Nepal Malaria Strategic Plan 2014-2025

Government of Nepal
Ministry of Health and Population
Department of Health Services,
Epidemiology & Disease Control Division,
Teku, Kathmandu, Nepal

Foreword

Nepal has arrived at a critical junction in its fight against malaria, as it has already achieved MDG goals sets for 2015, and the country is in a unique position to move towards eliminating the local indigenous transmission of malaria. The Ministry of Health and Population, with the continued support of its partners, is continuously implementing strong malaria control program, steadily improving the coverage and quality of indoor residual spraying, high coverage of long lasting insecticide-treated nets to prevent transmission in risk areas, and increasing access to early diagnosis of suspected malaria cases and institution of appropriate treatment.

The Ministry of health and population, through its National Malaria Control Program, has set ambitious vision of a malaria-free Nepal by 2026. Over the next 5 years (2014-2018), our priority will be to consolidate the gains achieved till date in reducing the malaria burden and sustain the downward trend in malaria morbidity and mortality and maintain outbreak free status.

Recent Malaria Program reviews (Mid-term review of the National Malaria Program in June 2013, Program review 2010, and JANS 2011), by external experts with international experience and expertise with inputs and support of national experts has clearly mentioned in their report as "Nepal has surpassed the Millennium Development Goal #6 by cutting malaria morbidity and mortality rates by more than 50% in 2010 as compared to 2000. Despite the political instability and current restructuring of administrative set up towards increasing federalism, the country is in a favorable position to progressively eliminate the remaining active foci (wards) where malaria transmission remains of concern. The Ministry of Health and Population, with the support of its partners especially WHO which is coordinating the technical assistance, has implemented a strong malaria control program, steadily improving the coverage and quality of indoor residual spraying (IRS), introducing long lasting insecticidetreated nets (ITNs), and increasing access to rapid malaria diagnosis (RDTs) and powerful artemisinin-based combination treatments (ACTs)." The report has also mentioned the need for a strong team at center and districts to intensify surveillance, improve the epidemiological information for timely containment of the possible transmission; Nepal has high receptivity and vulnerability for malaria transmission so strengthening sensitive surveillance & monitoring system are major steps for the country to move towards elimination pathway.

In achieving elimination goal, in addition to surveillance and prevention, coordination and concerted effort with India particularly in tracking malaria in migrant workers have received specific focus in this strategy.

Finally, I would like to acknowledge the continuous support provided to the National Malaria Program by the WHO and the Global Fund. At this critical moment of embarking on the next stage in the fight against malaria, I look forward to renewed commitment/support from all partners and urge all stakeholders to support our national goal of ***"Malaria-free Nepal by 2026"***.

Secretary
Ministry of Health and Population
Government of Nepal

Foreword

It gives me immense pleasure to write forward for Nepal Malaria Strategic Plan 2014-2025 with a vision of malaria free Nepal by 2026. Nepal's 65 districts and 73% of the population used to be in malaria endemic areas, which is now further narrowed down to 1254 VDC's in 40 districts as we embarked 2013. Malaria is still affecting the poor and socially marginalized and mobile population. The disease is mainly affecting adults in productive age group and is a major cause of poverty.

Malaria burden in Nepal has declined about 40% in confirmed cases during the last five years. National Malaria Control Program assessment by international and national experts was undertaken in 2010, 2011 and 2013. The review reports have clearly mentioned that the program has moved forward from control to pre-elimination stage and suggested that it is now time for Nepal to adopt strong strategy and prepare for elimination.

As malaria is a focal disease in Nepal with 54 VDCs in high 201 VDC's in moderate and 999 VDC's in low risk areas, activities and strategies are now focused towards sensitive surveillance detecting every malaria cases for effective treatment and halting indigenous transmission of malaria. The management of our interventions must extend to the community level and household level in all malaria endemic foci. Community participation and community mobilization therefore plays a key role in ensuring that all Nepalese own and take part in this national goal. As achieving elimination is difficult without strong coordination and concerted effort with India, advocacy at all level and particularly addressing issues of migrant/mobile population have received specific focus in this strategy.

National Malaria Control Program has set an ambitious vision of a malaria-free Nepal by 2026. Nepal Malaria Strategic Plan 2014-2025 has projected to: i. Achieve zero death due to malaria by 2015 and sustain it thereafter; ii. Reduce the incidence of indigenous malaria cases by 90% and number of VDCs having indigenous malaria cases by 70% of 2012 levels by 2018. Over the next 5 years, our priority will be to consolidate the gains we have made and sustain the downward trend in malaria morbidity and mortality and maintain outbreak free status of the country.

Finally, I would like to acknowledge the continuous support provided to the National Malaria Program by World Health Organization and the GFATM. At this critical moment of embarking on the next stage of combating malaria, I look forward to a broad partnership from all partners and urge all stakeholders to support our national goal of ***"Malaria-free Nepal by 2026".***

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Dr. Senendra Raj Upreti

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Director General
Department of Health Services
MOHP, Kathmandu

Acknowledgement

Malaria control in Nepal has been identified as priority-I public health program under the National Health Sector Program Implementation Plan-II (NHSP-II) 2010-2015. Malaria control services are rendered free of cost and emphasize on the accessibility of services by high risk and vulnerable groups and marginalized remote populations.

The program has successfully achieved the MGD and RBM targets. Comprehensive independent External Evaluation in June 2010, JANS August 2011, and MTR- June 2013, has clearly recommended to consolidate the gains and sustain the achievements of malaria control program and suggested that the country should embark upon pre elimination with an ultimate goal of elimination of malaria. Based on the recommendations, the Malaria Program has developed the current Strategic Plan with an outline of a long term malaria elimination strategy.

Based on long term strategy 2014-2026, Epidemiology and Disease Control Division under the Department of Health Services has taken a lead in the development of Malaria Strategic Plan-2014-2025, the proposed strategies has been discussed in consultative workshops attended by representatives from affected community, DHOs, civil society, RHDs, CHD, FHD, NPHL, VBDRTC, NHEICC, professional societies, health/academic institutions, External Development Partners, INGO and independent malaria experts; based on which the current draft has been finalized for MoHP approval.

This document will provide the key strategic direction that will reorient the program to gear up for elimination, in view of the ongoing country administrative restructuring towards federalism in which the opportunities and constraints of the external factors can be managed to achieve the larger vision of elimination.

The main focus of current malaria program will be elimination of transmission foci, for which the health systems must be strengthened to early detect, characterize, delimit and eliminate the foci; confirm all suspected malaria cases and appropriately treat all confirmed malaria cases and significantly reduce human-mosquito contact. These two shifts will be facilitated by the implementation of active surveillance and targeted interventions as outlined in this Strategic Plan.

Finally, I would like to acknowledge the efforts of Dr Michael MacDonald, Dr Sergio Spinaci, Dr Leonard Ortega, Dr M K Banerjee, Dr G D Thakur, Dr Y R Pokharel, Dr Nihal Singh, Dr Prakash Ghimire, Dr M P Upadhyay, Mr Deepak Acharya, Mr Sunil Aryal, the past and present health work force of malaria, WHO and GFATM for contributing to encouraging results in malaria and urge all to sustain the current momentum of malaria program to achieve further success. As we move forward to malaria elimination we will continue to advocate in securing resources for the program from the government and urging for renewed commitment from partners.

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Dr. B R Marasini
Director, Epidemiology and Diseases Control Division
Department of Health Services, Ministry of Health and Population

List of Acronyms

ABER	Annual Blood Examination Rate
ACT	Artemisinin Combination Therapy
ANC	Ante-Natal Care
APMEN	Asia Pacific Malaria Elimination Network
BCC	Behavior Change Communication
CCM	Country Coordination Mechanism
DCS	Disease Control Section
DDA	Department of Drug Administration
DHO	District Health Office
DoHS	Department of Health Services
DPHO	District Public Health Office
EDCD	Epidemiology and Diseases Control Division
EDPs	External Development Partners
EHS	Essential Health Care Services
EWARS	Early Warning and Reporting System
FCHV	Female Community Health Volunteer
GMP	Good Manufacturing Practice
GoN	Government of Nepal
HFMC	Health Facility Management Committee
HMD	Health Management Division
HMIS	Health Management Information System
HP	Health Post
IEC	Information Education and Communication
INGO	International Non Government Organization
IRS	Indoor Residual Spraying
ITN	Insecticide Treated Net
ISO	International Standards Organization
IVM	Integrated Vector Management
LLIN	Long Lasting Insecticidal Net
LMD	Logistics Management Division
M&E	Monitoring and Evaluation
MoHP	Ministry of Health and Population
MI	Malaria Inspector
NGO	Non Government Organization
NHEICC	National Health Education, Information and Communication Centre
NHTC	National Health Training Center
NPHL	National Public Health Laboratory
PHC	Primary Health Center
PMU	Program management Unit
PSI	Population Services International
RBM	Roll Back Malaria
RDT	Rapid Diagnostic Test
RHSD	Regional Health Services Directorate
SHP	Sub-health Post
SWAp	Sector Wide Approach
TA	Technical Assistance
TB	Tuberculosis
TWG	Technical Working Group
VBDRTC	Vector Borne Disease Research and Training Centre
VCA/I	Vector Control Assistant/Inspector

VCO	Vector Control Officer
VDC	Village Development Committee
WHO	World Health Organization
WHOPES	World Health Organization Pesticide Evaluation Scheme
WP	Wettable Powder

Executive Summary

Malaria continues to be a public health priority in Nepal with a national aim of a *malaria-free Nepal by 2026.* The country has surpassed targets set by the Millennium Development Goals and is positioned to eliminate indigenous malaria transmission. The modified malaria strategic plan 2014-2025 presented here takes into consideration the results of microstratification of malaria risk areas-2012, the midterm program review 2013, the current epidemiology and updated WHO guidelines, particularly for vector control and insecticide resistance management. This plan has inherent Government of Nepal's commitment and seeks appraisal of external development partners, including the Global Fund, for possible external funding and technical assistance.

