaria vectors while potential risk areas include receptive gewogs but without local malaria cases within the last three years. “Low risk” areas are all those gewogs which had local transmission reported within the last 3 years, share direct border with India along with vector prevalence and climatic factors that favor vector survival (Figure 11). The micro-stratification is used to plan and implement control interventions (vector control interventions like LLIN, IRS, advocacy campaigns, surveillance and trainings) in targeted manner and for additional continued attention and vigilance in higher risk areas.

Figure 11: Micro stratification of malaria transmission risk at sub-district level



In recent years, all indigenous cases were reported from the areas that share common and direct border with India. These few pockets are confined in the three districts of Sarpang, samtse and Samdrup Jonkhar which continue to generate sporadic cases and therefore currently have active and residual non-active foci (Figure 12).

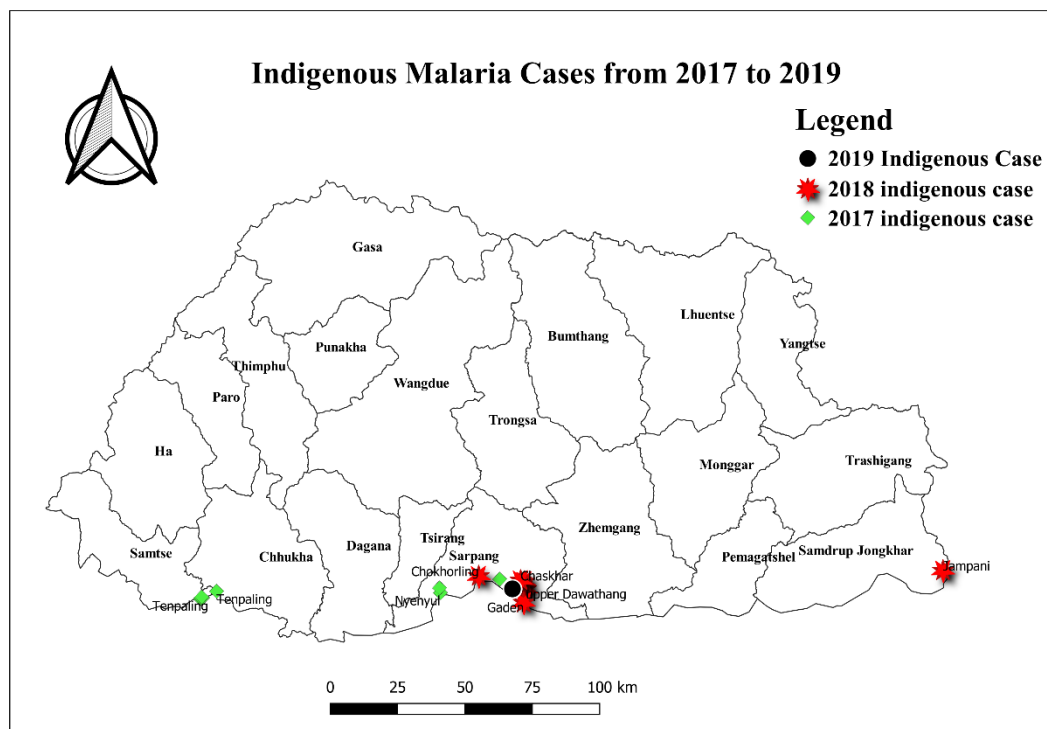


Figure 12: Location of indigenous cases and foci classification map from 2016-2019

Although the burden of malaria has dropped to its lowest in the country over the last decades, potential for malaria outbreaks and a resurgence of malaria remain high due to high receptivity in the southern districts in Bhutan coupled with the increasing frequency and volume of movement of migrant population to and fro from the highly malaria endemic states of India, posing a risk of re-introduction of the parasite to the country. Further, many hydropower and development activities are taking place in and around the country which render the areas highly vulnerable to malaria transmission as recorded vector densities still remain conducive.

Cross-border and imported malaria cases

Bhutan share borders with the Indian states of West Bengal and Assam on southern side, Arunachal Pradesh on eastern side and Sikkim on south-west side. The country is bordered on northern and north-western side by China (**Figure 13**). The southern border with malaria endemic Indian states of Assam and West Bengal remain highly porous and unfettered with free movements of population across the border.



Figure 13: Bhutan map showing bordering districts of Assam and West Bengal

It is estimated that there are approximately 45,000 - 50,000 immigrants in Bhutan and a vast majority of them are of Indian origin, mostly coming from the states of West Bengal and Assam and some from the states of Uttarakhand, Bihar and Uttar Pradesh. Most of the immigrants are employed as construction workers at hydroelectric power projects sites and housing projects (**Figure 14**). They generally stay for a few months and then return to native districts in India. Many workers cross the border in the morning hours, engage in occupational activities during the day and return to their homes by evening. A total of 16, 057 day workers were enumerated on the national census day in 2017.



Figure 14: Hydro-power projects under 10,000MW development initiative (Source: updated from DGPC)

Since 2014, increasing number of malaria cases are detected in non-Bhutanese as compared to the Bhutanese (**Figure 15**), most of whom are of Indian nationality. Therefore, cross-border malaria initiatives are very crucial for malaria elimination and prevention of reintroduction in Bhutan.

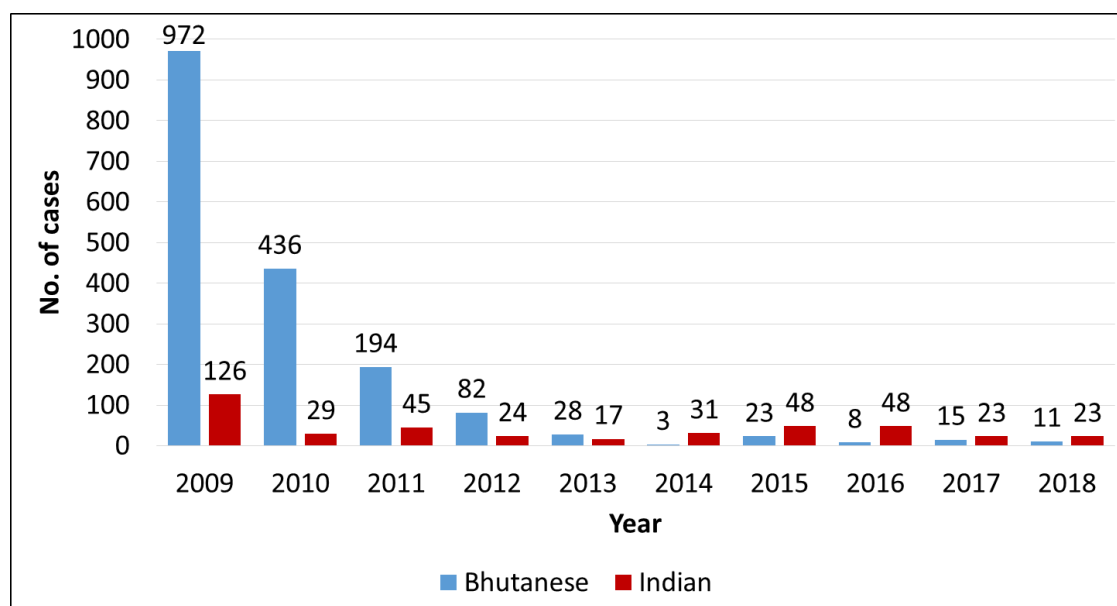


Figure 15. Nationality of malaria cases from 2009-2018

Recognizing the challenge and importance of cross-border malaria, the Bhutan government has already put in some measures to prevent and control cross border malaria in the country. All foreign laborers (almost all are Indians) bound for employments in the country are mandated to undergo malaria testing as part of medical screening. The screening is conducted by the hospitals located in the border districts and private diagnostics centers in the country. Since its implementation, the screening activities conducted by the hospitals at these entry points has seen increasing number of labour being screened over the years (**Table 2**).

Table 2: Malaria screening conducted by health centers located at the border from 2015-18

(The screening done by the private diagnostics center is not included in this figures)

Screening centers	2015	2016	2017	2018
Sarpang Hospital	103	52	316	341
Gelephu Hospital	262	336	1205	947
P/ling	32	4	895	791
Samtse	0	1	2921	731
Lhamozingkha	313	247	1124	85
Samdrup Jongkhar	260	384	695	0
Jomotsangkha BHU-I	637	423	544	1120
Panbang BHU-I	0	119	224	769
Nanglam BHU-I	18	37	71	116

Further, proactive surveillance are conducted regularly and targeted at high risk areas like Mega hydro power projects sites (**Figure 16**). The screening program have detected both *PF* and *PV* cases in the migrant labourers. Although the cases detected are few, considering the existence of conducive climatic conditions and presence of vectors, this poses a potential risk for re-introduction and establishment of malaria transmission in the locality. Hence, screening for malaria parasite among this group is a very important part of the overall malaria elimination program that need to be continued.

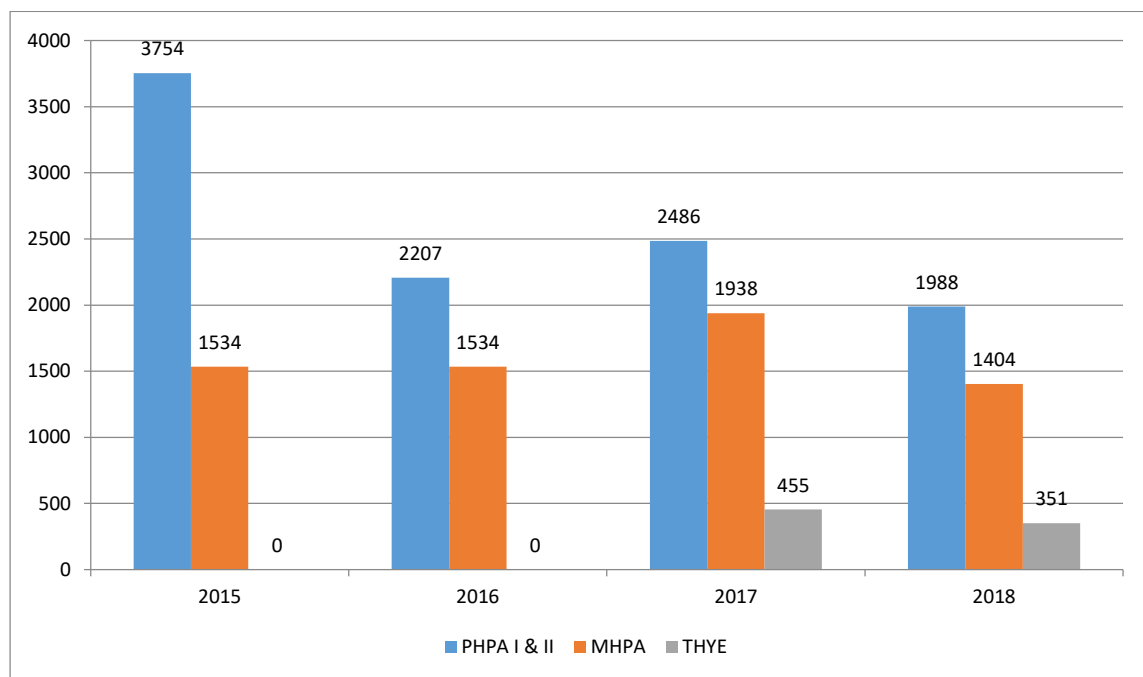


Figure 16: Malaria screening conducted in Hydro power project sites 2015-18

Malaria Indicator Survey 2017

According to the MIS 2017 survey report, all the set indicators and targets of the program and the donors had been achieved and in some cases even exceeded. The survey revealed a phenomenal LLIN distribution, coverage and utilization. The malaria prevalence rate had considerably declined to a meagre 0.5% due to effective programmatic interventions at all levels. The Table 3 is a summary of the findings.

Table 3: Summary of key indicators for 2006, 2009, 2013 and 2017(Source: Malaria Indicator Survey 2017)

INDICATORS (%)			2006	2009	2013	2017
1	Proportion of households with at least one LLIN	LLIN coverage	63.8	83.0	73.8	99.1
2	Proportion of population that slept under LLIN in the previous night	LLIN utilization	-	78	77.9	99.5
3	Proportion of children under five years who slept under LLIN in the previous night	Practice	73.6	92.3	94.8	90.9
4	Proportion of pregnant women who slept under LLIN in the previous night	Practice	64.8	95.4	87.5	100
5	Proportion of households who know that malaria is transmitted through mosquito bites	Knowledge	-	58.9	89.2	84.9
6	Proportion of households who are able to tell 3 symptoms of malaria: • Headache/fever • Body/back/joint pain • Vomiting	Knowledge	-	83.3 53.9 36.3	89.7 44.5 42.3	84.5 37.9 23.7
7	Proportion of household that had at least 1 malaria case in the past 12 months	Prevalence	4.8	14	9	0.5
8	Proportion of households that had at least 1 fever case in the past 1 month	Incidence of fever	14.12	43.5	32.6	13.6
9	Proportion of households seeking medical attention within first 24 hours of fever.	Health seeking behaviour	-	83.4	89.1	88.9
10	Proportion of households sprayed with IRS within last 12 months	IRS coverage	51.6	56	41.1	62.1

The survey noted that program should work for sustainability of the program interventions and should develop all the technical expertise and resources to manage events of any magnitude on its own. The malaria program should endeavor to provide continued and constant education and public health programs to those people living in malaria risk areas.