The plan aims at achieving zero deaths due to malaria by 2015 and sustain it thereafter, reducing the incidence of indigenous malaria cases by 90%, and number of Village Development Committees (VDCs) having indigenous malaria cases by 70% of current levels by 2018. The strategic plan has five major strategic objectives: i) to strengthen strategic information for decision making towards malaria elimination ii) to further reduce malaria transmission and eliminate the foci wherever feasible iii) to improve quality of and access to early diagnosis and effective treatment of malaria iv) through advocacy and communication, sustain support from the political leadership and the communities towards malaria elimination v) to strengthen programmatic technical and managerial capacities towards malaria elimination.

Objective 1: Strategic Information. This includes activities to validation and updates the current strata up to the ward level; strengthening surveillance and response mechanisms through compulsory reporting of malaria cases (including private sector); establishing electronic database and reporting system for case-based surveillance; expanding communitybased surveillance and establishing and expanding Border Malaria Check posts and crossborder collaboration. This objective also introduces foci investigation and delimitation in high and moderate risk areas. As a source of strategic information operational research and surveys have been given due importance.

Objective 2: Transmission Reduction. This includes primarily distribution of Long Lasting Insecticide Treated Nets (LLINs) and Indoor Residual Spraying (IRS). In High Risk VDCs, there will be mass distribution to all populations, plus continuous distribution through AnteNatal Clinics (ANCs). To VDCs stratified to be at Moderate Risk, there will be no mass free distribution to all populations, but distributed to pregnant women attending ANCs. For VDCs stratified as low risk and no risk there will be no LLINs mass distribution or ANCs, but populations will be encouraged to continue using nets available from the market. IRS will be conducted in two ways, First is regularly scheduled IRS for selected high risk VDCs, estimated approximately 88,444 households during the first year, reducing to 60,000 households in the second year and 30,000 in the third. The second mode of IRS implementation is in response to emerging foci, this is estimated to be approximately 5,000 households per year. Entomological monitoring, including insecticide resistance monitoring is a core element of a national vector control program. The entomological monitoring and vector control activities will be implemented in the frame work of Integrated Vector Management, notably ***"evidence-based decision making"*** (i.e. targeting based on micro-stratification); integrated approaches (i.e. IRS procurement and implementation for both malaria and kala-azar affected populations; entomological monitoring in municipalities to include *Aedes.*

Objective 3: Diagnosis and Treatment. This includes training on malaria case management for Female Community Health Volunteers in remote VDCs including health personnel working in public and private sectors; expand and strengthen quality malaria microscopy service, including competency assessments, improved training and cross checking of blood smears; expand the use and quality assurance for Rapid Diagnostic Tests.

Objective 4: Advocacy and Behavior Change Communication. directs the program to conduct formative research in developing evidence and strategy for advocacy, social mobilization and behavioral change communication at national, district and the community levels.

Objective 5: Program Management. This objective includes training key staff on programmatic and management skills shifting from malaria control towards elimination. This includes staffing and training needs assessment and human resource plan with clear terms of reference and appropriate structure at all levels. Activities under this objective will also strengthen the Malaria Technical Working Group, collaboration with the Vector Borne Disease Research and Training Centre (VBDRTC) in Hetauda and other academic institutes. There will be quarterly district review meetings and an annual national review meeting. Vacant positions will be filled and external technical support sought, including from WHO. Program performance monitoring will be conducted.

The total estimated funds required for effective implementation of Nepal Malaria Strategic Plan 2014-2025, during 2014-2018 is US$ 30,339,780 (18,696,260 gap + 11,411,020 Govt. Contribution + 232,500 WHO contribution). Government of Nepal and WHO Nepal are contributing 38% (US$ 11,643,520) of the required budget. In this context, financial gap to implement Malaria Strategic Plan during 2014-2018 comes around US$ 18,696,260.

The estimated budget shows that the government is investing around 37%, and WHO for another 1% of the total budget required for the implementation of activities in coming five years (2014-2018) as per the NMSP 2014-2025, and walking Nepal in the path for elimination by 2025. In other words, almost 20 % (6.2 million) of the estimated total budget (30.33 million) is required in maintaining the regular malaria control program and it requires additional 80% for elimination of malaria. In nominal terms an estimated USD 18,696,260 additional budget is required for five years for effective and enhanced malaria control leading towards elimination. The government and existing WHO support have approximately USD 11.6 million and has a clear short fall of (financial gap) of USD 18.7 million, accounting for around 62% of the resources required to implement the program in next 5 years.

The program has no other alternative resources than depending on Global Fund support. If the anticipated funds envisaged in the financial gap analysis are not allocated, the malaria program will likely face a setback in attaining the goal of elimination in the set time frame, and may be at risk of maintaining the achievements gained so far. To combat this issue the program will make special efforts not to let the disruption of essential services jeopardize the gains of the program and gear-up the surveillance for prevention and control of outbreaks.

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Introduction

Malaria continues as a priority public health program in Nepal with a national aim of malaria*free Nepal by 2026.* The country has exceeded the Millennium Development Goals in 2010 (instead of 2015) to cut malaria morbidity and mortality and is in position to move towards elimination. Overall malaria trend in Nepal for the last five years indicates a decline of both clinical and confirmed malaria cases. The 2012 micro-stratification estimates the population at risk of malaria has decreased to 13.02 million from 20.35 million over the previous five years, noting that the earlier stratification included the entire district and did not stratify by VDC.

The 2012 micro- stratification estimates 3.6% of the population living in "High Risk" VDCs and 9.8% in "Moderate Risk" VDCs:

Strata	VDC	Percent of Total VDC	Population	Percent of Total Population
High Risk	54	1.4%	985,636	3.6%
Moderate Risk	201	5.1%	2,660,692	9.8%
Low Risk	999	25.1%	9,378,735	34.5%
No Risk	2718	68.4%	14,139,920	52.1%
Total	3976		27,164,983	100 %

The strategic plan has five major strategic objectives:

i) To strengthen strategic information for decision making towards malaria elimination ii) To further reduce malaria transmission and eliminate the foci wherever feasible iii) To improve quality of and access to early diagnosis and effective treatment of malaria

iv) through advocacy and communication, sustain support from the political leadership and the communities towards malaria elimination

v) To strengthen programmatic technical & managerial capacities towards malaria elim-ination.

The key activities to this strategic plan is to strengthen epidemiological surveillance and individual case investigation, leading to more targeted interventions until indigenous malaria transmission has been eliminated from Nepal.

Country profile:

Nepal: its land and people

Nepal has three main ecological zones, Mountain, Hill and Terai, running from west to east intersected by north to south flowing rivers. In 2011 the population was estimated to be 26.6 million and average family size of 4.9 persons, a three-fold increase from 9 million populations in 1950. There were estimated to be 1.9 million Nepali citizens outside the country, mostly male workers, many in India and few in other countries, who upon return contribute to the significant number of imported malaria cases. The annual population growth rate is 1.35%. Urbanization continues to occur at a rapid pace, including in malaria endemic areas of the Terai, contributing to changing malaria transmission ecology. Further details can be found at WHO Country Cooperation Strategy Nepal, 2013–2017, WHO Country Office for Nepal, 2013

Political administration

Since 1990 Nepal has undergone considerable political turbulence, including internal armed conflict from 1996 until 2006 when an interim constitution was promulgated. In 2007 Nepal became a federal republic, with a president as the head of state. The newly formed constitution assembly is expected to promulgate the new constitution with defined federal structures and roles. Nepal is administratively divided into 5 regions, 14 Zones, 75 Districts, 83 Municipalities, and 3,914 Village Development Committees (VDCs). VDCs are further divided into 9 Wards and each municipality is divided into more than 10 wards depending upon the population. For the purposes of malaria elimination efforts, the primary unit of micro-stratification is VDC level, with further stratification up to wards.

Socio-economic profile

Nepal is a country of diverse languages and ethnic groups, with 123 languages and 125 groups recognized in the 2011 census. GDP is growing at approximately 5% per year, with agriculture employing 76% of the workforce most of the agriculture produce is in the Terai, in regions that are formerly or currently malaria endemic. Remittances contribute 25-30% of GDP. Inflation has been reduced to a three-year low to 7%.

Health System

The Government of Nepal has committed to boost spending in the health sector with the second Nepal Health Sector Program 2010–2015 increasing budget allocation for health from 7% in 2010 to 9.6% in 2014. The Ministry of Health & Population provides policies planning monitoring & supervision of the activities implemented through the Department of Health Services, Regional Health Directorate and District Public Health Offices.

The Department of Health Services is responsible for the implementation of preventive and curative health. Under this there are 5 Regional Health Directorates; and in 62 of the 75 districts, a District Health Office (DHO) with a District Hospital and a District Public Health Office (DPHO). The district office includes positions for vector-control officer and assistant, malaria inspector, laboratory technician and laboratory assistant. Further details and organizational structures can be found in the Department of Health Services Annual Report 20112012

There is one Primary Health Care Center (PHCC) at each of the 205 electoral constituencies and approximately in 100,000 population, one health post (HP) for 3-5 Village Development Committees (VDCs) and one sub-health post (SHP) for each VDC. SHPs, HPs are the first facility-based contact point for basic health services and serve as the referral center.

There is one FCHV in each ward of VDC. SHPs serve as venue for community-based health activities and as a referral point for patients to HPs and PHCs, and district, zonal and regional hospitals, and finally to the specialty tertiary care centers. Each VDC has a health facility management committee responsible for smooth operation of health institution in the VDC.

Decentralization and Management of Health Facilities:

District Health Office manages its public health program through a network of Primary Health Care Center, Health Post and Sub health post. The community level health facilities are managed by the Health Facility Management Committee chaired by VDC chair-person.

Health facilities deliver curative & preventive services and there are 3-5 outreach clinics in every VDCs which are conducted by VHWs/MCHWs every month. At the community level the district public health network is supplemented by the network of Female Community Health Volunteers in every ward of VDCs. FCHVs are nominated by mothers' group of the ward.

Organizational Structure of Epidemiology and Disease Control Division

At Central level, Epidemiology and Disease Control Division (EDCD) under the Department of Health Services is responsible for developing strategies, guidelines, plan and monitoring of the implementation of the vector borne diseases: Malaria, Kala-azar, Dengue, Lymphatic Filariasis, Japanese encephalitis, Leptospirosis and other VBDs along with surveillance and response to water borne, air borne and zoonotic diseases and health disasters. In addition to the Director EDCD, Disease Control Unit of EDCD has six sanctioned posts: Malariologist (Sr. Health Administrator-1), Public Health Officer -1, Vector Control Inspectors-2, one medical officer and a health assistant.

Regional Health Directorate:

At the regional level, there is a disease control section under the public health section with provision for Entomologist-1, Asst. Entomologist -1, Vector Inspector-1, Vector Control Inspectors/Malaria Inspectors/Entomological technicians-4, Lab.boy-1, Laboratory technician1, Laboratory assistants-2 and Maintenance technicians-2, based in each of the five regions. The entomological teams in RHDs currently are staffed with one VCI and a Lab tech., other positions are lying vacant for many years.

District Public/Health Office:

At district level, most of malaria endemic districts have a Public Health Officer, one Vector Control Inspector or Malaria Inspector and laboratory technicians/assistants. Suspected malaria cases presenting to government health facilities are diagnosed clinically, provided laboratory confirmation, treated and reported to districts through weekly reports. District vector borne disease units staffed with Vector Control Inspector/Malaria Inspectors plus Global Fund-supported Monitoring and Evaluation officers are responsible for monitoring, reporting and follow-up of cases.

GFATM/Program Management Unit:

In addition to government positions at EDCD and peripheral health institutions, a Global Fund supported Program Management Unit (PMU) is staffed with one Project Coordinator, six Program Officers for entomology, microbiology, procurement and supply chain management, training, finance, monitoring and supervision, and assistants supporting in the areas of finance, logistics and data. A total of 31 Monitoring and Evaluation officers, funded under GFATM support are posted in 31 malaria endemic districts support district teams in surveillance and implementation.

Vector Borne Disease Research and Training Centre (VBDRTC):

The VBDRTC, located at Hetauda, is a semi-autonomous institute under Ministry of Health & Population providing training and research in diagnostics, therapeutic drug efficacy studies, entomology and vector control. The institute has lecture/training halls, dormitory for trainees, microscopes and RT-PCR for laboratory studies and insectaries. Currently the institute is understaffed to provide full support to malaria program planning and implementation.

Malaria Technical Working Group

Since 2007, a Technical Working Group (TWG) has been established which includes expertise in program management, laboratory diagnostics, case management, entomology, vector control, IEC/BCC, monitoring & evaluation and operational research. Experts representing National Public Health Laboratory, Institute of Medicine, Patan Academy of Health sciences, Sukra Raj Tropical & Infectious Diseases Hospital, National Health Education Information & communication Center, Tribhuvan University and the INGO/NGO sector are nominated by EDCD and approved by the DG/DOHS. The Director General of Department of Health Services is the Chair and Director, EDCD serves as a member secretary and WHO is a permanent technical advisor. Strategic partners and stake holders are also invited to join. TWG's main responsibility is to review and update of existing policies, strategies and technical guidelines in light of surveillance information, evaluations and operational research. TWG also oversees equitable and evidence-based distribution of services and allocation of all program commodities. The TWG meets every six months.

Health Information system

There are three different systems for health information: a. ***Health Management Information System (HMIS)***, providing a range of service delivery information that will soon include geo-referencing; b. ***Early Warning and Reporting System*** *(EWARS*, managed by EDCD to receive information on malaria, kala-azar, dengue, polio, measles, influenza, cholera, and diarrhea from 39 sentinel hospitals); c. and the ***Immunization Preventable disease*** (CHD-WHO-IPD) database, including surveillance of polio, measles, rubella, acute encephalitic syndrome from 494 public and private reporting units monitored by surveillance officers employed by WHO Nepal. EDCD has recently developed a web-based malaria case recording and reporting system ***(Malaria Disease Information System-MDIS)*** with a provision of SMS recording and reporting and rolled out for web based reporting this year, which is expected to be fully utilized in coming years. Finally the ***Integrated disease Surveillance System (IDSS)***, is yet to be operational, which will also include vector borne diseases.

Health Situation

Nepal has made progress in raising health status. Currently, Nepal is on track to meet MDG 4 and 5, for which Nepal has received "Child Survival Award" from GAVI for its progress in MDG 4; and UN MDG 5 award for its progress in Maternal Health. TB control has been achieved and the country is on track to achieve TB related MDGs. Leprosy elimination targets also have been met. MDG goal for malaria has been achieved and is moving towards pre-elimination with a target of elimination by 2026; Kala-azar elimination programme is in progress, with only <900 cases and CFR 0.11 by 2010; lymphatic filariasis and soil transmitted helminths' eliminations are considered on track.

Epidemic prone diseases, such as cholera and acute gastroenteritis, are endemic in all regions of the country with a constant threat to the public health system. Compounding the situation are emerging threats, for example dengue, novel influenza and leptospirosis, which have the potential of causing wide spread morbidity and mortality.

The current situation warrants strengthening of surveillance, response and preparedness capacities to minimize damage to human lives and containment of infection at source or as near as possible to the source. Country is stepping towards implementation of integrated disease surveillance and adopting integrated vector management system.

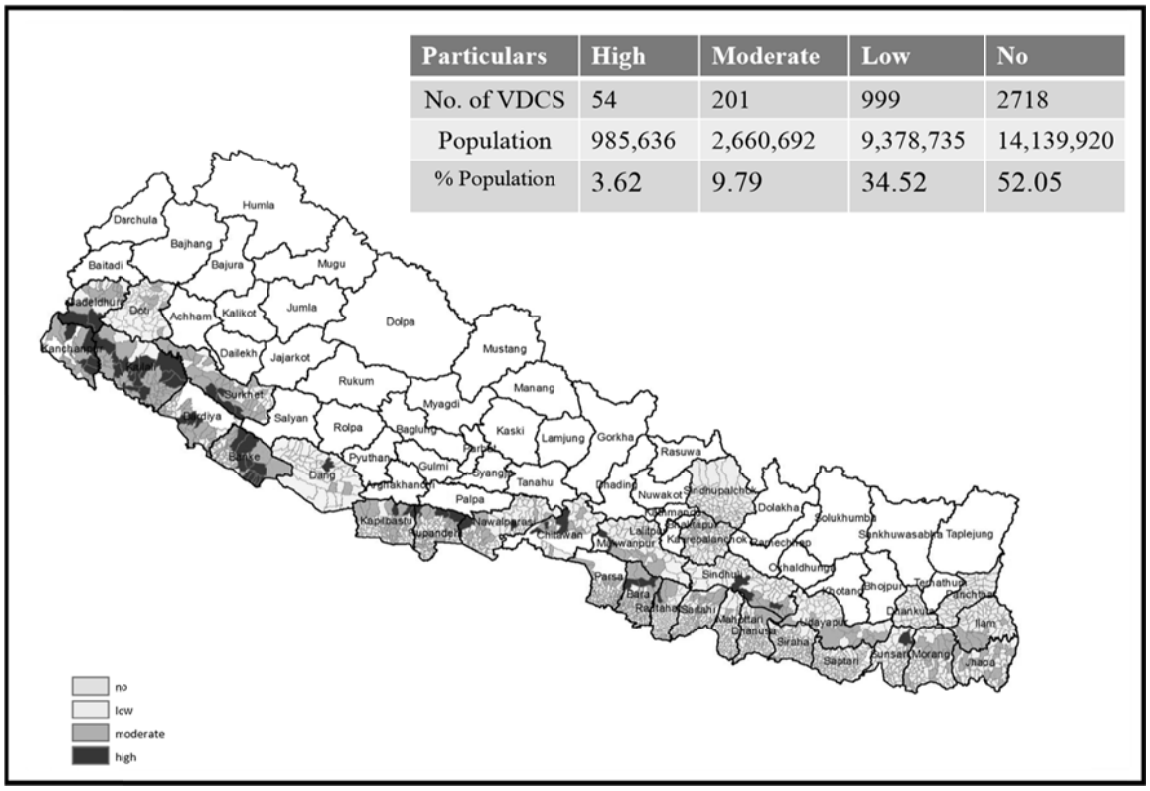
Although there is paucity of information on the burden of non-communicable diseases (NCDs), the behavioral and the intermediate risk factors for NCD's are increasing due to changing lifestyles in the cities. The major NCD burdens are cardiovascular disease, chronic obstructive pulmonary disease, diabetes and cancer, blindness, hearing impairment and mental disorder.

Malaria Epidemiology

Populations and areas at risks of malaria

From 75 districts in the country, ***35 districts*** have reported zero malaria case over the last three years. These districts have ***no risk of malaria*** because of high elevation and low temperatures inimical to malaria transmission. Fifteen low risk districts have not reported indigenous cases during the last three years but have the record of imported malaria cases. Although, some of them are considered to be receptive and vulnerable they have not reported any secondary cases. It is not clear if there was no more transmission or surveillance was not sensitive enough to detect indigenous cases. The third groups of districts are those that have reported malaria cases during the last 3 years and are stratified as high or moderate risk.

Overall malaria risk population



VDCs are classified as

a) **No-risk**: No malaria transmission in the last three years; ecology not favorable for transmission;
b) **Low risk:** history of transmission in the past, but no indigenous case in the last three years, Ecology is favorable for transmission;
c) **Moderate risk:** historically with evidence of transmission and indigenous cases in the last three years, but with average three-year API is < 1/1,000 population; transmission risk is present due to favorable ecology
d) **High risk:** Evidence of transmission with indigenous cases in the last three years and average three-year API > 1/1,000 population.