External review of malaria program 2017

As per the WHO external review 2017, massive deployment of ACT and RDTs down to community level, large-scale ILLNs campaign with two-rounds of IRS and enhanced malaria surveillance has enabled Bhutan to achieve remarkable progress towards malaria elimination, and indigenous transmission has been already interrupted in 18 districts out of 20. The review team reported that probability of interrupting indigenous transmission by 2018 remains high for program considering that Bhutan continues sustaining and improving further ongoing operations against malaria as recommended in the review.

Table 4: External Malaria Review recommendations 2017

Actions Recommended	Responsible Agency
1. Surveillance and response	
1.1 Update the SOPs on case and focus investigation and classification and their response based on the WHO framework for malaria elimination.	VDCP, with technical support from WHO
1.2 Update the electronic database taking into account the SOP on case and focus investigation and classification. Each case/focus should have unique/tracking identification number to link each other.	RCDC, in collaboration with VDCP
1.3 Conduct a retrospective analysis of cases and foci reported in 2013 – 2016, verify and re-classify if necessary in accordance with the updated SOPs.	VDCP, with technical support from WHO
1.4 Continue applying the current system for detection/prevention of cases among laborers coming from India as well for detection/prevention of malaria among military personnel before and after their deployment to malaria endemic countries.	VDCP
2. Case Detection and Management	
2.1 Improve the quality assurance system on malaria microscopy in line with WHO Malaria Microscopy Quality Assurance Manual version 2. a) Update the SOP on QA QC of malaria microscopy b) Upgrade the equipment and materials for training in malaria microscopy. A multi-viewer microscope and reference slides for training are essential. c) Consider RCDC as national reference laboratory for malaria. Upgrade their technical skills and equipment and support them to set up slide bank for training and reference. d) Conduct training in malaria microscopy. e) Conduct internal and external competency assessment.	VDCP, in collaboration with RCDC and technical support by WHO
2.2 Continue the existing practice on directly observed treatment and 28-day follow-up, and build on it a system to assess therapeutic efficacy in line with WHO protocol. Beyond the 28-day follow-up, it is also recommended that every case who are residing within Bhutan, regardless of species and classification, should be followed up quarterly for 1 year, and continue annually for two years in case of <i>P. vivax</i> .	VDCP and hospital
2.3 Set-up a system that would ensure availability of RDT and ACT in every BHU and hospital even in non-endemic districts	VDCP
3. Vector Control and Entomological Surveillance	
3.1 Maintain universal coverage of LLINs in border districts with India with particular attention to high-risk chiwogs with ongoing transmission or its recent history based on the receptivity and vulnerability of each chiwog.	VDCP
3.2 Continue conducting 2 rounds of IRS in chiwogs where transmission occurred in the last three years, in border villages adjacent to settlements in Indian side of the border and in areas where receptivity and vulnerability remains high (e.g., in development project areas with history of malaria transmission).	VDCP
3.3 Conduct focal IRS in chiwog/active foci where indigenous transmission occurred with the presence of introduced and/or indigenous case.	VDCP
4. Cross-Border Collaboration with India	
4.1 Develop policy to set-up a functional cross-border collaboration on malaria elimination between India and Bhutan using existing platforms (bilateral cooperation between Bhutan and India and SAARC) and leveraging on the commitments of India to eliminate malaria by 2030. SEARO and GMP, and collaboration with Country Office in Bhutan and India, may assist in setting up a side meeting between delegation from Bhutan and India during WHA in May 2017.	Department of Health / VDCP; WHO to help facilitate the collaboration.
4.2 Using its existing financial resources from Global Fund grant for cross-border collaboration, VDCP should consider supporting Bhutan – India Friendship Association to organize meetings with community stakeholders in India side of the border to: a) Identify mechanism for provision and promotion of the use of LLINs in 29 villages on the Indian side of the border across Sarpang District; and b) Explore feasibility of empowering community volunteers, teachers in private schools and other community-based organization to provide case detection and treatment services and health education on malaria.	VDCP
4.3 While a formal and functional mechanism for cross-border collaboration with India is being negotiated, VDCP should negotiate with Global Fund on the following: a) provision of 5000 – 6000 LLINs in 2017 or early 2018 from existing grant to support the above-mentioned 29 Indian villages using Bhutan – India Friendship Association mechanism;	VDCP and CCM. WHO to also advocate to Global Fund

b) Inclusion of support for the above-mentioned 29 Indian villages in the upcoming GF funding request (above allocation request).	
5. Program Management and Capacity Strengthening	
5.1 Bhutan Malaria Elimination Commission (BMEC) should be established to provide strategic guidance and oversight, and advocate for sustained commitments and financing to eliminate malaria and prevent its re-establishment. The commission may be specific for malaria or the existing commissions may be transformed into public health commission and include malaria elimination in its TOR.	VDCP and Department of Health WHO may provide technical support to prepare TOR.
5.2 Malaria Elimination Technical Advisory Group (METAG) should be strengthened and become fully operational, and its TORs and composition should be revisited to support the VDCP on various technical issues including reviewing and verification of the elimination documentation, with special focus on case and foci classification.	VDCP and Department of Health WHO may provide technical support to prepare TOR.
5.3 Review and update training curricula and materials for training to ensure they are aligned with the current policies, recommendations and guidelines in malaria elimination and prevention of re-establishment of transmission.	VDCP, with technical support from WHO
5.4 The following in-country trainings/workshops are recommended: a. Training workshop on case and focus investigation, classification and management of cases and foci (for District Malaria Supervisors and Malaria Technicians) b. Malaria elimination training for DHO and ADHO c. Malaria case management training for medical doctors, health assistants and nurses d. Refresher training in basic malaria microscopy e. Field entomology and vector control (for District Malaria Supervisors and Malaria Technicians) f. QC of laboratory malaria services including maintenance of laboratory equipment (for Malaria Technicians and selected technicians at hospitals and RCDC)	VDCP, with technical support from WHO
5.5 Consider international training (short courses, diploma) in the following areas for VDCP staff: a. Entomology and vector control b. Epidemiology and disease surveillance c. Parasitology to ensure availability of technical expertise to achieve malaria elimination and prevent its re-establishment and to address the needs for other vector borne diseases.	Department of Health, in collaboration with the WHO and other partners
5.5 Assess the needs to make the entomology laboratory and entomological surveillance functional and advocate for support.	VDCP with technical support from WHO
6. Operational research	
6.1 Conduct operational research to support malaria elimination and prevention of re-establishment of transmission. Some key areas that may be considered are: a. Malaria vectors and their behaviours and appropriate vector control approaches/measures in different eco-epidemiological settings of the country in the context of climate change and ecological changes. b. The role of PCR and ultra-sensitive RDTs in malaria elimination. c. Assessment of population dynamics and risk of malaria re-introduction of malaria. d. Assessment of the degree of receptivity across different eco-epidemiological settings in the context of climate and environmental changes. e. Improving and sustaining community engagement in malaria elimination and prevention of re-establishment of local transmission. f. Explore feasibility of carrying out malaria prevalence survey in private schools (there is no public school) on the Indian side of the border in areas bordering Sarpang District.	Academia, in collaboration with VDCP and RCDC. WHO may provide technical support
7. Inter-sectoral collaboration and community involvement	
7.1 Engagement of national and district administrations should be sustained to oversee the inter-sectoral work directed at malaria elimination.	Department of Health and VDCP
7.2 The Department for Public Health should continue working jointly with other departments such as planning, land development, religious community, environment, labor, transport, forestry, agriculture, education, community development, army and police, especially at district and lower levels.	Department of Health and VDCP
7.3 The Department for Public Health should facilitate and review current activities of other sectors to identify their potentials and roles in addressing those determinants of malaria where concerted efforts by multiple sectors are required with respect to malaria elimination.	Department of Health and VDCP

7.4 Malaria elimination should be part of the agenda DT & GT meetings.	Department of Health and VDCP
7.5 The existing communication/advocacy strategy should be reviewed and revised as necessary and implemented to encourage involvement of other sectors in malaria elimination.	Department of Health Promotion and VDCP
7.6 Support of local leadership at district, geowog and chiwog and the Community Action Groups (CAGs) should be sustained. CAGs should be expanded to all areas at least in the border Districts.	Department of Health and VDCP
7.7 BCC strategies on malaria elimination targeting minorities and tribal groups across the international border in India and labour groups in Bhutan should be improved through formative research.	Department of Health Promotion and VDCP
8. Technical support	
8.1 WHO should provide technical support in updating of SOPs, trainings / workshops as outlined above and cross-border collaboration.	WHO
8.2 WHO should consider provision of short term consultant(s) to mentor VDCP and DHO staff on case and focus investigation, classification, management of foci as well as epidemiological and entomological surveillance and response and other elimination activities - experts on malaria elimination & vector control	WHO
9. Financing the current National Strategic Plan	
9.1 Update the NSP taking into account the findings and recommendations in this review, WHO regional strategic plan in malaria, Global Technical Strategy and the 12 th five year plan of MOH (2018 – 2023). The NSP should be costed and aligned with the 12th five year plan of MOH (2018 – 2023).	VDCP and Department of Health, with technical support from WHO
9.2 Explore sustainable financing for malaria elimination and prevention of re-establishment of local transmission.	Department of Health

Review of the performance of the previous strategic plan

Guided by the National malaria elimination Strategic Plan 2015 - 2020 with a aim to eliminate indigenous malaria by 2018 and achieve WHO certification by 2020, surveillance system was intensified, programmatic and technical capacity of malaria officials were strengthened and early case detection and treatment through universal access to quality assured diagnostics and treatments was improved. The guidelines and SOP on diagnosis, treatment and surveillance was updated. Enhanced quality assurance of diagnostics through extension of cross-checking activities and procurement of ACT for Pf was done. Extensive training was conducted, including on topics such as referral and procurement of pre-referral drugs, training of trainers for diagnosis and patient management, health care providers on malaria prevention and control, laboratory technicians and other health staff on microscopy, and other training. With implementation of the NSP, significant reduction in malaria incidence and foci of transmission was achieved. Through the implementation of previous strategic plans with the support of Global Fund and other partners, the total malaria cases in the country was brought down to 54 with just six indigenous cases in 2018. Despite the best of efforts of the program to achieve the stated objectives of the NSP, the goal to achieve zero indigenous malaria in the country was missed as 6 indigenous cases was recorded with 1 deaths in 2018, thus hampering the progress to realize zero indigenous case by 2018. A case-based surveillance and response was initiated since 2015 but program experienced difficulties in case classification due to inadequate epidemiological capacity to trace the origin of infection. The compromised epidemiological investigation resulted in incomplete information and documentation required for proper case classification which adversely affected the elimination progress and status. The WHO experts were fielded to review the elimination program and malaria surveillance system. The retrospective analysis of malaria case was recommended for re-classification and improving the quality of data documentation in preparation for elimination certification. Despite consistent reduction of malaria cases including indigenous malaria in the country, one major risk in malaria elimination is frequent and high volume of population movement across porous and unfettered common border with India. The migrants workers mostly come from a malaria endemic states of India. In addition, as incidence of other vector borne diseases in the country increases, development of health system and infrastructure to strengthen the national response to malaria and other vector-borne diseases is considered important to not only accelerate the

programmatic interventions to achieve elimination of malaria but also develop sustainable program to operate beyond malaria elimination to prevent re-introduction of malaria and manage threats posed by other priority vector-borne diseases. Therefore, the continued strengthening of overall technical and managerial capacity at the program, further strengthening of surveillance system for malaria elimination and quality assured diagnostic and treatment services and pursuing strong collaboration and engagement of key stakeholders outside of health that is underpinned by prioritization and implementation of operational research coupled with implementation of robust M & E will be crucial for Bhutan to achieve and sustain malaria elimination as stipulated in this revised strategic plan.

SWOT analysis of current malaria elimination program in Bhutan

<p>Strengths</p> <ol style="list-style-type: none"> 1. High level commitment 2. Committed malaria workers 3. Good healthcare access and coverage 4. Quality assurance system for malaria diagnosis and case management 	<p>Weakness</p> <ol style="list-style-type: none"> 1. Weak epidemiological capacity (Case classification) 2. HR shortages and capacity 3. Response to outbreaks not well established 4. Collaboration with other programs 5. Lack of innovation in IEC approach 6. Surveillance and documentation 7. Program activities S & M
<p>Opportunities</p> <ol style="list-style-type: none"> 1. Political commitment 2. Availability of IT technology and tools (Harnessing social media potential for communication and advocacy) 3. Multi-sector collaboration approach 	<p>Threats</p> <ol style="list-style-type: none"> 1. Cross border collaboration issues 2. Level of community involvement and behavioral change of people 3. Availability of committed and sustained funding for malaria elimination program 4. Global warming and climate change 5. Declining competency of health workers on malaria

Collaborating Partners

The success that was achieved by malaria program was mainly due to the continued support received from the national and international collaborating partners. The support and partnership is even more important during elimination phase. The main international collaborating partners will be WHO, Government of India and GFATM which have been the main funding and technical partners of the VDCP program. Since 2006 global fund has been a major funding source. Bhutan managed to secure funds from GFATM in Round 4(2006), Round 7 (2008) and Transitional Grant (2013), New funding Model (2015) and Tailored review in 2018. The GF support had made significant contribution in achieving many of the objectives of malaria control and elimination in Bhutan. In addition, Bhutan as one of the founding members of APMEN receives assistance in conducting operational research grants and fellowships for capacity building (Table 6). The APMEN sponsored fellowship in malaria mapping has enabled the country to build capacity in GIS-mapping and conduct micro-stratification of malaria transmission areas.