Malaria vector species

Among 43 Anopheles mosquito species recorded, only four are considered as major malaria vectors in our country, i.e. ***An. annularis, An. fluviatilis, An. minimus*** and ***An. maculatus.***

An. fluviatilis is one of the important vector species in the forest belt of terai and inner terai which hills up to an elevation of 1,300 m. It breeds in slow flowing water with marginal vegetation similar to *An. minimus*. As an opportunistic vector, it has both anthropophilic and zoophilic tendencies (anthropophilic index: 30 – 60%) and feeds indoor or outdoor equally. DDT spraying significantly reduced the indoor resting abundance of all anopheline species except for *An. fluviatilis* in Nepal, but reversal of exophily was restored after cessation of spraying or re-plastering of walls during festivals. This suggests that this mosquito population did not shift entirely to exophily but behavior mainly reflects the excito-repellent effect of DDT. Most of the malaria outbreaks are associated with this species.

An. maculatus is a sporadic vector breeding in semi-shaded streams and seepages, and is associated with persistent high-altitude malaria transmission in many hilly districts. Sporozoite-positive specimens were found at 2,000 m. in Gum valley in Mugu district (mid-western region) during 1969 and in inner and outer terai in 1993 and two districts of the central region, Dhanusha and Sindhuli. *An. maculatus* has a high tendency for early biting as compared to *An. fluviatilis* and mainly zoophilic but will readily feed on humans (anthropophilic index: 13%). In Nepal *An. maculatus willmori* (sibling species of the maculatus complex) is a vector of malaria. The abundance of the partially exophilic *An. fluviatilis* and *An. maculatus* also decreased markedly after IRS, but then rebounded rapidly within 1 or 2 months after treatment. *An. maculatus* shows some degree of tolerance to DDT.

An. annularis is an inefficient vector, breeding in stagnant water and implicated as a fourth species of malaria vector in Nepal. It is mainly zoophilic, endophagic and endophilic, with a relatively higher man-biting habit during April and October (anthropophilic index: 2 – 8%). IRS did effectively control indoor resting species in Nepal such as *An. annularis, An. culicifacies, An. splendidus* and *An. vagus*.

An. minimus, another primary vector in the forested belt of terai and inner terai (lower valleys between Churia and Mahabharat ranges) is highly anthropophilic, endophilic and endophagic. After a few rounds of DDT spraying, it was disappeared due to its high susceptibility. Recent entomological surveys have reported the occurrence of this species in outdoor biting collections in Ranibas VDC, Ward 5, Sindhuli district. If the reappearance of the An. *minimus* in the terai is confirmed, it will be important to determine its range and intensify control efforts to reduce the threat of this very efficient malaria vector.

Recent susceptibility tests using WHO test procedures showed that all anopheline were susceptible to deltamethrin, permethrin, alpha-cypermethrin and lambda- cyhalothrin.

Malaria parasites

Plasmodium vivax and ***Plasmodium falciparum*** are two predominant human malaria species in Nepal. *P. malariae* has not been detected for more than 20 years, while *P. ovale* has been reported from the private sector among patients returning from Africa. During the last 5 years, percentage of *P. falciparum* remained between 17-26% of the total confirmed malaria cases, with *P.vivax* making up the remainder. Anti-malarial drug resistance monitoring in Nepal started in 1978. Chloroquine resistant *P. falciparum* was reported in 1984; in 1986 chloroquine was replaced by sulfadoxine-pyrimethamine (SP). In 2000, late treatment failure rate of falciparum cases treated with sulfadoxine-pyrimethamine was 57%. A therapeutic efficacy study done in 2003 in Jhapa district, the efficacy of SP was detected to be around 80%, which led to the revision of national treatment guidelines and adoption of artemetherlumefantrine (artemisinine-based combination therapy–ACT) as first line drug for the treatment of uncomplicated falciparum malaria in 2004. The efficacy for artemether-lumefantrine carried out during 2005, 2007, 2008 and 2009 in Jhapa, Dhanusha and Dadeldhura districts revealed high efficacy (ACPR-100%). Since last year, 2013, therapeutic efficacy of ACT as a first line drug against uncomplicated malaria cases, is ongoing with enrollment of cases from 4 sentinel sites spread from east to west. The results of which are expected to be useful in guiding the future antimalarial drug policy.

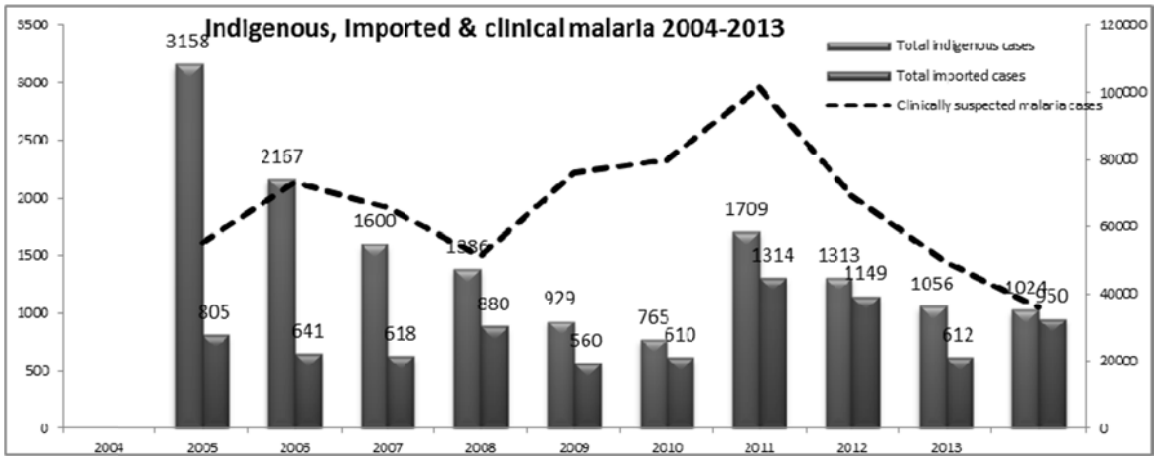
Epidemiological Trend of Malaria 2004-2013

S. N.	Particulars	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	Total population in '000	24843	25410	25991	26641	27307	27989	26701	26970	26852	13025
2	Total slide collection	159044	188930	166474	135809	153331	123903	135997	113225	152538	112379
3	Total positive cases	4895	5050	4969	5261	3888	3335	3004	2631	2092	1974
4	Total indigenous cases	3158	2167	1600	1386	929	765	1756	1555	1106	1024
5	Total imported cases	805	641	618	880	560	610	1314	1079	1026	950
6	Total P. falciparum cases *	743	1181	1358	1391	792	575	895	592	418	325
7	% of Pf of the total cases *	15	23	27	26.4	20.4	17.2	29.8	22.5	20	16.4
8	Total indigenous Pf cases *	308	84	303	226	161	176	420	240	184	118
9	Total imported Pf cases *	144	114	135	161	167	137	467	346	592	207
10	Total P. vivax cases	4152	3870	3601	3870	3096	2760	2109	2018	1664	1649
11	Total indigenous P. v. cases	2850	2083	1297	1075	768	496	1289	1208	872	906
12	Total imported P. v. cases	661	527	483	639	393	445	847	732	792	743
13	Blood examination rate	0.87	1.00	0.86	0.68	0.75	0.60	0.51	0.42	0.57	1.02
14	Annual parasite incidence	0.27	0.27	0.26	0.26	0.19	0.16	0.11	0.10	0.08	0.15
15	Annual falciparum incidence	0.04	0.06	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.03
16	Slide positivity rate	3.08	2.67	2.98	3.87	2.54	2.69	2.21	2.4	1.37	1.48
17	Slide Pf positivity rate *	0.47	0.63	0.82	1.02	0.52	0.46	0.65	0.52	0.27	0.24
18	Clinically suspected malaria cases	55372	73259	65655	51412	76037	80073	101511	69180	49,550	36139

Total number of confirmed **(**either by microscopy or RDT) malaria cases have declined from 5,261 in 2007 to 1974 in 2013. It means a decline of 60% in malaria incidence in 2013 as compared to 2007. {Source: HMIS-2013 *Total PF includes mix (PV+PF) cases also}.

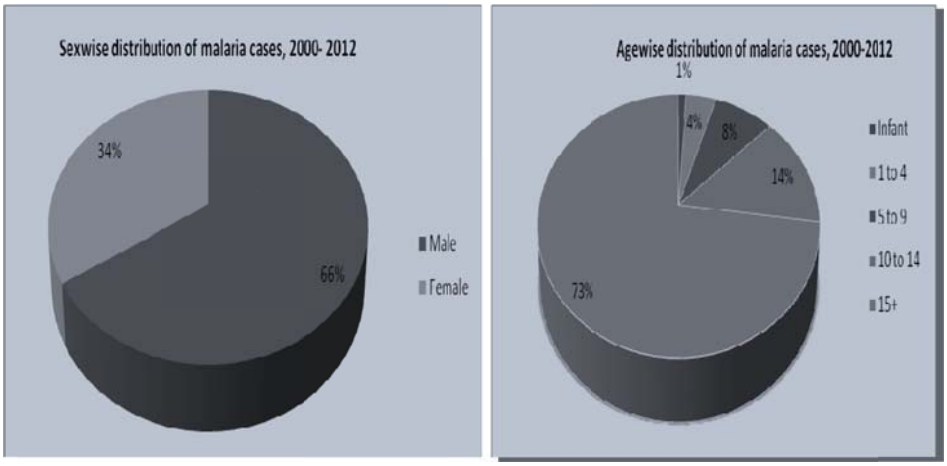
Indigenous and imported cases

Large number of Nepalese goes outside the country for work, mainly they visit malaria endemic States of India like Assam, Gujarat, Maharashtra and West Bengal etc. Imported malaria through these returning labor forces contributes to the change in epidemiological situation, between 2007 and 2013, 50-57% cases were considered as indigenous, 3044% cases were imported and remaining cases were unclassified.



Age, sex distribution of malaria cases

Malaria cases are reported in all age groups, but majority of cases are adult males. Over 75% of cases are recorded in the age group of 15-years and above with adult males (66%) more affected than adult females (34%).



Malarial Parasite species distribution

Of the total malaria cases reported, 71-85% of laboratory confirmed cases of malaria between year 2007 and 2013 were caused by *P. vivax* and remaining cases were either caused by *P. falciparum* or mixed infections Pv/Pf. There is fluctuation in *P. falciparum* percentage, 15% in 2004 which increased to 29.8% in 2010 and then a gradual decline thereafter to less than 20% in year 2013.

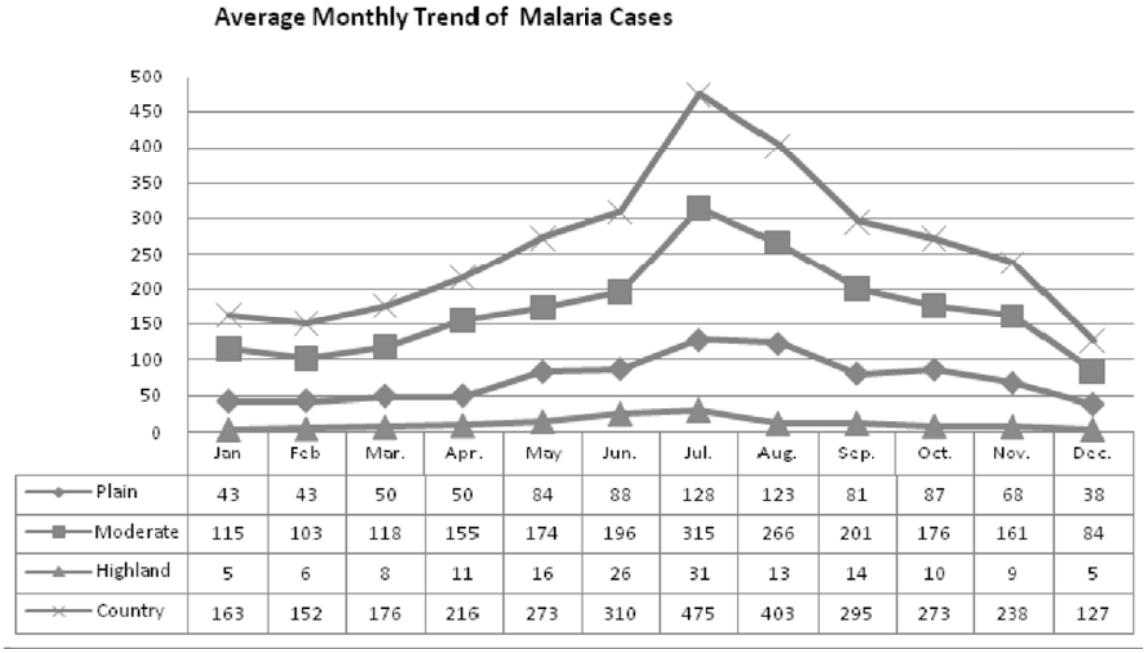
Malaria mortality:

Malaria mortality declined from a peak of 32 deaths reported in 2006 during an outbreak of malaria in Banke district. The mortality gradually dropped and reached zero in 2012 and there is no death in 2013 as well, which is maintained at zero level, till date.

Transmission period:

Malaria cases are reported throughout the whole year with increase of transmission after the monsoon, peaking in July.

Figure-9: Monthly Distribution of Malaria Cases:



	Jan	Feb	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Plain	43	43	50	50	84	88	128	123	81	87	68	38
Moderate	115	103	118	155	174	196	315	266	201	176	161	84
Highland	5	6	8	11	16	26	31	13	14	10	9	5
Country	163	152	176	216	273	310	475	403	295	273	238	127

Malaria Control and Elimination

The National Malaria Strategic plan includes objectives for five areas of work:

1. Strengthening Strategic Information
2. Transmission Reduction 3. Diagnosis and Treatment.
4. Advocacy and Behavior Change Communication
5. Program Management

1. Strategic Information:

1.1. Malaria surveillance

Malaria surveillance is conducted through the network of government health facilities. Annual targets for slide examination or RDT are set in high and moderate risk districts, 10% slide examination/ RDT of the OPD attendance and 1% to other source. The actual annual blood examination rate (ABER) is very low, less than 1% overall, and needs to be corrected. Currently, there is no Active Case Detection or community based surveillance system. Female Community Health Volunteers (FCHV) are not involved in malaria surveillance although they keep records for other health activities and events. Participation of private practitioners in the program is almost negligible.

1.2. Health Management Information System (HMIS)

The HMIS collects routine health services statistics from districts and presents them as monthly, quarterly and annual basic health reports. The health care facilities in the districts record and report malaria information such as suspected and laboratory confirmed malaria in malaria registers available in their facilities. The health facilities consolidate the data every month and report to DHOs / DPHOs. The DHO / DPHO compile, consolidates and analyzes them and reports to HMIS section of Management Division, DoHS. EDCD/PMU vertically gets reports through M & E officers/Focal person and further analyzes them with the reports of HMIS data and uses it in the management of National Malaria Program. HMIS does not cover unsecured areas and private sector health care.

District-based M&E Officers recruited with the support of GFATM funds have the key responsibility to regularly monitor and play vital role in improvement of the data quality, completeness and timeliness in high and moderate risk districts. The M&E officer is often unable to visit the field to supervise and provide feedback on data collection from the peripheral health facilities, due to challenges in transportation. At the central level the post of the EDCD epidemiologist is sanctioned, but has remained vacant for the past year.

1.3. Early Warning and Reporting System (EWARS)

Another surveillance mechanism, Early Warning and Reporting System (EWARS) is a hospital based sentinel site reporting system on priority vector borne diseases including malaria. EWARS prepares weekly reports of number of cases and deaths (including 'Zero' reports) from 39 sentinel hospitals. EWARS was established to complement HMIS in its function of surveillance for disease outbreaks. EWARS is the only comprehensive source of hospitaladmitted cases of severe malaria and their treatment outcome. The data collection, recording and reporting is done at the sentinel hospital and is reported weekly and immediately (within 24 hours) to EDCD by fax. EDCD consolidates the weekly report and prepares a weekly EWARS Bulletin for dissemination to stakeholders including the sentinel hospitals.

1.4. Weekly Outbreak Sentinel Ssurveillance

1.5.

A third reporting mechanism is the Weekly Outbreak Sentinel Surveillance System. This system includes at least one community-based sentinel site in each of malaria outbreak prone districts for detection and containment of the malaria outbreaks at a very early stage. The system is currently not functioning due to inadequate support and supervision.

1.6. Epidemic Preparedness and Response (EPR)

EDCD has a reporting system through weekly Early Warning and Reporting System (EWARS). HMIS gives monthly comprehensive data for malaria indicators which are being used by EDCD since 1996. EWARS provides weekly information on admitted malaria cases and deaths from 40 out of 85 hospitals. It also generates immediate reports (within 24 hours) for severe malaria cases. Community sentinel sites for epidemic outbreak control were established in 2009-2013 in thirteen districts, each having two sites at PHC level.

The current data collection, collation and reporting system must be strengthened to achieve the target of timely, accurately reporting and response. Functional case-based surveillance, identification and elimination of malaria foci will require a review and significant strengthening of the surveillance systems.

At district and peripheral health facilities, epidemic preparedness and response mechanisms are functional to detect and control malaria epidemics. Rapid Response Teams (RRTs) have been established in regions, districts and up to the community levels. Adequate supervision and technical support for data analysis is lacking and it is likely that localized epidemics can be missed. EWARS at hospital-based sentinel system may not have the sensitivity to detect highly focal outbreaks in the community.

1.7. Cross border Check posts and collaboration

Two border malaria check posts at Kakarvitta, Jhapa district in east, and Gaddha Chowki, in Kanchanpur district, in the far west, were to be established in 2013, but have been delayed because of infrastructure challenges. There is significant population movement across Nepal's long and porous border with India. Recently, there have been positive developments to improve cross border coordination for the control of malaria and other diseases, with highlevel meetings, one in Bhutan and the other in Nepal, held in 2012 which took important decisions to forge cross border collaborations. Imported malaria from adjoining districts across the border and from more distant malaria endemic areas such as Gujrat and Assam needs further analysis for taking appropriate containment/intervention measures. Entomological data on vector presence and insecticide susceptibility status in bordering districts of the outer Terai would also be required. Such evidence would help to determine the costeffectiveness of screening at check points, cross-notification of cases, coordination of entomological monitoring and vector control measures, harmonized IEC/BCC for migrants, etc.

2. Transmission Reduction: entomology and vector control

2.1. Integrated Vector Management (IVM)

IVM aims to make vector control more efficient, cost effective, ecologically sound and sustainable; helping vector control programmes to find and use more local evidence, to integrate interventions where appropriate and to collaborate within the health sector and with other sectors, as well as with households and communities. The IVM framework, as developed by WHO includes five elements relevant to malaria elimination in Nepal.

- Advocacy, social mobilization and legislation
- Cross sector collaboration
- Integrated approach
- Evidence-based decision-making
- Capacity-building

These five elements are addressed in the following sections on entomology and vector control

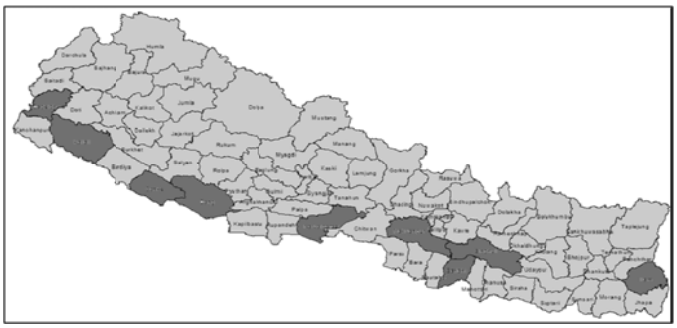
2.2. Entomology

Entomological surveillance, combined with epidemiological surveillance is the foundation of IVM, evidence-based decision making. Nepal, like many other countries, is challenged by a dearth of trained staff that can perform the basic entomological functions of determining the presence of vectors in a given area, the insecticide susceptibility status and response to control measures.