National Strategic framework (2020 – 2025)

Vision

Bhutan free of malaria

Goal

To achieve zero indigenous malaria in Bhutan by 2022 and obtain WHO malaria-free certification by 2025

Mission

Achieve malaria elimination and prevent re-introduction through use of evidence based interventions, sustaining political support and mobilizing multi-sectors and community participation at all levels.

Guiding principles

Achievement of malaria elimination targets set in this malaria strategic plan will be guided by the following broad principles:

- Use of evidence based strategies conforming to the recommendations of WHO and the regional strategy for malaria control adapted to local conditions and needs
- Forge national ownership and leadership for malaria elimination through establishment of oversight commission
- Universal access to quality malaria diagnosis, treatment and prevention with emphasis on coverage of migrant and vulnerable populations
- Coordinated multi-sector approach through consultative planning, implementation, research, monitoring and evaluation of malaria elimination activities
- Strengthen decentralized malaria elimination with district health taking the onus of malaria elimination and promoting community empowerment for malaria elimination activities
- Collaborate and network with local institutions and leaders, neighboring countries, international organizations and agencies
- Utilize new and modern tools and technology to strengthen surveillance system, conduct research and epidemiological analysis

Key assumptions

The following will be key assumptions to achieve malaria elimination and prevent re-introduction through implementation of this NSP:

- Continued political commitment by leadership at all levels to support the national strategic plan for malaria elimination through provision of adequate financial and human resources
- Continued international support in both technical and financial assistance
- Availability of critical mass of qualified and competent staffs at the central program and districts for successful planning and implementation of national malaria elimination plan
- Uninterrupted socioeconomic progress and development in Bhutan
- Availability of armamentarium to tackle new challenges such as drug and insecticidal resistance when it arises

Objectives

1. To eliminate all active foci of malaria by 2022
2. To prevent re-establishment of local malaria transmission from 2025 onward.

3. To prevent malaria mortality from 2019 onwards
4. To strengthen and sustain health and community system for malaria elimination and prevention of re-establishment

Strategies and action plans

To achieve the above goal and objectives, the strategic framework will be mainly focused on:

- Targeted implementation of vector control interventions guided by updated malaria transmission risk stratification and mapping
- Ensuring continued provision of quality assured diagnosis and prompt effective treatment using DOTS strategy
- Strengthen the real time surveillance system using web-based and mobile technology and rapid response
- Pursue effective partnerships and collaboration with relevant local and international stakeholders and institutions
- Strengthen the managerial and technical capacity of the malaria elimination program
- Pursuing effective and innovative advocacy and community mobilization
- Prioritization and implementation of operational research to ensure informed policy decision and interventions for program sustainability

Strategic objective 1: Strengthen targeted and focused preventive malaria interventions

As geographical extent and intensity of malaria transmission had already declined with few malaria cases which have become increasingly focal in distribution, program need to adapt to identify and target the remaining parasite reservoirs by deploying resources with efficiency for detecting and targeting the remaining clusters of infection. The planning and implementation of preventive measures will be guided by epidemiological and entomological surveillance data gathered. Therefore, all efforts will be geared towards finding individual infections and implementing vector control measures on the basis of updated malaria risk stratification.

Strategy 1.1 Updated risk stratification and mapping of receptive areas for geographical reconnaissance

VDCP initiated geographical reconnaissance for risk stratification throughout the country using malaria case, vectors and breeding sites distribution for implementation of targeted preventive interventions. These variables will be uploaded and analysed in customized Geographic Information System (GIS) databases to produce malaria risk stratification maps. Every health facility in a district in malaria prone area have geo-location of household which will be used to map buffer households around an index case for malaria case-based surveillance. The household geo coordinates will enable health facility, districts and program in assessing risk stratification of areas and population, intervention coverage, impact assessment and focused interventions for malaria. The households and new settlements add every year constantly due to new constructions and rehabilitation in every locality and this will require additional geo-location information every year in respective health facility level.

Action plans

- Annual re-stratification of malaria transmission and mapping at gewog/chiwog level on the basis of malaria transmission, receptivity and vulnerability
- Update and generate households mapping for surveillance using available appropriate software
- Training of IT personnel on GIS mapping
- Training of trainers (ToT) of IT personnel on using GIS tools, data collection and case mapping and re-stratification
- Training on use and application of GIS software for health workers (Entomologists, Epidemiologist, DHOs, MT)
- Update existing operational/training manuals on GIS
- Develop/revise standardized and user-friendly guidelines and format for data collection
- Collection of new households village-wise data and other core variables by health centers under the supervision of district
- Printing of foci delimitation maps
- Vector and species prevalence data collection with geo-locations at chiwog level

Strategy 1.2 Implementation of targeted and focused interventions based on risk strata

The WHO framework for malaria elimination 2017 foci definition will be used for malaria transmission risk stratification and foci definitions.

1. **Cleared foci** - area with no evidence of local transmission for more than 3 years
2. **Residual non-active foci** - area in which transmission has been interrupted recently (1-3 years ago)
3. **Active focus** - a focus with ongoing transmission.

For purpose of interventions and decision making purpose, the lowest malaria transmission risk stratification will be made at the sub-districts “Gewogs” level as follows (**Table 5**). The micro-strata will be defined as follows:

No Risk – Gewogs free of malaria transmission due to high altitude and absence of vectors

Potential risk – Gewogs with both receptivity of ecosystem and vulnerability for transmission of malaria (vector present at least during summer, presence of mega projects with high volume of migrants from malaria endemic areas) but without local malaria transmission within last three years

Low risk – Gewogs with both high receptivity and vulnerability and evidence of local malaria transmission within the last three years and sharing direct border with India. All gewogs with common and porous border with malaria endemic India lie within mosquito flight range and have high number of population influx and reflux to and fro from across the border.

Table 5: Micro-strata and recommended interventions

	<i>No risk areas</i>	<i>Potential risk areas</i>	<i>Low risk areas</i>	<i>Remarks</i>
Anti-malarial and diagnostic supplies	Yes	Yes	Yes	
Training on case management and diagnosis	Yes	Yes	Yes	
Follow up (Pf)	Day 3 and 28	Day 3 and 28	Day 3 and 28	

Follow up (Pv)	Day 3, 28 and 3rd month and upto 1 year	Day 3, 28 and 3rd month and upto 1 year	Day 3, 28 and 3rd month and upto 1 year	As per latest WHO guidelines
iDES (DOT & FU)	Yes	Yes	Yes	As per guidelines
Passive surveillance	Yes	Yes	Yes	As per guidelines
Case-based Investigation (RACD)	Yes	Yes	Yes	As per guidelines
Foci investigation	No	Yes	Yes	As per guidelines
Event monitoring	No	Yes	Yes	As per guidelines
Active surveillance	No	Yes	Yes	As per guidelines
Epidemic/Rapid Response Team	Yes	Yes	Yes	Integrated rapid response team
LLIN distribution	No	No	Yes	
IRS	No	No	Yes*	Focal in active foci and during outbreak response
Vector surveillance	Yes* (In selective areas)	Yes* (In selective areas)	Yes	In low lying areas and deep valleys during summer season
Insecticide resistance monitoring	No	No	Yes	In sentinel sites
IEC/BCC	Yes	Yes	Yes	More frequent and aggressive in low risk areas and active foci
CAG activity	No	Yes (Selective)	Yes (Selective)	
Malaria Review Meeting	Annual	Annual	Annual	
M & E interval	Annually	Quarterly	Monthly	

LLIN will be core vector control intervention and provided to all households in low risk gewogs (including active and residual non-active foci) and gewogs lying along Indian border with high risk of malaria transmission. It will also be provided to those around index case, mobile and migrant populations in low risk areas. The areas lying along the border with high malaria transmission potential will be prioritized and considered even if these areas lie in “cleared foci”. IRS activity will be guided by the national protocol using WHOPES recommended chemicals. Focal IRS will be carried out if new case is detected in potential or low risk areas. To prevent pressure of insecticide resistance due to longer period of use of the same insecticide, the alternate chemical (Organophosphate/ Carbamates/synthetic pyrethroids) for IRS will be considered as a priority during this NSP implementation as per existing standards. For effectiveness of IRS, training and re-training of the spray squads including their supervisors are necessary. Chemical procured for IRS will be quality assured by RCDC and VDCP will send the random selected samples to the institute.

Action plans

- Procurement and mass distribution of LLIN
- Enumeration of households and population for LLIN distribution planning.

- Piloting social marketing for promotion of LLIN (in 2 districts)
- Conduct review for possible replacement of chemicals and insecticides used for IRS
- Annual procurement of insecticide, spray pumps and necessary spare parts
- Training of spray squads by respective health facilities on how to do the maintenance of sprayer parts and take safety precautions (during every round of spray).
- Annual spraying program at the low risk gewogs
- Ad hoc focal spray during new cases detection or larger outbreaks
- Procurement of protective attire for sprayers
- Capacity building of staff to establish insecticide quality assurance at RCDC
- Establish and conduct insecticide quality assurance at RCDC

Strategic objective 2: Establish rigorous quality assurance program for laboratory diagnosis and ensure prompt and effective treatment and follow up

The prompt diagnosis and treatment of malaria is one of the key interventions for reducing malaria morbidity and mortality. The malaria diagnosis is currently performed by either microscopy or Rapid Diagnostic Test Kits (RDTs) in all health centers and private diagnostic centers in the country. It is performed as per the Quality Assurance (QA) manual for malaria diagnosis. Availability of diagnostic equipment including microscopes and RDT is ensured in all facilities and internal quality control (IQC) for malaria smear microscopy is in place. However, PCR facilities is available at National Malaria Reference laboratory (NMRL) established in RCDC. Further, early and effective case management is important to prevent malaria morbidity and mortality. Current treatment is guided by the national malaria treatment guidelines, 2016. Anti-malarial drugs are made available in all the health centers and DOTs strategy is followed for treatment. As per WHO recommendation, G6PD testing at point of care will be initiated as part of good clinical practice and safety of the patient prior to administration of radical cure with primaquine in all PV cases. Further, with malaria cases on decline, risk of malaria importation is likely to increase as Bhutanese are travelling overseas and therefore, malaria chemoprophylaxis will be considered at exit points for travelers to endemic countries.

Strategy 2.1 Strengthen national quality assurance program for malaria microscopy and RDTs

The most important element of malaria surveillance is to maintain a high suspicion of malaria in health units and to promptly provide quality-assured diagnosis. The quality assured laboratory diagnosis is critical to ensure effective case detection and treatment. The diagnostic methods and tools used need to be quality assured.

Action plans

- Procurement of microscopes and RDTs
- Procurement of PCR equipment and reagents
- Establishment of fully functional reference laboratory at RCDC
- Incorporate malaria diagnosis training modules in pre-service training of trainees in Faculty of Nursing and Public Health
- Consultative meeting to develop NEQAS guidelines for malaria diagnosis

- Training of Laboratory personnel and malaria technician on NEQAS system
- Provide refresher training course on external competency assessment (ECA) for malaria microscopist
- Conduct National competency assessment and ECA for malaria microscopist
- Explore for Institutional linkages with WHO collaborating centers on malaria diagnosis
- Develop SOP for malaria diagnosis at NMRL
- Participation in international external quality assessment scheme (IEQAS) and accreditation of NMRL with international institution
- Ex-country training of laboratory and malaria technician on microscope maintenance
- Establishment and preparation of SOP on malaria slide bank
- Monitoring and supervisory visit to district laboratories and private diagnostic centers
- Shipment cost for transportation of DBS sample, MP slide cross checking and MP panel slide testing (Cost to be reflected with district)
- Development of SOP for evaluation of RDT
- Procurement of laboratory equipment
- Training of laboratory staff of private diagnostic centers on quality assurance in malaria diagnosis

Strategy 2.2 Sustain competency of health worker on malaria diagnosis and treatment

High degree of suspicion of malaria and providing correct treatment is important to reduce morbidity, mortality and prevent further transmission. Early diagnosis is key; without diagnosis, there is no treatment, no case investigation, no data for stratification, and no response. Additionally, with elimination of malaria, it is crucial to sustain the knowledge and skills of health workers to maintain high degree of suspicion and their competency on diagnosis and treatment for malaria.