The functions of the entomology unit include:

i) Updating the vector control strategy to maximize efficiencies with a focus on malaria elimination;
ii) Building capacity and providing strategic information on vector presence, insecticide susceptibility status and basic entomological indicators, linked to epidemiological indicators at the VDC level and
iii) Monitoring of vector control strategies and their entomological impact.

Updating the vector distribution map and characterization of insecticide resistance is an important part of micro-stratification exercise. This aspect is especially important where transmission is so heterogeneous and where the program is moving towards elimination with more focal deployment of interventions. **Fig: Distribution of Entomological surveillance sites**



The current entomological monitoring program is carried out by a single entomological team based at EDCD travelling to sentinel sites to conduct biting and resting collections and insecticide susceptibility assays.

This routine entomological monitoring strategy is shifting from the fixed sentinel sites illustrated above to align more closely with the epi-demiological surveillance focusing on 54 high risk VDCs, including four municipalities, spread across 15 Districts. The entomologists will provide training and supervision to 15 District Vector Control Inspectors, to carry out spot checks of three-days duration 2-4 times per transmission season (April to November) to determine a limited number of basic entomological indicators, including presence or absence of vectors in the area. Bioassays to determine insecticide susceptibility status will

be continued to confirm the morphological identification of samples and any additional indicators, such as sporozoite determination. In the strategy of IVM in four municipalities high risk areas, VDC teams will collaborate with the municipality to include the presence of malaria vectors, the presence, distribution and prevalence of other mosquito vectors, especially Aedes of dengue and chikungunya.

LLINs are the key interventions for malaria vector control in Nepal. WHOPES-approved LLINs were procured and distributed by the program through support of Population Services International/Nepal (PSI). From 2009 LLINs were also distributed to those living in moderate risk districts. LLINs were distributed according to the existing LLIN distribution guidelines, developed by EDCD (one LLIN for 2 persons in a house). The current LLIN distribution strategy needs review and revision according to MTR. Following recent WHO guidelines on maintenance of universal LLIN coverage, and for monitoring the durability of LLINs in the field, provisions will be made for continuous distribution systems to ensure access to LLINs between times of mass free distributions; and to have closer monitoring of access, coverage, use and physical durability of the LLINs over time.

Given the budget allocation by Global Fund in Concept note (New Funding Model), mass free distribution of LLINs through campaigns should be now targeted to just those VDCs at high risk. Continuous distribution of LLINs to pregnant women through Antenatal Clinics should be continued in *both* high and moderate risk VDCs, but the moderate risk VDCs will no longer be provided LLINs through mass distributions. Under this plan, the program will procure a total of 874,155 LLINs over the three years, with 664,522 for the 54 High Risk VDCs distributed through both mass distribution and ANC; 130,164 in the Moderate Risk VDCs for pregnant women through ANC only.

Table: Estimation of LLINs in coming 3 years:

Place	2015			2016			2017			3 year
	Mass	ANC	Total	Mass	ANC	Total	Mass	ANC	Total	Total
High (54 VDCs)	368,606	17,447	386,053	75,028	17,921	92,950	167,598	17,921	185,519	664,522
Moderate (201 VDCs)		42,808	42,808		43,386	43,386		43,971	43,971	130,164
Total	368,606	60,255	428,861	75,028	61,307	136,335	167,598	61,892	229,491	794,687
10% outbreak response	36,861	6,025	42,886	7,503	6,131	13,634	16,760	6,189	22,949	79,469
Annual total	405,467	66,280	471,747	82,531	67,437	149,969	184,358	68,082	252,440	
Three year total										874,155

As detailed elsewhere, epidemiological surveillance will be intensified across VDCs at moderate and low risk as well as high risk. Should there be a change in malaria endemicity, the VDC may be immediately reclassified, and if shifted from moderate to high risk will be provided appropriate vector control measures.

Within the Operations Research component for vector control, there are a number of questions related to LLIN to be addressed. As recommended in the mid-term review, first is operational research for a small-scale analysis of the technical and economic feasibility of WHOPES-approved long lasting treatment for conventional nets (IconMaxx).

2.3. Indoor Residual Spraying (IRS)

IRS is used for both kala-azar and malaria control programmes, and when properly planned and executed following stringent SOPs, remains an efficient tool. In recent years however IRS activities were generally planned according to funds received or not executed due to insufficient operational budget. IRS is being refocused from general coverage to much more targeted and focused use to combat epidemics and to reduce transmission in active foci alongside with LLINs. Regular entomological surveillance and species identification of mosquitoes will guide which vector control tool have to be used, i.e. LLINs, IRS or the combination of both.

Insecticide for IRS is used among the four available classes of WHOPES-approved insecticides (i.e. organochlorine (DDT); organophosphates (primiphos-methyl); carbamates (bendiocarb); and pyrethroids (alphacypermethrin, deltamethrin, and lambdacyhalthrin). Since 1990, DDT is no longer used in our country the only insecticides that have been used are the pyrethroids, presently alpha-cypermethrin. Following the recommendations of WHO Global Plan for Insecticide Resistance Management, it is needed to develop a plan for insecticide resistance management that will likely include the rotation of the class of insecticide used for IRS among pyrethroid, carbamate and organophosphate insecticides. As carbamate and organophosphate insecticides are more expensive than pyrethroids, this will have budget implications for the GoN contribution to the malaria programme.

Over the years, IRS covered 19.6% population in 2008 and 16.6% of population in 2009 at risk VDCs. During 2010 to 2012 population coverage varied from 47,000 to 145,000. Insecticide consumed per year was 13,051 kg and average cost per year was US $158,646 during this period. IRS procurement and operations are funded through GoN resources and should not be included in GF budget. As noted in the Joint Assessment report of 2011 and the Midterm review of 2013, there needs to be a serious review and revitalization of IRS programme. From the mid-term review, the two implementation strategies for IRS when used in the malaria program are:

- Implement good quality focal spraying once a year to eliminate high risk foci (wards),
- Implement responsive spraying to prevent / contain outbreaks and eliminate active foci

In 2013, EDCD distributed 15,400kg of insecticide alpha-cypermethrin, which in theory would cover 1,026,664 population or 205,333 house hold structures in 17 districts. Six of the districts in the east were targeted for kala-azar exclusively, and the other eleven for malaria. In the current strategy IRS for malaria will be focused to high risk wards pressing for elimination and when there is evidence of an impending outbreak. In this plan, Year 1 will target 88,444 households in high-risk wards; Year 2 is projected to be reduced to 60,000 households and Year 3 reduced to 30,000 households.

In addition to VDCs scheduled for an annual IRS applications, there are provisions for 'responsive spraying' for newly emerged foci. These have been budgeted at approximately 10,000 houses per year throughout each of the three years.

The strategy acknowledges and fulfills the criteria in the WHO Guidance on LLIN/IRS combinations, March 2014 that states:

1. In settings where there is high coverage with long-lasting insecticidal nets (LLINs) and LLINs remain effective, indoor residual spraying (IRS) may have limited utility in reducing malaria morbidity and mortality. However, IRS may be implemented in areas where there are LLINs as part of an insecticide resistance management strategy.

2. If LLINs and IRS are to be deployed together in the same geographical location, the IRS should use non-pyrethroid insecticides.
3. Malaria control and elimination programmes should prioritize delivering either LLINs or IRS at high coverage and to a high standard rather than introducing the second intervention as a means of compensating for deficiencies in the implementation of the first.
4. Evidence is needed to determine the effectiveness of combining IRS and LLIN in malaria transmission foci, including in low transmission settings. Evidence is also needed from different eco-epidemiological settings outside of Africa.
5. All programmes in any transmission setting that invest in the combined use of LLINs and IRS should include a rigorous programme of monitoring and evaluation (e.g. a stepped wedged introduction of the combination) to confirm whether the additional inputs have the desired impact. Countries that are already using both interventions should similarly undertake an evaluation of the effectiveness of combining versus either LLINs or IRS alone.

Entomological monitoring and insecticide resistance management are core elements of the national vector control strategy. An important part of this is rotation of insecticide classes to mitigate risk of the emergence of resistance. Currently the GoN is procuring pyrethroids as a cost of $150,000 per year. The alternate class of insecticide, carbamates such as bendiocarb, may cost 4x as much, or $600,000. If bendiocarb was used in Year 1 and Year 3, the illustrative cost of procurement would be, $ 600,000 for years 1 and 3, and $150,000 for Year 2.

3. Early diagnosis and prompt treatment

3.1. Diagnosis

Malaria diagnosis and treatment are free in government health facilities. Supply of microscopy slides, reagents, RDTs, antimalarial medicines (as Chloroquine, ACTs and Quinine) are managed by EDCD through logistics management system and should be continued. Diagnosis and treatment in private sector remains largely unregulated, and in need of coordination. At community level FCHVs are expected to refer all suspected malaria cases to a health facility for confirmation and appropriate treatment.

Microscopy is available at district and up to Primary Health Care Center and in some high risk VDCs up to the health post level. Combination RDTs (which can detect Pv and Pf) are used in those health institutions where microscopy is not available as well as in emergency purposes.. There is an evident need to review the Quality Assurance and Standard Operating Procedures for diagnosis. In 2012, a national workshop was organized, but it appears lab registers are not standardized and not well maintained; the Quality Assurance system for microscopy and RDTs is generally lacking; and the overall strategy for deployment of microscopes or RDTs is unclear and based on availability of microscopes.

3.2. Treatment

Uncomplicated *P. falciparum* cases are treated with ACT (artemether/lumefantrine) for three days. Similarly, *P. vivax* cases are treated with chloroquine for 3 days followed by radical treatment for 14 days with primaquine. Recently, a single dose of primaquine is also given in *P. falciparum* cases along with ACT. Where there is no laboratory services the suspected cases should be tested with RDT and then treated with chloroquine/or Coartem.

RDTs and ACTs are available in all health facilities except those where there is no malaria case during the last 3 years. Due to the low incidence, ACTs quantities remain limited to 3month consumption, to reduce risk of expired stock. For the use of primaquine as a single dose in *P. falciparum* it is necessary to review the treatment protocol.

4. Advocacy and Behavior Change Communication

Behavior change communication (BCC) was an important component of National Malaria Strategy 2010-2012. Five methods were applied in IEC/BCC: interpersonal communication, primary and secondary school education, mass media, special events (campaign, etc.) and high level advocacy. National Health Education Information and Communication Centre (NHEICC) is the focal point of the IEC/BCC activities for all health programs. The mandate of NHEICC includes the development and production of IEC/BCC media and messages, planning, implementing and evaluating health education and health promotion activities at all levels. Health education technician is functional as the focal point for all IEC/BCC activities in the district. At the VDC level FCHVs play an active role in IEC. EDCD has been supported by PSI on the IEC/BCC component during mass LLINs distribution. Available data on knowledge and practices on malaria treatment and prevention in both rural and urban areas reflect achievements of IEC/BCC. Radio (MW and FM) was found to be most powerful means of information in both rural and urban areas. IEC/BCC materials, malaria billboards have been developed and deployed, which have played important role in improving community awareness in malaria. In some areas, basic knowledge on malaria, regarding mosquito larval habitats and biting habits is still inadequate. IEC/BCC is important to discourage selfmedication and to encourage private service providers to follow national diagnosis treatment protocols.

There is no written malaria strategy encompassing advocacy, IEC and BCC activities providing clear directions on the content and delivery of communications at each level, including communities. PSI has promoted the use of LLINs and to some extent, through billboards, promotion of diagnosis and treatment for workers returning from India, but without a clear evidence-based strategy. According to PSI, IEC/BCC activities have had an impact on awareness and use of LLINs through their TRaC surveys. Moving forward attention should be given to adult males especially those working in at-risk situations outside VDCs, as forest workers, soldiers, migrants, refugees, other ethnic groups, etc. Suitable, evidence-based BCC/IEC activities should be designed, implemented for these most at-risk populations.

5. Program management

5.1. Human resource and capacity building

The organizational structure of EDCD, the Global Fund Programme Management Unit, the Regional and District Office are provided above in Section 2.

Human resource management has improved since 2010, but challenges remain. The main problem of human resources is deployment and retention of physicians, nurses and other basic health services staff in peripheral health facilities. There is also the problem of continuation of vector control staffs at the district level, i.e. the post of Vector Control Inspectors and Malaria Inspectors post are going to be abolished after their retirement from the government service. Monitoring and Evaluation Officers are working on yearly contracts through GFATM support. There is an urgent need to make provision for key posts: Entomologist, Microbiologist, and Epidemiologist, Medical Officer and Monitoring and Evaluation Officer in the disease control section of EDCD.

Human resources at district level appear adequate in terms of number of staff, but functions and responsibilities must be clearly defined. It is necessary to analyze data at district level properly for

stratification and pre elimination actions. There is a need to clarify functions and connectivity between teams and units especially when related to epidemiological data and performance of surveillance systems, which is especially important in this elimination strategy.

The transition from malaria control to elimination requires assessment and realignment of core capacities, both technical and managerial, at each levels, taking into account the longterm integration into the overall health system.

5.2. Vector Borne Diseases Research and Training Center (VBDRTC)

The VBDRTC in Hetauda, described above in Section 2, is often used by EDCD as a venue for meetings and training. The Center currently has only 6 positions filled out of 21, seriously compromising performance. The Executive director's position is hired on four-year contracts. The single insectary should be maintained with an air conditioner and skilled staff. There is a functional lab for malaria microscopy and Quality Assurance for diagnosis. One entomologist and vector control assistant support training and field investigations.

VBDRTC Development Board should be revitalized and recruit an Executive Director for at least 3-5 year contract along with filling of remaining vacant posts. An institutional strategic plan for the VBDRTC should be developed and presented to the Ministry of Health and Population and Department of Health Services as a road map to build capacity in technical, operational and research departments. A Scientific Advisory Committee should be established through the collaboration with WHO and other international development partners in Nepal.

5.3. Malaria Logistics Management

Overall malaria medicines, RDTs and other supplies such as microscopes, slides, and lancet, stains and spray pumps, insecticide for IRS are found to be available. Artemetherlumefantrine and injections were not always available at the lower level health facilities where there is low malaria incidence and lack of medical doctors to administer injections. If needed, such medicines could be obtained from nearby district stores within the same day. Buffer for preparation of Giemsa stains were not used in most facilities in spite the existence of an SOP which prescribes buffering.

However, EDCD still needs to develop a comprehensive plan for antimalarial medicine quality assurance. The Department of Drug Administration is not accredited and Zest Laboratories in Kathmandu, while ISO17025 accredited cannot do microbiological quality control. It is necessary to improve stock management for insecticides and maintenance of spray equipment, where there are often quantities of expired insecticide and irreparable sprayers. Storage facility at EDCD needs improvement. At district level medical stores have been designed and built with technical support from USAID. The storage facility can be improved by getting rid of/writing off obsolete/un-functioning material/equipment. At the more peripheral levels only small quantities of malaria commodities are kept.

The PSM plan states that three items included in national Logistic Management Information system (LMIS): Chloroquine, Primaquine, Quinine tablets and Quinine injection. RDTs, four categories of ACTs, Artesunate injection and Artemether injections are in the process of being enlisted into the national LMIS. Minimum/maximum stock levels are already defined down to sub district level. Three systems for inventory control are being used: Bin cards, inventory book/registry and a LIMS. Quarterly reports on stocks and consumption are sent from the districts to the EDCD who then supplies directly to the district.

5.4. Budget and Finance

Malaria funds made available and used by the MoHP/EDCD during the last 5 years to perform tasks to control malaria in Nepal was NRs 3,629,600,836 (around USD 36 million) from 2008 to 2013. The GFATM has contributed 87% of the total amount (around 80% to PSI and 20% to MoHP/EDCD). The remaining 13% come from the Government of Nepal regular budget - including salaries - (12%) and from WHO (1%) which is managing most of the needed strategic Technical Assistance to the program.
In the shift from malaria control to malaria elimination there should be increasing emphasis on surveillance, case investigation, outbreak detection and control, with improved, and more narrow, targeting of LLINs and IRS. The national budget should progressively increase to ensure proper support to surveillance and capacity to prevent reintroduction, maintenance of dedicated skilled staff and active collaboration with neighboring countries.

Nepal Malaria Strategic Plan for Elimination

The objectives of malaria control programs range from reducing the disease burden and maintaining it at a reasonably low level, to eliminating the disease from a defined geographical area, and ultimately to eradicating the disease globally. These levels of control are defined as follows (WHO, 2007):

- **Malaria control:** reducing the disease burden to a level at which it is no longer a public health problem
- **Malaria elimination:** interrupting local mosquito-borne malaria transmission in a defined geographical area, i.e. zero incidence of locally contracted cases, although imported cases will continue to occur. Continued intervention measures are required.
- **Malaria eradication:** permanent reduction to zero of the worldwide incidence of malaria infection.

Since the last attempts at malaria elimination or eradication more than half a century ago, the landscape in which antimalarial activities are being conducted has changed considerably. New, more effective tools are available; communication technology has improved, as have the wealth of nations and the social and economic standards of people living in endemic areas. These changes, combined with the malaria control achievements of the past few years, have inspired the governments of malaria-endemic countries and major international donors to aspire to a more ambitious, accelerated effort.

History shows that new goals and targets for global malaria control, elimination and possible eradication must be realistic in order to avoid disappointment and disillusionment and the devastating implications of disease resurgence, experienced in the past. The lessons of the past and the efficacy and effectiveness of the current tools will serve as guides to setting realistic targets. Potential threats to malaria control, the prevailing state of health systems and the epidemiology of malaria in country, must also be taken into account in setting realistic targets.

During the Mid-term review of the performance of the malaria program in June 2013, from data generated by public health care facilities and computerized through the Health Management Information System (HMIS) as well as from extra studies fine-tuning malaria stratification, the overall malaria trends in Nepal for the last 5 years clearly indicated a substantial decline of both clinical and confirmed falciparum and vivax cases. The recently conducted micro-stratification exercise shows that there are less districts classified as high and moderate risk (25 instead of 31) and that the overall population living in at risk Village Development Committees (estimated at 1,254 VDCs out of 3,972) has declined to 48% in risk as compared to earlier 73% of the total population. This gives hope that an increasing number of wards (foci) will become free of malaria in the coming years.

Clinical "malaria" cases have dropped from 73,259 in 2005 to 36139 in 2013. Confirmed cases dropped as well from 5,050 in 2005 to 1974 in 2013. The proportion of falciparum infections is slightly declining over time to reach 16.4% in 2013. Recorded malaria deaths are drastically declining from more than 200 during the 2006 epidemic years to less than 10 in 2010 and zero by 2012 and sustained thereafter. During 2004-2007, the Malaria Parasite Incidence (API) has remained stable (0.26-0.27 per 1000 population countrywide), and thereafter has been gradually declining from 2008 onwards to be at the lowest level ever recorded in 2012 (0.08/1000 population), however it looks spiked to 0.15 in 2013, mainly due decrease in denominator/risk population.
The above data/trend is positive and indicative of substantial progress made in Nepal towards pre-elimination targets bearing in mind that data are generated by public health care facilities only and are still requiring continuous attention for improvement.