Action plans

- Develop national protocol for malaria chemoprophylaxis to be given to travelers to high risk countries
- Review and revise national malaria treatment guideline including fever management flowchart
- Training of all clinicians and other health professional including military medical staff on revised malaria treatment guidelines
- Training of laboratory staffs on the revised and updated malaria diagnosis guideline
- Training of laboratory staff on sample collection, preparation and shipment for PCR testing
- Conduct supervision and monitoring visits to health facilities to check stock status of antimalarial drugs/diagnostic kits, DOT implementation and case management evaluation
- Develop guidelines and SOP for G6PD testing at point of care in all PV cases prior to administration of the 14-day primaquine regimen
- Training of health workers on G6PD testing SOP
- Procurement of G6PD test kits
- Procurement of antimalarial drugs
- Update training module on malaria case management for pre-service health professionals
- Procurement of ambulance
- Conduct mobile outreach clinics for diagnosis and treatment of high risk population
- Conduct follow up of all cases as per WHO recommendations up to day 28 for Pf cases and at least upto 3rd month for PV cases.
- Develop and update integrated malaria case follow-up procedure and reporting forms (iDES and DOT)
- Training/re-training of VHWs for monitoring and promotion of DOT strategy

- Supervision and monitoring for implementation of follow-up for all cases for treatment compliance and drug efficacy monitoring

Strategic objective 3: Strengthen services for surveillance for malaria case detection and rapid outbreak response system

The case-based malaria surveillance system as crucial element during elimination phase will be strengthened. The notification through the National Early Warning Alert and Response (NEWARS) system and DHIS2 will be continued and strengthened. The case investigation and response will be implemented by the district with support from VDCP and report is submitted through the DHIS2 system. To improve surveillance and data collection, standard case notification, case and foci investigation forms has been developed and incorporated into electronic based reporting format in DHIS2 platform. The system was piloted and rolled out in all health centers. However, case investigation and classification per WHO definition has been reviewed and found to be inadequate, particularly for cases occurring along the Indian borders in which there is neither travel history nor presence of imported cases in the areas. In addition, vector surveillance including Insecticide resistance monitoring will be strengthened to take intervention decision on changing of vector control insecticides and treated nets. Currently, there are four sentinel sites for monitoring insecticide resistance which will need to be continued and further strengthened to generate evidence on insecticide resistance pattern for informed decision-making by the program. Entomological knowledge is key to stratification and identification of transmission risk areas; targeting and selecting appropriate vector control interventions; and monitoring their impact on vector populations. Currently, monthly entomological surveillance is conducted in all high transmission risk areas by malaria technician within their catchment areas irrespective of foci stratification. But the monitoring site is not specified as such and it is very difficult to monitor the trend of vector density. Therefore, the existing surveillance system needs further review and strengthening of epi-investigation to collect adequate information for case classification according to the WHO case definition. This strategic objective is aimed to facilitate effective surveillance and case-based malaria investigation to achieve surveillance indicators.

Strategy 3.1 Strengthen epidemic preparedness, forecasting, early warning and response system

Well planned surveillance and response system are the keys to achieving and maintaining malaria elimination. Surveillance of epidemics of infectious diseases comprises forecasting, early warning and early detection, confirmation and response. Using climatic and epidemiological parameters, an early warning and detection system for malaria epidemics is required. Outbreaks are more likely as malaria transmission intensity declines and population immunity to malaria wanes. Currently, fever surveillance is taken as proxy to detect and issue early warning and alert for possible malaria epidemics.

Action plans

- Develop/revise SOP on outbreak preparedness and response plan for malaria epidemics
- Integration of training of District Health Rapid Response Team (DHRRT) on malaria epidemic outbreak investigation and management
- Periodic assessment of district capacity by programme for malaria epidemics preparedness and response

- Procure and ensure availability of buffer stocks (LLIN, IRS) at regional and sufficient stocks maintained at the program level
- Strengthen distribution and monitoring on the availability of buffer stock
- Consultative meeting with Hydromet & NEC division to explore and integrate climatic surveillance system for early detection and response to malaria and other vector borne disease outbreaks
- Review and strengthen existing surveillance system to detect epidemics and issue early warning and alert system
- Collect data on environmental and meteorological risk factors, population dynamics for risk mapping
- Training of epidemiologist/entomologist in modelling of disease outbreak forecasting, early warning and early detection
- GIS mapping of receptive and vulnerable areas using GIS software and GPS

Strategy 3.2 Conduct case-based investigation and response

Every confirmed malaria case is considered as an outbreak and case investigation and response should be mounted immediately. The timeliness of the response is key, and therefore a '1-3-7 initiative' is adopted which require malaria case to be reported within one day, full outbreak investigation to be conducted within three days, and response actions to be completed within seven days. Performance will be monitored against this 1-3-7 benchmark. The reactive case detection is conducted within 1km radius from the house of index case by screening all individuals for asymptomatic infection using microscopy or rapid test kit to eliminate the source of infection in the community. Any positive cases are treated and followed up and classified. Comprehensive case investigation is important to characterize and classify cases as per the case definition to determine the progress towards elimination target, establish the possible source of infection and to launch appropriate response. However, due to lack of adequate epidemiological case investigation, some cases are unclassifiable as per WHO definitions as the source of infection remains unable to be ascertained.

Action plans

- Review and revise national malaria surveillance and response guideline and SOP including malaria case classification criteria
- Train new health workers and provide refresher training in immediate notification using NEWARS/DHIS2 system
- Training of relevant health workers on revised malaria surveillance and response guidelines
- Training of relevant health workers on field epidemiological investigation and tools including data analysis
- Procurement of computers for online reporting and submitting case information (RGOB)
- Review and update modules in DHIS2 for data collection to suit the need of elimination stage
- Capacity building of IT officials in DHIS2 system and up-gradation
- Review and classification of reported malaria case at the national level by the TAGME
- Monitoring of surveillance data quality at health facility, district and central program level

Strategy 3.3 Improve proactive case detection (PACD)

In elimination setting, PACD should be tailored to local context and target high risk and vulnerable groups such as those in remote areas with poor health access, migrants and refugees groups who may not use or have limited access to routine health care and likely reservoir of asymptomatic infections. Due to increase in hydropower projects and other economic developments in the country there is a huge influx of migrant worker

from endemic neighbouring countries like India. This poses a serious threat of importation and re-introduction of malaria in the country especially in areas that remain receptive. Currently, PACD are conducted at project sites, active foci and residual non-active foci. The migrant workers entering the country are screened for malaria by the health facilities and private diagnostic clinics at the border entry points. This is aimed to detect asymptomatic cases in the high risk population and foci areas to eliminate a potential source of infection.

Action plans

- Review and revise guideline and SOP for active case detection strategies to detect all potential symptomatic and asymptomatic malaria infection
- Update and reformulate policies to prevent re-introduction of malaria through migrants works in collaboration with Immigration Department and private diagnostics centers
- Conduct annual mass screening in mega hydropower project sites employing migrant laborers and in industrial sites
- Identify vulnerable population groups (hard to reach population) for active case detection
- Conduct border screening for malaria at exit/entry point for travelers/high risk groups from Malaria endemic countries
- Investigate cases of pyrexia of unknown origin reported from the districts for special investigation
- Conduct one time field survey in low risk areas that has local malaria transmission to detect asymptomatic parasite carriers

Strategy 3.4 Strengthen capacity for entomology and insecticide resistance surveillance and response

Entomology service should be key component for malaria elimination and sustenance. The capacity of entomology staff, both at national and district level will be developed to address vector surveillance and modification of environmental, vector mapping, integrated vector management, and monitor insecticides resistance. Currently, there is no vector sentinel surveillance site established. Conducting sentinel based vector surveillance is integral part of entomological surveillance to regularly monitor the vector activity. This requires collecting information of the areas with vulnerable population, area with persistent malaria transmission risk over a long period of time, area with high receptivity, and area with ongoing large scale developmental project with significant environmental changes for closely monitoring of vector composition.

Action plans

- Update entomological surveillance and insecticide resistance monitoring guidelines and SOP to adapt to malaria elimination and prevention of re-introduction phase
- Training and re-orient malaria technicians and relevant health workers on revised entomological surveillance and SOP aligned with malaria elimination
- Capacity building of entomologist and malaria technicians on entomological surveillance techniques in malaria elimination
- Review and incorporate vector and climatic surveillance data using web-based real time reporting system in DHIS2
- Develop M & E tool kit for quality assurance of entomological surveillance
- Consultative meeting with hydropower project management on operational mechanism for vector surveillance and malaria prevention
- Update and revise the vector control guidelines and SOP incorporating integrated vector control management
- Monitoring residual efficacy of insecticides used in IRS and LLIN

- Procurement of entomological equipment (Bioassay cones, suction tubes, impregnated papers and WHO insecticide susceptibility test kit)
- Procurement of insectary laboratory equipment
- Explore entomology capacity building through support of BSc in Entomology/MSc in Medical Entomology and parasitology
- Recruitment and training of entomology Assistant (Insect collector)
- Training on vector control operations and maintenance of equipment
- Training of laboratory personnel on PCR for vector incrimination

Strategy 3.5 Strengthen special events surveillance

The event surveillance will include monitoring for events such as unexpected population movements, construction of large developmental projects, mass community gathering, changes in climatic data, number and pattern of fever cases in the communities and any events with potential for malaria importation and transmission. This will be done through the multi-sectoral collaboration and community monitoring. Entomological surveillance in the developmental projects will inform potential transmission area and level of receptivity.

Action plans

- Sensitization of VHWs and community for events recognition and reporting in their community to respective health facilities and Gewog
- Sensitization of health workers for events recognition and reporting to the program
- Develop and implement malaria risk mitigation measures in collaboration with other relevant stakeholders
- Periodic spot vector surveillance in hydro-project sites

Strategic objective 4: Strengthen effective collaboration and partnerships to support malaria elimination program

For Bhutan to successfully achieve malaria elimination and sustain it, multi-sector approach through involvement of key relevant agencies is important. The non-health sector involvement should be sought to mainstream relevant malaria prevention and control activities in all their developmental activities. The relevant NGOs should also be consulted and engaged for programmatic interventions. The role of private and autonomous agencies will be pivotal during the elimination phase. The private companies, NGO, CBO will also be engaged in community mobilization for malaria elimination efforts. The stakeholders will be involved based on the potential and relevance of the malaria elimination initiatives.

Strategy 4.1 Forge strategic partnership and collaboration with key stakeholders for malaria elimination

This strategy will foster and develop effective partnerships and collaboration with all stakeholders at all levels. This will be done with the all relevant governmental, non-governmental and private sectors. Also, effective collaboration with neighboring countries will be explored and pursued as issue of border malaria can be addressed only with cross-border coordination and collaboration. The VDCP will lead coordination in this collaboration to ensure that there is no duplication of work and that the activities of partners are fully aligned with the national strategic plan for elimination and re-introduction of malaria in Bhutan.

Action plans (For collaboration with line ministries and agencies)

Ministry of Education

- Training of School health coordinators on prevention and control of malaria -
- Education and awareness for teachers and students in schools located in low risk areas (border areas) on malaria elimination efforts
- Pre-departure briefing of the students selected for overseas scholarship on malaria prevention especially those departing to malaria endemic countries
- Review and incorporate malaria prevention in the school health guideline

Ministry of Agriculture

- Consultative meeting to establish mechanism for information sharing for collaborative HEALTH IMPACT ASSESSMENT (HIA) of agricultural and livestock projects (Fishery projects)
- Consultative meeting for formulating integrated pest and vector management Eg: community forest, irrigation projects
- Engage in consultative process of national pesticide and chemical policies
- Collaborative projects for mass rearing and distribution of indigenous larvivorous fish
- Engage during farmers training especially in low risk areas organized by MoAF
- Support in distribution and effective use of LLIN and repellents for forest patrolling team and out-post in malaria risk areas

Ministry of Works and Human Settlement

- Consultative and advocacy meeting with Thromde authorities on enforcement of storm water drainage system during approval of building design in malaria risk areas
- Advocate on reduction of man-made mosquitoes breeding sites in construction industries during the construction
- Advocate and incorporate mosquito proof housing designs in the malaria endemic areas
- Institute joint inspection of thromde areas for monitoring and awareness on malaria elimination activities

Ministry of Labour and Human Resource

- Incorporate storm water drainage system and mosquito proofing net in skill based curriculum of TVET
- Consultative meeting on feasibility assessment on introduction of labour screening policy to re-screen those labours working in high risk areas after a duration of 2 weeks of leaving the workplace in Bhutan

Ministry of Home and Cultural Affairs

- Information sharing on personal profile of migrant labour in risk areas
- Support for re-screening of laborer who was away for more than 2 weeks duration
- Facilitate VDCP to advocate and sensitize during the cross border coordination meeting
- Issue directives to districts with low risk gewogs to support and prioritize efforts to facilitate malaria elimination activities at the communities
- Support inclusion of malaria agenda in all GT/DT meetings in all low risk areas
- Include advocacy on malaria elimination during Annual Dzongdag Conference

Armed forces

- Facilitate and support training of relevant medical professionals in the armed forces on malaria case detection and diagnosis in collaboration with VDCP
- Facilitate and support to screen armed forces coming back from UN peacekeeping mission to Bhutan
- Ensure use of preventive measures by armed forces on out-post duty in malaria endemic areas
- Conduct awareness on malaria prevention during gathering of troops
- Support in distribution and effective use of LLIN and repellents for patrolling team and out post in malaria risk areas
- Support and conduct proactive screening of soldiers returning after patrolling in the malaria risk areas inside the country

National Environment Commission

- Facilitate and support VDCP to conduct sensitization and advocacy to the environmental officers
- Incorporate environmental factors affecting health in EIA of any mega projects proposal

National Centre for Hydrology and Metrology

- Consultative meeting with NCHM for sharing of meteorological data with VDCP for prediction of malaria outbreaks, and joint research

Collaboration with the private sectors

Private diagnostic centers

- Institute and strengthen malaria case reporting and case referral system to concerned district and VDCP
- Support monitoring and supervision to ensure the test kits are of quality and standard as per the requirement of Drug Regulatory Authority
- Use of only certified and registered test kits and reagents
- Support to ensure quality assurance and capacity building activities as reflected in diagnosis and treatment strategy

Construction Development Board (CDB)

- Support to ensure medical screening of labour for malaria during the recruitment
- Support and facilitate VDCP during screening, monitoring and supervisory visits to construction sites in risk areas
- Support to ensure that all construction areas are free of possible mosquito breeding sites and all workers are covered by malaria preventive measures in risk areas
- Support to ensure that re-screening is conducted for those laborers who have been away for more than 2 weeks duration
- Support referral of any suspected malaria cases to the nearest health facilities

Media

- Support to advocate on corporate social responsibility to support the malaria elimination plan (Radio program, Drungtsho BBS)
- Support dissemination of press releases and regular publications of malaria related articles in mass media
- Support to organize high impact public events related to malaria (e.g. Malaria Day, tagged with other TV programs)

Community based religious and local healers

- Support in early referral of fever cases to health facilities
- Support in reducing stigma and myths around malaria in the community

Health-allied agencies (KGUMSB, RCDC, DRA, BMHC, DMS and DoMSHI)

- Consultative meeting with partner institutions to discuss on the key areas to be addressed for malaria elimination and develop action plan
- Review and incorporate malaria elimination aspects in the pre-service training curriculum of KGUMSB
- Finalization and validation of curriculum for Diploma in Medical Technology (Entomology) Course
- Develop up-gradation proposal for existing Malaria technicians to Medical Technician (Entomology)
- Conduct joint operational Research in support for malaria elimination
- Capacity development of University faculty members on malaria research and training
- Process registration for VDCP as teaching Institute
- Support KGUMSB for pre-service training attachment at VDCP
- Incorporate malaria management course in the curriculum of relevant PG course at KGUMSB
- Sensitize intern and new doctors on malaria elimination program
- Training of national Drug testing laboratory staff on drug quality testing (RCDC)
- Procurement of reference materials for minilab
- Training on good store management for pharmacy storekeepers by EMTD
- Forklift for medical supplies
- Procurement of refrigerator/ ILR

Strategy 4.2 Strengthen cross-border and inter-country collaboration

Bhutan shares a porous land border with Indian States of Assam and West Bengal which are endemic to malaria. Considering the proximity and human settlement the risk are even high. Over the past years, malaria cases in the country are confined to international border areas, posing considerable threat to not only in achieving our malaria elimination goal but also sustaining the prevention of re-introduction. Therefore, reducing malaria incidences across border remains very fragile, unless the cross border initiatives are well instituted and established. It calls for strengthening actions oriented to improve cross border coordination and collaboration at all levels. Bhutan and India has always enjoyed an exemplary friendship and also conducts the regular meetings to enhance peace and security across the borders, both at the local and central level. These platforms can be expanded to address public health related diseases of cross-border origin. There is need to have joint bilateral initiative in addressing cross border malaria through proper exchange of information, researches and other malaria control interventions.

Action plans

- Consultative and coordination meeting between Bhutan and India for planning bilateral collaboration and coordination for malaria elimination interventions across the border
- Establish joint bilateral coordination mechanism for addressing cross border malaria elimination issues and information sharing network
- Incorporate malaria elimination agenda in the existing forums such as WHO, SAARC & Indo- Bhutan Friendship Association

- Advocacy with MoFA and MoHCA to initiate discussion on cross border collaboration
- Putting malaria agenda in local government cross-border coordination meetings
- Explore and initiate institutional linkage for collaboration with NGOs like Rotary Club, Lions club and Red Cross Society in the border areas
- Study visit to the collaborating institutions for malaria networking
- Meeting of national program of two countries months to share data and experiences and to strategically plan joint control/elimination activities across the border

Strategy 4.3 Strengthen community engagement and participation

In quest for malaria elimination, community empowerment and participation will be vital. The well-established Community Action Group (CAG) which was specifically formed with the overall objective to carry out social mobilization activities including community level awareness raising programme will be strengthened in its role. The community based CAG will carry out Integrated Vector Management (IVM) at the community level. The capacity of existing CAG will be improved and it will be expanded to other malaria-risk areas.

Action plans

- Training of new CAG members in collaboration with districts and gewogs
- Refresher training for all active CAG members
- Exposure trip to learn from best practices from other best performing districts for CAG members
- Supporting innovative ideas for vector control and prevention at community level
- Development/revision of IVM/CAG training manuals and guidelines
- Training of CAG members on IVM in *gewogs* in low risk districts
- Enable CAG members to influence local leaders within their constituent
- District level CAG coordination meeting (All CAG members)
- Explore and incentivize CAG member – Best performing CAG, Uniforms

Strategic objective 5: Improve program management and performance

The successful implementation of the strategic plans and achievement of malaria elimination and sustaining this agenda post-elimination requires strong managerial and technical capacity in the program that is well-supported by the oversight independent committees. The high level committee for malaria elimination is to strengthen and maintain political commitment and ensure adequate financial support for program continuity. Therefore, oversight and technical will be established for effective and smooth progress towards elimination to facilitate program to achieve, maintain and prevent re-introduction of malaria. It is also important that the focus on malaria elimination and prevention of reintroduction is not diluted during this crucial stage of malaria elimination as malaria can come back with a vengeance and re-establish in the country as witnessed in the history of malaria. It is paramount that program is re-oriented and re-structured to deliver malaria elimination and prevention of re-introduction and sustain it. The adoption of the elimination strategy increases the need for leadership and management in the malaria program. Operations will need to be managed with rigor and flexibility, supported by robust monitoring and quality control. The program will need to be responsive to the evolving needs of the elimination effort to accelerate programmatic impact. Recognizing the challenges and complexities of sustaining the malaria elimination and prevention of reintroduction, capacity needs to be developed, and resources, organization and management need to be strengthened to improve program

management and performance to ensure that the basic principles of equity, evidence based and value for money principles as enshrined in the implementation of the program are ensured. Global Fund support in the past has contributed to the successful implementation of malaria control activities. Continued funding in this plan, with gradual reduction of external funding over the next 3- 5 years, based on the national development policies and priorities of the country which envisage an elevation of the country's development and economic status, is proposed to improve program management and performance to sustain a successful malaria elimination and prevention of its reintroduction in the future with increased local funding towards the end of the plan in order to successfully sustain the malaria elimination and prevention of re-introduction program.

Strategy 5.1 Strengthen resources, organization and management to sustain malaria elimination and prevent re-introduction

As the elimination progresses, high level political support is necessary. It is important that the country has the required policy support and technical capacity to successfully eliminate malaria and prevent re-introductions. The WHO mandates the eliminating countries to institute the malaria elimination commission and Technical Advisory Group (TAG) to provide policy directive and guidance during the elimination programme. Further, a continued review and alignment of malaria elimination plans and tools such as legal provisions, guidelines, strategic documents and form should be considered.

Action plans

- Operationalize National Commission for Disease Elimination (NCDE)
- Biannual meeting of the NCDE
- Oversight visit by the NCDE and TAG for monitoring and status of elimination activities
- Establish Technical Advisory Group for Malaria Elimination (TAGME)
- Develop ToR for TAGME and endorsement
- Orientation and sensitization of the TAGME members on the status of malaria elimination and national strategic plan
- Conduct biannual meeting of TAGME
- Conduct annual field monitoring and supervision visit by TAGME members
- Conduct every reported malaria case and death review and verification by the TAGME or its sub-committee
- Incorporate malaria elimination concerns in National health bill (disease notification, private sector operations, regulation and approvals of products and tools)
- Review and incorporate malaria elimination concerns in MoUs between MoH and relevant agencies (Partnership for sustainability – prevention and control measures, proactive vector prevention measures)
- Review HIA to include malaria transmission risk assessment
- Supervision and monitoring of implementation of provisions in MoUs and other agreements
- Printing of manuals, reports, guidelines and registers

Strategy 5.2 Invest in capacity building

- Develop proposal to upgrade VDCP or establishment of CTZD
- Training on programme management skills to central program staff
- Epidemiology training for program staff
- Training of entomologist in advanced techniques in entomology
- Training on insecticide resistance, molecular entomology and IVM

- Obtain TA from external experts
- Develop and build research capacity
- Recruitment of adequate technical human resources for VDCP
- Training of district health officers and programme personnel on malaria elimination
- Training of financial personnel on management of GFATM advance payments.
- Study tour to learn from the best practices from countries which have already eliminated malaria or are in the progress of elimination
- Training on logistics management to include forecasting, inventory management, storage and distribution - JOINT
- Capacity building for support staffs
- Operational cost for the programme – hiring of vehicles, salary of staff

Strategy 5.3 Strengthen decentralized malaria elimination program

The overall health policy follows a decentralized and integrated health care system. The district health sector are responsible for planning and implementation of health services including malaria control in their respective district. The VDCP as nodal national program for malaria will continue to provide technical support to strengthen malaria elimination process in the districts. The district level malaria elimination will be led by respective district health sector while VDCP will provide technical and budgetary support.

Action plans

- Support DMS and DHO office
- Training for DHO/DMS/CMO from malaria risk districts on malaria elimination framework
- Monitoring and supervision by DHO/DMS in health facilities on malaria elimination activities
- Maintenance of existing infrastructure

Strategic objective 6: Intensify advocacy and pursue effective IEC approaches for malaria elimination

As Bhutan shift from a low income country to lower middle income country, advocacy at different levels is crucial to sustain the malaria agenda beyond malaria elimination phase. The policymaker will need to be sensitized to prevent a reversal of the malaria elimination process as experienced in some countries. Partnerships with community will play a pivotal role in health promotion initiatives to drive and sustain malaria elimination. The VDCP program recognizes that an effective awareness raising strategy forms the foundation of any effort to effectively change service-provider skills and community behaviour apt for disease elimination and prevention of re-introduction. A comprehensive and effective strategy using many modes of communication in collaboration with health promotion division will be planned and implemented. All this will be complemented by improving the capacity of the staff to ensure that correct messages are transmitted and misconceptions are nipped in the bud during this critical phase of this programme.

Strategy 6.1 Conduct high level advocacy on malaria elimination

Action plans

- Develop a high level advocacy materials on malaria elimination
- Sensitization of parliamentarians for advocacy on malaria elimination during their constituency visit

- Conduct Advocacy campaign in DT/GT and Dzongdag conferences for malaria elimination
- Conduct consultative meeting with relevant authorities and line ministries to discuss on role for achieving malaria elimination and share recommendations
- Advocacy on prevention of malaria during the annual construction development board (CDB) conference
- Strongly advocate corporate social responsibility to support the malaria elimination activities as an integrated activity with other program under MoH
- Conduct advocacy on malaria elimination to the public by high level officials (PM, Health Minister)

Strategy 6.2 Raise awareness on malaria elimination among general population

Action plans

- Train relevant staff from VDCP and HPD in COMBI for social and behavior change communication (SBCC)
- Conduct awareness and educate for relevant target groups by the relevant agencies and partners
- Regular sensitization of students and scouts in all malaria risk areas
- Awareness for contractors on malaria prevention in low risk areas
- Organization of high impact public events to promote malaria elimination drive(e.g. Malaria Day, Festivals and Tshechus)
- Procurement of promotional materials (desktop calendars, ball point pens, etc.)
- Development of information package for travelers to malaria endemic areas
- Conduct BCC activities video shows, quiz shows, drama, lucky draws, games including to those vulnerable populations.
- Sensitize incoming and outgoing mobile/migrant populations about malaria risk, prevention and diagnosis and treatment services through peer education and targeted BCC campaigns at source communities, exit/entry points and through employers and agents at work sites
- Develop medical screening card in collaboration with relevant stakeholders to check during re-entry
- Develop tools to assess the effectiveness of BCC interventions implemented in target population
- Promote utilization of IT technology and social media in advocacy and IEC
- Support for awareness of malaria prevention through press releases and regular publications mass media
- Review and revise current IEC/BCC materials/boards
- Display IEC materials/boards at strategic sites
- Procurement of AV equipment

Strategic objective 7: Conduct operational research on malaria elimination

Prioritization and conduct of operational research is imperative for evidenced-based implementation of malaria elimination; to understand and continuously improve the operational aspects of the program strategies and interventions and to generate the strategic information for elimination program. The operational research will be prioritized and implemented in collaboration with partner institutions and WHO/APMEN.

Action plans

- Conduct consultative workshop to update on evolving research needs and prioritization of OR
- Training on operational and implementation research
- Develop research proposal on priority topics for funding
- Implement OR to ensure achievement and sustaining of malaria elimination in the country
- Conduct periodic review of research projects

Strategic objective 8: Strengthen Monitoring and evaluation of malaria elimination program

M & E is the weakest link at all level in monitoring routine program activities and tracking progress towards malaria elimination. The existing programme M & E is not implemented well and program performance and progress is not well documented.

Action plans

Strategy 8.1 Reinforce implementation of supervision, monitoring and evaluation

- Develop M & E guidelines, framework and tools for malaria elimination program (2020 - 2025)
- Develop or update guidelines and tools for supervision, monitoring and evaluation
- Train program personnel on M & E in the region
- ToT and M & E
- Conduct quarterly consultative review workshop with DHO/DMS and VDCP
- Conduct KAP survey
- Conduct external evaluation of the malaria elimination program
- Publication of annual reports
- Quarterly and annual supervision and monitoring visit to the field
- Annual Malaria Review Meeting

Strategy 8.2 Expedite for certification of malaria elimination

- Biennial meeting of NCDE and TAGME for malaria elimination program review
- Establish processes and policies to document evidences to achieve malaria elimination certification

Implementation plan

This NSP 2020 – 2025 is a living document and therefore, it will be reviewed every two or three years and if required amended to address the epidemiological and programmatic situations and aligned accordingly with other national plans. The Department of Public Health under the Ministry of Health will lead the malaria elimination with VDCP at the helm of driving day-to-day coordination of the strategy and its activities, ensuring that all implementing partners have financial, policy, human resources and infrastructure capacity necessary to efficiently and effectively carry out their respective malaria elimination functions. VDCP will also provide technical and programmatic support on diagnosis and case management, entomological monitoring and vector control, case detection and surveillance, information and communication for behavioral change and community empowerment, as well as providing monitoring, supervision and evaluation of the activities that are implemented as per the NSP. VDCP will be the nodal agency for resource mobilization besides liaising and reporting to the international partners. While VDCP develops policies and guidelines, the implementation of the elimination activities will continue and expand in a decentralized manner with onus given to the district health sector. The districts may further decentralize to gewogs with respective Primary Health Units (PHCs) playing a central role at the community level. The PHCs have to initiate malaria elimination through community empowerment by mainly utilizing the Community Actions Groups (CAG) and Village Health Workers (VHW). The entomological services will be provided through the district entomological units. The District Rapid Response team will attend to any outbreak with technical and entomological backup provided by the VDCP and RCDC. The NCDE will provide policy directions and oversight to the program for the activity implementation and mobilization of the budget and resources. The commission will be backed up by the Technical Working Group (TWGME) which will provide technical support and recommendations to ensure that NSP is implemented smoothly and successfully to achieve its stated goals and objectives. The partner institutions like RCDC, KGUMSB, DRA and other stakeholders will provide support to VDCP through implementation of relevant malaria elimination activities as specified in the plan. The RCDC as national malaria reference laboratory will ensure the quality of malaria diagnosis through institution of quality assurance systems. In addition, it will also provide technical backup not only in malaria diagnosis and parasite genotyping, but also in strengthening surveillance systems. The Drug Regulatory Authority and the Department of Medical Supplies and Health Infrastructure will ensure the quality antimalarial drugs, diagnostics and other medical supplies are procured and distributed throughout the country and are available all the time. The KGUMSB will collaborate to ensure that malaria is taught in pre-service training, maintain expertise among the faculty, and also offer diploma course in entomology to ensure that malaria is kept on academic agenda beyond the elimination period. The RGoB will mobilize funds and resources for the malaria elimination. The international donor funds will be channeled through the Gross National Happiness Commission and the GNHC will monitor the overall planning, budgeting and expenditure through the web-based planning, budgeting and expenditure management system.

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TABLE 7: PERFORMANCE FRAMEWORK FOR MONITORING AND EVALUATION (2020-2025)

TABLE 8: COSTED ACTION PLANS OF NSP

S.no	Modules	Activities	Year 1	Year 2	Year 3	Year 4	Year 5	Total(in USD)
Strategic objective 1: Strengthen targeted and focused preventive malaria interventions								
1.1 Updated risk stratification and mapping of receptive areas for geographical reconnaissance								
1.1.1	RSSH: HMIS & M&E	Annual update of stratification of malaria transmission and mapping at gewog/chiwog level on the basis of local malaria transmission, receptivity and vulnerability						
1.1.2	RSSH: HMIS & M&E	Update and generate households mapping for surveillance using available appropriate software	0	0	0	0	0	-
1.1.3	RSSH: HMIS & M&E	Training of Relevant personnel on GIS mapping	10860	0	10860	0	10860	32,580
1.1.4	RSSH: HMIS & M&E	Training on use and application of GIS software for health workers (Entomologists, Epidemiologist, DHOs, MT)	0	21375	21375	21375	21375	85,500

1.1.5	RSSH: HMIS & M&E	Update existing operational/training manuals on GIS	3420	0	3420	0	3420	10,260
1.1.6	RSSH: HMIS & M&E	Develop/revise standardized and user-friendly guidelines and format for data collection	0	3420	0	3420	0	6,840
1.1.7	RSSH: HMIS & M&E	Collection of new households village-wise data and other core variables by health centers under the supervision of district	73125	0	0	73125	0	146,250
1.1.8	RSSH: HMIS & M&E	Vector and species prevalence data collection with geo-locations at chiwog level	12480	12480	12480	12480	12480	62,400
Sub. Total			99,885	37,275	48,135	110,400	48,135	343,830
1.2 Implementation of targeted and focused interventions as per updated risk strata								
1.2.1	Vector Control	Procurement and mass distribution of LLIN	0	311554	0	0	311554	623,108
1.2.2	Vector Control	Enumeration of households and population for LLIN distribution planning.	73125	0	0	73125	0	146,250
1.2.3	Vector Control	Conduct review for possible replacement of chemicals and insecticides used for IRS	4275	0	0	4275	0	8,550
1.2.4	Vector Control	Annual procurement of insecticide, spray pumps, spare parts and fogging machine.	113478	113478	113478	113478	113478.4	567,392
1.2.5	Vector Control	Training of spray squads by respective health facilities on how to do the maintenance of sprayer parts and take safety precautions (during every round of spray).	11400	11400	11400	11400	11400	57,000
1.2.6	Vector Control	Annual spraying program at the district level	63000	63000	63000	63000	63000	315,000
1.2.7	Vector Control	Ad hoc focal spray during outbreaks	10000	10000	10000	10000	10000	50,000
1.2.8	Vector Control	Procurement of protective attire for sprayers	15000	0	15000	0	15000	45,000
1.2.9	Vector Control	Capacity building of staff to establish insecticide quality assurance at RCDC	7240	0	0	7240	0	14,480
1.2.10	Vector Control	Establish and conduct insecticide quality assurance at RCDC	3900	3900	3900	3900	3900	19,500
Sub. Total		Sub. Total	301,418	513,332	216,778	286,418	528,332	1,846,280

Strategic objective 2: Establish rigorous quality assurance program for laboratory diagnosis and ensure prompt and effective treatment and follow up

2.1 Strengthen national quality assurance program for malaria microscopy and RDTs								
2.1.1	Case management	Procurement of RDTs	16820	16820	16820	16820	16820	84,100
2.1.1	Case management	Procurement of microscopes	20220	20220	20220	20220	20220	101,100
2.1.2	RSSH:Laboratory System	Procurement of PCR reagents	0	27000	0	27000	0	54,000
2.1.3	RSSH:Laboratory System	Establishment of fully functional reference laboratory at RCDC	0	5000	0	0	5000	10,000
2.1.4	Program Management	Incorporate malaria diagnosis training modules in pre-service training of trainees in Faculty of Nursing and Public Health	0	8550	0	0	8550	17,100
2.1.5	RSSH:Laboratory System	Consultative meeting to develop NEQAS guidelines for malaria diagnosis	4275	0	0	4275	0	8,550
2.1.6	RSSH:Laboratory System	Training of Laboratory personnel and malaria technician on NEQAS system	14250	14250	14250	14250	14250	71,250
2.1.7	RSSH:Laboratory System	Provide refresher training course on external competency assessment (ECA) for malaria microscopist	0	19950	19950	19950	19950	79,800
2.1.8	RSSH:Laboratory System	Conduct National competency assessment and ECA for malaria microscopist	0	4788	0	4788	4788	14,364
2.1.9	RSSH:Laboratory System	Explore for Institutional linkages with WHO collaborating centers on malaria diagnosis	0	9200	0	0	0	9,200
2.1.10	RSSH:Laboratory System	Develop SOP for malaria diagnosis at NMRL	0	4275	0	0	4275	8,550
2.1.11	RSSH:Laboratory System	Participation in international external quality assessment scheme (IEQAS) and accreditation of NMRL with international institution	0	7240	0	7240	0	14,480
2.1.12	RSSH:Laboratory System	Training of Trainers on malaria microscopy maintenance and repair	0	14480	0	14480	0	28,960
2.1.13	RSSH:Laboratory System	Establishment and preparation of SOP on malaria slide bank	4275	0	0	4275	0	8,550
2.1.14	RSSH:Laboratory System	Monitoring and supervisory visit to district laboratories and private diagnostic centers	9360	9360	9360	9360	9360	46,800
2.1.15	RSSH:Laboratory System	Shipment cost for transportation of DBS sample, MP slide cross checking and MP panel slide testing (Cost to be reflected with district)	2000	2000	2000	2000	2000	10,000
2.1.16	RSSH:Laboratory System	Development of SOP for evaluation of RDT	3420	0	0	3420	0	6,840
2.1.17	RSSH:Laboratory System	Procurement of laboratory equipment	30000	0	0	30000	0	60,000

2.1.18	RSSH:Laboratory System	Training of laboratory staff of private diagnostic centers on quality assurance in malaria diagnosis	8550	8550	8550	8550	8550	42,750
Sub. Total		Sub. Total	113,170	171,683	91,150	186,628	113,763	676,394
2.2 Sustain competency of health worker on malaria diagnosis and treatment								
2.2.1	Case Management	Review and revise national malaria treatment guideline including fever management flowchart	0	5700	0	0	5700	11,400
2.2.2	Case Management	Training of all clinicians and other health professional including military medical staff on revised malaria treatment guidelines	45600	0	45600	0	45600	136,800
2.2.3	RSSH:Laboratory System	Training of laboratory staffs on the revised and updated malaria diagnosis guideline	0	14250	0	14250	0	28,500
2.2.4	RSSH:Laboratory System	Training of laboratory staff on sample collection, preparation and shipment for PCR testing	0	0	0	0	0	-
2.2.5	Case Management	Conduct supervision and monitoring visits to health facilities to check stock status of antimalarial drugs/diagnostic kits, DOT implementation and case management evaluation	11700	0	11700	0	11700	35,100
2.2.6	Case Management	Sensitize Health Help Centre staff & Emergency Medical Team on fever case management (REVIEW)	0	0	0	0	0	-
2.2.7	Case Management	Develop guidelines and SOP for G6PD testing at point of care in all PV cases prior to administration of the 14-day primaquine regimen	4560	0	0	4560	0	9,120
2.2.8	Case Management	Training of health workers on G6PD testing SOP	6840	6840	0	6840	6840	27,360
2.2.9	Case Management	Procurement of G6PD test kits	2500	2500	2500	2500	2500	12,500
2.2.10	Case Management	Procurement of antimalarial drugs	17500	17500	17500	17500	17500	87,500
2.2.11	Case Management	Update training module on malaria case management for pre-service health professionals	0	5700	0	0	5700	11,400
2.2.12	Case Management	Procurement of ambulance for malaria risk hospital	120000	0	0	120000	0	240,000

2.2.13	Case Management	Conduct mobile outreach clinics for diagnosis and treatment of migrant population	14040	14040	14040	14040	14040	70,200
2.2.14	Case Management	Conduct follow up of all cases as per WHO recommendations up to day 28 for Pf cases and at least upto 3rd month for PV cases	11700	11700	11700	11700	11700	58,500
2.2.15	Case Management	Develop and update integrated malaria case follow-up procedure and reporting forms (IDES and DOT)	0	5130	0	0	5130	10,260
2.2.16	Case Management	Training/re-training of VHWs for monitoring and promotion of DOT strategy	6120	6120	6120	6120	6120	30,600
2.2.17	Case Management	Supervision and monitoring for implementation of follow-up for all cases for treatment compliance and drug efficacy monitoring	2340	2340	2340	2340	2340	11,700
Sub. Total		Sub. Total	242,900	91,820	111,500	199,850	134,870	780,940
Strategic objective 3: Strengthen services for surveillance for malaria case detection and rapid outbreak response system								
3.1 Strengthen epidemic preparedness, forecasting, early warning and response system								
3.1.1	Case Management	Develop/revise SOP on outbreak preparedness and response plan for malaria epidemics	0	0	3420	0	0	3,420
3.1.2	Case Management	Integration and training of District Health Rapid Response Team (DHRRT) on outbreak investigation and management	0	15390	0	15390	0	30,780
3.1.3	Case Management	Periodic assessment of district capacity by programme for malaria epidemics preparedness and response	0	0	0	0	0	-
3.1.4	Case Management	Procure and ensure availability of buffer stocks (LLIN, IRS, larvicide) at regional and sufficient stocks maintained at the program level	0	0	0	0	0	-
3.1.5	Case Management	Strengthen distribution and monitoring on the availability of buffer stock	0	0	0	0	0	-
3.1.6	Progrm Management	Consultative meeting with Hydromet division to explore and integrate climatic surveillance system for early detection and response to malaria and other vector borne disease outbreaks	4560	4560	0	4560	0	13,680
3.1.7	RSSH: HMIS & M&E	Review and strengthen existing surveillance system to detect epidemics and issue early warning and alert system	0	0	0	0	0	-
3.1.8	RSSH: HMIS & M&E	Collect data on environmental and meteorological risk factors, population dynamics for risk mapping	12285	12285	12285	12285	12285	61,425

3.1.9	RSSH: HMIS & M&E	GIS mapping of receptive and vulnerable areas using GIS software and GPS	9360	0	9360	0	9360	28,080
3.1.10	RSSH: HMIS & M&E	Training of epidemiologist/entomologist in modelling of disease outbreak forecasting, early warning and early detection	0	7240	0	7240	0	14,480
Sub. Total		Sub. Total	26,205	39,475	25,065	39,475	21,645	151,865
3.2 Conduct case-based investigation and response								
3.2.1	RSSH: HMIS & M&E	Review and revise national malaria surveillance and response guideline and SOP including malaria case classification criteria	0	7980	0	0	7980	15,960
3.2.2	RSSH: HMIS & M&E	Train new health workers and provide refresher training in immediate notification using NEWARS/DHIS2 system	11400	11400	11400	11400	11400	57,000
3.2.3	RSSH: HMIS & M&E	Training of relevant health workers on revised malaria surveillance and response guidelines	11400	0	11400	0	11400	34,200
3.2.4	RSSH: HMIS & M&E	Training of relevant health workers on field epidemiological investigation and tools including data analysis	7240	7240	0	7240	0	21,720
3.2.5	RSSH: HMIS & M&E	Procurement of computers for online reporting and submitting case information	0	0	120000	0	0	120,000
3.2.6	RSSH: HMIS & M&E	Review and update modules in DHIS2 for data collection to suit the need of elimination stage	9980	0	9980	0	0	19,960
3.2.7	RSSH: HMIS & M&E	Capacity building of IT/HMIS officials in DHIS2 system and up-gradation	0	10860	0	10860	0	21,720
3.2.8	Progrm Management	Review and classification of reported malaria case at the national level by the TAGME	3648	3648	3648	3648	3648	18,240
3.2.9	RSSH: HMIS & M&E	Monitoring of surveillance data quality at district and central program level	4680	4680	4680	4680	4680	23,400
Sub. Total		Sub. Total	48,348	45,808	161,108	37,828	39,108	332,200
3.3 Improve proactive case detection (PACD)								
3.3.1	Case Management	Review and revise guideline and SOP for active case detection strategies to detect all potential symptomatic and asymptomatic malaria infection	7980	0	7980	0	0	15,960
3.3.2	Case Management	Update and reformulate policies to prevent re-introduction of malaria through migrants	0	7980	0	7980	0	15,960
3.3.3	Case Management	Conduct annual mass screening of migrants at the industrial sites and hydropower projects.	4680	4680	4680	4680	4680	23,400
3.3.4	Case Management	Identify vulnerable population groups (hard to reach population) for active case detection	3744	3744	3744	3744	3744	18,720

3.3.5	Case Management	Monitoring and supervision of projects areas and private diagnostic center regularly	0	0	0	0	0	-
3.3.6	RSSH: HMIS & M&E	Conduct border screening for malaria at exit/entry point for travellers/high risk groups from Malaria endemic countries	0	0	0	0	0	-
3.3.7	RSSH: HMIS & M&E	Investigate cases of pyrexia of unknown origin reported from the districts for special investigation	2340	2340	2340	2340	2340	11,700
3.3.8	RSSH: HMIS & M&E	Conduct one time field survey in low risk areas with local transmission to detect asymptomatic parasite carriers	5616	0	5616	0	5616	16,848
Sub. Total		Sub. Total	24,360	18,744	24,360	18,744	16,380	102,588
3.4 Strengthen capacity for entomology and insecticide resistance surveillance and response								
3.4.1	RSSH: HMIS & M&E	Update entomological surveillance and insecticide resistance monitoring guidelines and SOP to adapt to malaria elimination and prevention of re-introduction phase	6840	0	0	6840	0	13,680
3.4.2	RSSH: HMIS & M&E	Training and re-orient malaria technicians and relevant health workers on revised entomological surveillance and SOP aligned with malaria elimination	14250	0	14250	0	14250	42,750
3.4.3	RSSH: HMIS & M&E	Capacity building of entomologist and malaria technicians on entomological surveillance techniques in malaria elimination in the region	0	7240	0	7240	0	14,480
3.4.4	RSSH: HMIS & M&E	Review and incorporate vector and climatic surveillance data using web-based real time reporting system in DHIS2	7125	0	0	7125	0	14,250
3.4.5	RSSH: HMIS & M&E	Develop M & E tool kit for quality assurance of entomological surveillance	0	0	0	0	0	-
3.4.6	RSSH: HMIS & M&E	Consultative meeting with project management on operational mechanism for vector surveillance and malaria prevention	0	2565	0	2565	0	2,565
3.4.7	RSSH: HMIS & M&E	Update and revise the vector control guidelines and SOP incorporating integrated vector control management	0	0	0	0	0	-
3.4.8	RSSH: HMIS & M&E	Monitoring residual efficacy of insecticides used in IRS and LLIN	0	0	9360	0	0	9,360
3.4.9	RSSH: HMIS & M&E	Procurement of entomological equipment (Bioassay cones, suction tubes, impregnated papers and WHO insecticide susceptibility test kit)	0	4500	0	4500	0	9,000
3.4.10	RSSH: HMIS & M&E	Procurement of insectary laboratory equipment	0	0	0	0	0	-

3.4.11	Progrm Management	Explore entomology capacity building through support of BSc in Entomology/MSc in Medical Entomology and parasitology	0	18300	18300	0	0	36,600
3.4.12	Progrm Management	Recruitment and training of entomology Assistant	0	5400	0	0	0	5,400
3.4.13	Vector Control	Training on vector control operations and maintenance of equipment	0	0	5700	0	0	5,700
3.4.14	RSSH:Laboratory System	Training of laboratory personnel on PCR for vector incrimination	0	7240	0	0	0	7,240
Sub. Total		Sub. Total	28,215	45,245	47,610	28,270	14,250	161,025
3.5 Strengthen special events surveillance								
3.5.1	RSSH: CSS	Sensitization of VHWs and community for events recognition and reporting in their community to respective health facilities and Gewog	0	14280	0	14280	0	28,560
3.5.2	RSSH: CSS	Sensitization of health workers for events recognition and reporting to the program	0	0	0	0	0	-
3.5.3	Progrm Management	Develop and implement malaria risk mitigation measures in collaboration with other relevant stakeholders	5700	0	5700	0	0	11,400
3.5.4	RSSH: HMIS & M&E	Periodic spot vector surveillance in hydro-project sites	14040	0	0	0	14040	28,080
Sub. Total		Sub. Total	19,740	14,280	5,700	14,280	14,040	68,040
Strategic objective 4: Strengthen effective collaboration and partnerships to support malaria elimination program								
4.1 Forge strategic partnership and collaboration with key stakeholders for malaria elimination								
4.1.1	Progrm Management	Training of School health coordinators on prevention and control of malaria	8550	0	8550	0		17,100
4.1.2	Progrm Management	Review and incorporate malaria prevention in the school health guideline	5700	0	0	0	0	5,700
4.1.3	Progrm Management	Consultative meeting to establish mechanism for information sharing for collaborative HEALTH IMPACT ASSESSMENT (HIA) of agricultural and livestock projects (Fishery projects) & hydro-met department	0	5700	0	0	0	5,700
4.1.4	Vector Control	Consultative meeting for formulating integrated pest and vector management Eg: community forest, irrigation projects	6840	0	0	0	0	6,840
4.1.5	Vector Control	Engage in consultative process of national pesticide and chemical policies	0	0	0	0	0	-
4.1.6	Vector Control	Collaborative projects for mass rearing and distribution of indigenous larvivorous fish	0	0	0	0	0	-

4.1.7	Progrm Management	Consultative and advocacy meeting with Thromde authorities on enforcement of storm water drainage system during approval of building design in malaria risk areas	17100	0	17100	0	0	34,200
4.1.8	Progrm Management	Consultative meeting for Incorporate storm water drainage system and mosquito proofing net in skill based curriculum of TVET	0	0	0	0	0	-
4.1.9	Progrm Management	Consultative meeting on feasibility assessment on introduction of labour screening policy to re-screen those labours working in malaria risk areas after a duration of 2 weeks of leaving the workplace in Bhutan	0	0	0	0	0	-
4.1.10	Progrm Management	Consultative meeting to develop roles and responsibility of MOHCA on malaria elimination	0	0	0	0	0	-
4.1.11	Progrm Management	Facilitate VDCP to advocate and sensitize during the cross border coordination meeting	0	0	0	0	0	-
4.1.12	Progrm Management	Support inclusion of malaria agenda in all GT/DT & Thromdey Tshokdey meetings in all potential and low risk areas	0	0	0	0	0	-
4.1.13	Progrm Management	Include advocacy on malaria elimination during Annual Dzongdag Conference	0	0	0	0	0	-
4.1.14	Case Management	Facilitate and support training of relevant medical professionals in the armed forces on malaria case detection and diagnosis in collaboration with VDCP	0	13680	0	13680	0	27,360
4.1.15	Case Management	Facilitate and support to screen armed forces coming back from UN peacekeeping mission to Bhutan	0	0	0	0	0	-
4.1.16	Progrm Management	Consultative meeting with NCHM for sharing of meteorological data with VDCP for prediction of malaria outbreaks, and joint research	3420	0	3420	0	0	6,840
4.1.17	Progrm Management	Consultative meeting with partner institutions to discuss on the key areas to be addressed for malaria elimination and develop action plan	0	10260	0	10260	0	20,520
4.1.18	Progrm Management	Review and incorporate malaria elimination aspects in the pre-service training curriculum of KGUMSB	0	0	0	0	0	-
4.1.19	Progrm Management	Finalization and validation of curriculum for Diploma in Medical Technology (Entomology) Course	3420	0	0	0	0	3,420

4.1.20	Progrm Management	Develop up-gradation proposal for existing Malaria technicians to Medical Technician (Entomology)	0	0	0	0	0	-
4.1.21	RSSH: HMIS & M&E	Conduct joint operational Research in support for malaria elimination and prevention of re-introduction	10000	0	10000	0	10000	30,000
4.1.22	RSSH: HMIS & M&E	Capacity development of University faculty members on malaria research and training		7240.00		7240.00		14,480
4.1.23	Progrm Management	Process registration for VDCP as teaching Institute	0	0	0	0	0	-
4.1.24	Progrm Management	Support KGUMSB for pre-service training attachment at VDCP	3750	3750	3750	3750	3750	18,750
4.1.25	Progrm Management	Incorporate malaria management course in the curriculum of relevant PG course at KGUMSB	0	0	0	0	0	-
4.1.26	Progrm Management	Sensitize intern and new doctors on malaria case management and elimination program	2250	2250	2250	2250	2250	11,250
4.1.27	Case Management	Training of health workers on pharma-co vigilance and adverse drug reactions (DRA)	0	5700	0	5700	0	11,400
4.1.28	Case Management	Training of national Drug testing laboratory staff on drug quality testing (RCDC)	0	0	7240	0	0	7,240
4.1.29	Case Management	On-site testing of anti-malarial drugs using minilab by DRA	3120	0	3120	0	3120	9,360
4.1.30	Case Management	Procurement of reference materials for minilab	0	4000	0	4000	0	8,000
4.1.31	Case Management	Training on good store management for pharmacy storekeepers by EMTD	5700	0	5700	0	0	11,400
4.1.32	RSSH:HPMS	Forklift for medical supplies	11000	0	0	0	0	11,000
4.1.33	RSSH:HPMS	Procurement of refrigerator	0	11000	0	0	0	11,000
Sub. Total		Sub. Total	80,850	63,580	61,130	46,880	19,120	271,560
4.2 Strengthen cross-border and inter-country collaboration								
4.2.1	Progrm Management	Consultative and coordination meeting between Bhutan and India for planning bilateral collaboration and coordination for malaria elimination interventions across the border	9612.00	0.00	9612.00	0.00	0.00	19,224
4.2.2	Progrm Management	Establish joint bilateral coordination mechanism for addressing cross border malaria elimination issues and information sharing network	0	0	0	0	0	-
4.2.3	Progrm Management	Incorporate malaria elimination agenda in the existing forums Indo- Bhutan Friendship Association collaboration	0	0	0	0	0	-

4.2.4	Progrm Management	Advocacy with MoFA and MoHCA to initiate discussion on cross border collaboration	0	0	0	0	0	-
4.2.5	Progrm Management	Putting malaria agenda in local government cross-border coordination meetings	0	0	0	0	0	-
4.2.6	Progrm Management	Explore and initiate institutional linkage for collaboration with NGOs like Rotary Club, Lions club and Red Cross Society in the border areas	0	0	0	0	0	-
4.2.7	Progrm Management	Study visit to the collaborating institutions for malaria networking	0.00	14480.00	0.00	0.00	14480.00	28,960
4.2.8	Progrm Management	Meeting with State program of two countries 6 monthly to share data and experiences and to strategically plan joint control/elimination activities across the border	18100.00	0.00	18100.00	0.00	18100.00	54,300
Sub. Total		Sub. Total	27,712	14,480	27,712	-	32,580	102,484
4.3 Strengthen community engagement and participation								
4.3.1	RSSH: CSS	Training of new CAG members in collaboration with districts and gewogs	10200	10200		10200		30,600
4.3.2	RSSH: CSS	Refresher training for all active CAG members	10710	10710	10710	10710	10710	53,550
4.3.3	RSSH: CSS	Exposure trip to learn from best practices from other best performing districts for CAG members	0	0	14280	0	14280	28,560
4.3.4	RSSH: CSS	Supporting innovative ideas for vector control and prevention at community level	3000	0	3000	0	3000	9,000
4.3.5	RSSH: CSS	Development/revision of IVM/CAG training manuals and guidelines	4560	0	0	0	0	4,560
4.3.6	RSSH: CSS	Training of CAG members on IVM in gewogs of in low risk areas	0	7140	0	7140	0	14,280
4.3.7	RSSH: CSS	Enable CAG members to influence local leaders within their constituent	0	0	0	0	0	-
4.3.8	RSSH: CSS	District level CAG coordination meeting (All CAG members)	7140	7140	7140	7140	7140	35,700
4.3.9	RSSH: CSS	Explore and incentivize CAG member – Best performing CAG	0	0	0	0	0	-
Sub. Total		Sub. Total	35,610	35,190	35,130	35,190	35,130	176,250
Strategic objective 5: Improve program management and performance								
5.1 Strengthen resources, organization and management to sustain malaria elimination and prevent re-introduction								
5.1.1	Progrm Management	Operationalize National Commission for Disease Elimination (NCDE)						-
5.1.2	Progrm Management	Biannual meeting of the NCDE	6840	6840	6840	6840	6840	34,200

5.1.3	Progrm Management	Oversight visit by the NCDE and TAG for monitoring and status of elimination activities	3510	3510	3510	3510	3510	17,550
5.1.4	Progrm Management	Conduct biannual meeting of TAGME	5472	5472	5472	5472	5472	27,360
5.1.5	RSSH: HMIS & M&E	Conduct annual field monitoring and supervision visit by TAGME members	6435	6435	6435	6435	6435	32,175
5.1.6	RSSH: HMIS & M&E	Conduct every reported malaria case and death review and verification by the TAGME or its subcommittee	0	0	0	0	0	-
5.1.7	Progrm Management	Update and revise National Strategic Plan and malaria technical guidelines	0	0	0	11400		11,400
5.1.8	Progrm Management	Incorporate malaria elimination concerns in National health bill (disease notification, private sector operations, regulation and approvals of products and tools)	0	0	0	0	0	-
5.1.9	Progrm Management	Review and incorporate malaria elimination concerns in MoUs between MoH and relevant agencies (Partnership for sustainability – prevention and control measures, proactive vector prevention measures)	0	0	0	0	0	-
5.1.10	RSSH: HMIS & M&E	Review HIA to include malaria transmission risk assessment	0	0	0	0	0	-
5.1.11	Progrm Management	Supervision and monitoring of implementation of provisions in MoUs and other agreements	0	0	0	0	0	-
5.1.12	Progrm Management	Printing of manuals, reports, guidelines and registers	0	0	0	0	0	-
Sub. Total		Sub. Total	22,257	22,257	22,257	33,657	22,257	122,685
5.2 Invest in capacity building								
5.2.1	RSSH:HSG& P	Develop proposal to upgrade VDCP for establishment of CTZD	0	0	0	0	0	-
5.2.2	Progrm Management	Training on programme management skills to central program staff	0	7240	0	0	7240	14,480
5.2.3	Progrm Management	Field Epidemiology training for DHOs/program staff	3620	0	3620	0	0	7,240
5.2.4	Progrm Management	Training of entomologist in advanced techniques in entomology	0	0	7240	0	7240	14,480
5.2.5	Progrm Management	Training on insecticide resistance, molecular entomology and IVM	14480	0	0	0	0	14,480
5.2.6	RSSH: HMIS & M&E	Training on risk mapping using GIS	0	0	7240	0	0	7,240
5.2.7	Vector Control	Invite TA from external experts Training of entomologist	0	0	0	0	0	-

5.2.8	Progrm Management	Training of Epidemiologist on vector-borne disease	0	7240	0	7240	0	14,480
5.2.9	Progrm Management	Mater in Tropical Medicine in the Region	18300	0	18300	0	0	36,600
5.2.10	Progrm Management	Recruitment of adequate technical human resources for VDCP	0	0	0	0	0	-
5.2.11	Progrm Management	Training of district health officers and programme personnel on malaria elimination and prevention of re-establishment by WHO experts	0	20520	0	0	0	20,520
5.2.12	Progrm Management	Training of relevant personnel on management of GFATM funds management	0	7240	0	0	0	7,240
5.2.13	Progrm Management	Study tour to learn from the best practices from countries which have already eliminated malaria and prevention of re-introduction phase	0	0	21720	0	0	21,720
5.2.14	RSSH:HPMS	Training on logistics management to include forecasting, inventory management, storage and distribution	0	7240	0	7240	0	14,480
5.2.8	Progrm Management	Capacity building for support staffs (administration)	0	7240	0	0	7240	14,480
Sub. Total		Sub. Total	36400	56720	58120	14480	21720	187,440
5.3 Strengthen decentralized malaria elimination program								
5.3.1	Progrm Management	Training for DHO/DMS/CMO from malaria risk districts on malaria elimination framework By WHO experts	0	0	0	0	0	-
5.3.2	RSSH: HMIS & M&E	Monitoring and supervision by DHO/DMS in health facilities on malaria elimination activities	10608	10608	10608	10608	10608	53,040
5.3.3	Progrm Management	Operational cost for the programme – recurrent cost, salary of staff	1234350	1357785	1493564	1642920	1807212	7,535,830
Sub. Total			1,244,958	1,368,393	1,504,172	1,653,528	1,817,820	7,588,870
Strategic objective 6: Intensify advocacy and pursue effective IEC approaches for malaria elimination								
6.1 Conduct high level advocacy on malaria elimination								
6.1.1	Progrm Management	Develop a high level advocacy materials on malaria elimination and prevention of reintroduction	11400	0	0	11400	0	22,800
6.1.2	Progrm Management	Sensitization of parliamentarians for advocacy on malaria elimination during their constituency visit	0	3290	0	3290	0	6,580

6.1.3	Progrm Management	Conduct Advocacy campaign in DT/GT and Dzongdag conferences for malaria elimination	7050	0	7050	0	0	14,100
6.1.4	Progrm Management	Conduct consultative meeting with relevant authorities and line ministries to discuss on role for achieving malaria elimination and share recommendations	0	10260	0	10260	0	20,520
6.1.5	Progrm Management	Advocacy on prevention of malaria during the annual construction development board (CDB) conference	2350	0	2350	0	2350	7,050
6.1.6	Progrm Management	Strongly advocate corporate social responsibility to support the malaria elimination activities as an integrated activity with other program under MoH						-
6.1.7	Progrm Management	Conduct advocacy on malaria elimination to the public by high level officials (PM, Health Minister)	0	4000	0	4000	0	8,000
Sub. Total		Sub. Total	20800	17550	9400	28950	2350	79,050
6.2 Raise awareness on malaria elimination among general population Action plans								
6.2.1	Progrm Management	Train relevant staff from VDCP and HPD in COMBI for social and behavior change communication (SBCC)	7240	0	7240	0	0	14,480
6.2.2	Case Management	Conduct awareness among the at risk population around index case during RACD	18000	18000	18000	18000	18000	90,000
6.2.3	Progrm Management	Conduct awareness and educate for relevant target groups by the relevant agencies and partners						-
6.2.4	RSSH: CSS	Regular sensitization of students and scouts in all malaria risk areas	5000	5000	5000	5000	5000	25,000
6.2.5	Program Management	Awareness for contractors on malaria prevention in low risk areas	12000	12000	12000	12000	12000	60,000
6.2.6	Case Management	Sensitization of private retail pharmacies on anti-malaria in collaboration with DRA	0	0	0	0	0	-
6.2.7	RSSH: CSS	Organization of high impact public events to promote malaria elimination drive(e.g. Malaria Day, Festivals and Tshechus)	6000	6000	6000	6000	6000	30,000
6.2.8	Progrm Management	Procurement of promotional materials (desktop calendars, ball point pens, etc.)		20000			20000	40,000
6.2.9	RSSH: CSS	Development of information package for travelers to malaria endemic areas (airports/entery routes)	20000	0	20000	0	20000	60,000

6.2.10	RSSH: CSS	Conduct BCC activities video shows, quiz shows, drama, lucky draws, games including to those vulnerable populations.	0	14000	0	0	14000	28,000
6.2.11	RSSH: CSS	Sensitize incoming and outgoing mobile/migrant populations about malaria risk, prevention and diagnosis and treatment, through peer education and targeted BCC campaigns at source communities and through employers and agents at work sites.	0	0	0	0	0	-
6.2.12	RSSH: HMIS & M&E	Develop medical screening card in collaboration with relevant stakeholders to check during re-entry	0	15000	0	0	15000	30,000
6.2.13	RSSH: CSS	Develop tools to assess the effectiveness of BCC interventions implemented in target population						-
6.2.14	RSSH: CSS	Promote utilization of IT technology and social media in advocacy and IEC	10000	0	10000	0	10000	30,000
6.2.15	RSSH: CSS	Support for awareness of malaria prevention through press releases and regular publications mass media	0	0	0	0	0	-
6.2.16	RSSH: CSS	Review and revise current IEC/BCC materials/boards			5700			5,700
6.2.17	RSSH: CSS	Procurement of AV equipment		20000				20,000
Sub. Total		Sub. Total	78,240	110,000	83,940	41,000	120,000	433,180
Strategic objective 7: Conduct operational research on malaria elimination								
7.1	RSSH: HMIS & M&E	Conduct consultative workshop to update on evolving research needs and prioritization of operational research	4275	0	0	4275	0	8,550
7.2	RSSH: HMIS & M&E	Training on operational and implementation research	17100	0	17100	0	0	34,200
7.3	RSSH: HMIS & M&E	Develop research proposal for funding	0	0	0	0	0	-
7.4	RSSH: HMIS & M&E	Implement OR to ensure achievement and sustaining of malaria elimination in the country	15000	0	15000	0	0	30,000
7.5		Conduct periodic review and dissemination of research project findings		5130		5130		10,260
Sub. Total		Sub. Total	36,375.00	5,130.00	32,100.00	9,405.00	-	83,010
Strategic objective 8: Strengthen Monitoring and evaluation of malaria elimination program								
8.1 Reinforce implementation of supervision, monitoring and evaluation								

8.1.1	RSSH: HMIS & M&E	Develop M & E guidelines, framework and tools for malaria elimination program (2020 - 2025)	15960	0	15960	15960	0	47,880
8.1.2	RSSH: HMIS & M&E	Develop or update guidelines and tools for supervision, monitoring and evaluation						-
8.1.3	RSSH: HMIS & M&E	Train program personnel on M & E in the region	14480	0	0	14480	0	28,960
8.1.4	RSSH: HMIS & M&E	ToT and M & E		21375			21375	42,750
8.1.5	RSSH: HMIS & M&E	Conduct quarterly consultative review workshop with DHO/DMS and VDCP	10944	10944	10944	10944	10944	54,720
8.1.6	RSSH: HMIS & M&E	Conduct KAP survey	0	30000	0	0	0	30,000
8.1.7	RSSH: HMIS & M&E	Conduct external evaluation of the malaria elimination program	0	0	20000	20000	0	20,000
8.1.8	RSSH: HMIS & M&E	Publication of annual reports	1000	1000	1000	1000	1000	5,000
8.1.9	RSSH: HMIS & M&E	Quarterly and annual supervision and monitoring visit to the field	11700	11700	11700	11700	11700	58,500
8.1.10	RSSH: HMIS & M&E	Annual Malaria Review Meeting	11400	11400	11400	11400	11400	57,000
Sub. Total		Sub. Total	65,484	86,419	71,004	85,484	56,419	344,810
8.2 Expedite for certification of malaria elimination								
8.2.1	Progrm Management	Biennial meeting of NCDE and TAGME for malaria elimination program review	4150	4150	4150	4150	4150	4,150
8.2.2	Progrm Management	Establish processes and policies to document evidences to achieve malaria elimination certification	4275	4275	4275	4275	4275	4,275
Sub. Total		Sub. Total	8,425	8,425	8,425	8,425	8,425	8,425
Grand total			2,561,352	2,765,806	2,644,796	2,878,892	3,066,344	13,860,926