Based on the assessment of current epidemiological data, there are still crucial concerns to be addressed by the program in order to make data more accurate and reliable for decision-makers and

planning officers from district to central levels. In particular, there is a need to increase the capacity of district teams to analyse data generated by public health facilities and progressively include and analyse data generated by all private health institutions including NGOs (e.g. in charge of community activities, refugees and migrants).

Many factors might have contributed to that significant decline of clinical and confirmed malaria cases and decline of endemic districts (and most probably number of active foci). Among them we might assume that the following elements have played a major role:

- Overall improvement of social determinants of health (for example less than 20% of Nepalese people are below poverty line threshold in 2010 against more than 40% in 2000),
- Scaling up access to simple diagnostic tools like (combo) RDTs, o Availability of powerful ACTs in all public health care facilities,
- Distribution of more than 2 million LLINs leading to an exceptionally high coverage of LLINs (in addition to high usage of traditional nets) in targeted endemic areas.

To that extent, the significant financial support from the GFATM from 2004 has to be acknowledged to have played a significant role by allowing the program and partners to scale up, free of charge, essential cost-effective malaria control tools to the most peripheral level.

Based on the Malaria Program review 2010, JANS-2011 and MTR-2013 recommendations and NHSP-II targets, Govt. of Nepal, Ministry of Health has envisioned a long term goal for elimination of malaria from Nepal by 2025 with the below mentioned vision, mission and goals:

Vision: **Malaria-free Nepal by 2025**

Mission: To empower the health staff and the communities at risk of malaria to contribute towards the vision of malaria-free Nepal by 2025.

Goals:

- To sustain zero death due to malaria from 2012 onwards;
- To reduce the incidence of indigenous malaria cases by 90% by 2018 (relative to 2012);
- To reduce no. of VDCs having indigenous malaria cases by 70% by 2018 (relative to 2012);
- To receive WHO certification of malaria free status by 2025.

1. Strategic objectives and key targets

Objective 1: To strengthen strategic information for decision making towards malaria elimination.

Key targets / milestones:

- Ward-wise risk stratified and appropriate/rational interventions executed o By the end of 2015, ward-wise malaria risk microstratification will be completed, so the intervention units could be wards in place of current VDC's and earlier districts.
- Development and roll over of SMS and web based recording and reporting system for strengthening malaria surveillance, including suspected and confirmed cases reporting.
    - Introduction of Case based surveillance in all districts by the end of 2014. o All malaria cases will be recorded and reported through SMS and Web-based MDIS, by the end of 2015. o Establishment and expansion of Border check posts: 2 in 2014, 2 in 2015 and 3 in 2016 and continued thereafter.
- Quarterly review of the recorded data and plan interventions accordingly o Three quarterly reviews will be conducted and validation of data completed by the end of each year.
- Foci investigation rolled out by the end of 2014 o At least 54 foci will be investigated in 2014, 160 in 2015 and 100 each year after.
    - Investigated foci will be eliminated gradually and by the end of 2016 a total of 214 foci will be eliminated, sustained thereafter and gradually increased as per above target.
- Number of operational research will be carried out generating evidence for policy making.

Objective 2: To further reduce malaria transmission and eliminate the foci.

Key targets / milestones:

- Guideline for IVM developed and rolled over by the end of 2014 for implementation.
- Prevention using LLIN: Coverage of high risk VDC population through mass campaign and pregnant women in high and moderate risk VDCs through ANC visits.
    - 471,747 LLINs in 2014; 149,969 LLINs in 2015; 252,440 LLINs in 2016; 491,112 LLINs in 2017 and 155,851 LLINs in 2018.
- Prevention using IRS: Regular annual spray covering people living in high risk every year and responsive spraying as indicated by foci investigation.
    - 88,444 households in 2014; 60,000 households in 2015 and 30,000 house-holds in 2016.
- Foci elimination and documentation of lessons learnt for prospective activities.
    - 54 in 2014; 160 in 2015 and 100 every year thereafter.

Objective 3: To improve quality of and access to early diagnosis and effective treatment of malaria.

Key targets / milestones:

- Update the malaria diagnosis and treatment policy, manual and roll over its application by the end of 2014
- Development of training package on malaria case management: development and roll out by 2015
- Training on case management of malaria by 2015 o FCHVs in remote VDCs to detect malaria using RDTs,
    - Training on malaria case management for public & private sector health care providers
- Expand and improve quality of malaria microscopy service-continued annually o Finalize and roll over of the SOP on malaria microscopy o Establish slide banks for training and reference in malaria microscopy o Conduct internal competency assessment of malaria lab technicians and assistant
    - Conduct external competency assessment lab technicians and assistants o Conduct instructional skills development training for trainers in malaria microscopy
    - Basic training in malaria microscopy o Refresher training in microscopy
    - Training on preventive maintenance of microscopes o Supportive supervision and monitoring of malaria microscopists o Cross-checking / validation of blood smears
- Expand the use of RDTs and set up QA QC of combo RDTs- by the end of 2015
- Procurement and supply of antimalarial drugs and diagnostics to avoid stock out o Regular monthly recording and reporting through FMIS/MDIS.
    - Annual health facility survey conducted to document no stock out of logistics.

Objective 4: To sustain support from the political leadership and the communities towards malaria elimination.

Key targets / milestones:

- Develop and roll out of comprehensive BCC strategy by the end of 2015 o Develop communication package to mobilize communities for malaria prevention
- Develop specific materials (print, audio and video) to improve the following behaviors: sleep under nets every night; seek early diagnosis and treatment for malaria, and adhere to treatment on malaria.
- Organize Multi-sector advocacy meetings at national / district levels to support malaria elimination o Celebration of World Malaria Day: April 25.
    - Cross–border collaboration meetings annually for sharing the information and harmonizing interventions.

Objective 5: To strengthens programmatic technical and managerial capacities towards malaria elimination.

Key targets / milestones:

- Training key program staffs in malariology, case management, entomology, health informatics, GIS mapping , malaria microscopy etc.- annual targets in annex- budget sheet
- Convene Malaria Technical Working Group; o at least 3/yr
- Periodically update the national malaria strategic plan- o by the end of 2018, review and revise as necessary
- Supervision, monitoring and evaluation- o Annually as per M & E Plan.
- Strengthen VBDRTC capacity in malaria training and research o Equipment provided and staffs deployed as necessary
- Recruit and fill vacant positions at EDCD, VBDRTC, Regions and Districts o By the end of 2014, vacant positions will be filled and sustained there after
- Strengthen partnership with WHO and other national/international institutions o Collaborative meetings, activities implemented

2. Key interventions per strategic objectives

Objective1: To enhance strategic information for decision making towards malaria elimination.

Malaria transmission ecology in Nepal is heterogeneous; determinants that affect the intensity of transmission may vary from one locality to another. Understanding the local epidemiology of malaria and its determinants is essential for policy and strategy development as well as for planning, monitoring and evaluation of the programme at different levels of the health system. Especially, as Nepal moves towards elimination, timely VDC and ward-specific information is essential.

1.1 Validation of micro-stratification of malaria risk areas

- Malariometric surveys,
- Entomological surveys • Geographical reconnaissance.

1.2 Update micro-stratification up to the ward level

- Collection and coalition of updated VDC and ward wise disease and other indicator based data, as per micro-stratification 2013.
- Update ward-wise malaria risk micro-stratification, based on above data.
- Convene dissemination meetings for districts and regions.

1.3 Strengthen surveillance and response mechanisms

- Develop and implement policy on compulsory reporting of malaria cases from both public and private sector
- Develop operational manual for malaria surveillance
- Establish electronic database and reporting system o National malaria database establishment and maintenance o Orientation of districts for web-based / SMS reporting o Weekly, monthly and annual analysis and feedback
- Case-based surveillance o Investigation into classification and mapping of confirmed cases,
    - o Line listing of malaria cases and initiation of national malaria register-HMIS and EDCD based,

- Community-based surveillance o Orientation-training of FCHVs: Case detection using RDTs in hard to reach endemic areas in remote high risk VDCs (estimated at 10%), where population movement from outside is common
- Establish and expand Border Malaria Check posts o Two in 2014, two in 2015 (total 4), three 2016 (total 7); Operating 7 in
  2017, includes infrastructure, personnel, supplies and training
- Capacity strengthening of rapid response teams.
  - Teams at central, regional and district levels oriented and mobilized to support the local levels in case investigation and outbreak control activities.

1.4. Foci investigation and delimitation

- Develop manual on foci investigation and delimitation
- Training of key staff on foci investigation and delimitation and elimination
- Foci investigation and mapping of each case
- Procurement of motorbikes, computer (laptop or tablet) and accessories

1.5. Annual Health Facility Survey

- Annual health facility survey will be carried out every year to validate the case reporting, understand the stock out and availability of trained staffs' situation to help design/align appropriate activities.

1.6. Research and surveys

- Survey on malaria microscopy services to establish baseline on adherence to standard operating procedures in malaria microscopy and follow up
- Study on malaria diagnosis and treatment practices in public and private sector
- Operational research on directly observe treatment (DOT) both for *P. falciparum* and for *P. vivax* cases.
- Monitor efficacy of first line malaria drugs in accordance with WHO recommended protocol every 2 years
- Monitor vector susceptibility to insecticides in accordance with WHO recommended protocol
- Mapping of malaria parasites in the country in collaboration with national and international research institutes.
- Publication of research and survey reports; Publication of malaria annual report

Objective 2: To further reduce malaria transmission and eliminate the foci.

2.1. Integrated Vector Management (IVM)

IVM is defined by WHO as "a rational decision-making process to optimize the use of resources for vector control". IVM aims to make vector control more efficient, cost effective, ecologically sound and sustainable; helping vector control programmes to find and use more local evidence, to integrate interventions where appropriate and to collaborate within the health sector and with other sectors, as well as with households and communities. The two primary interventions will be LLINs and targeted use of IRS. Larval Source Management will be used opportunistically – where the larval habitats are "few fixed and findable" according to WHO guidance.

2.2. Prevention using Long Lasting Insecticidal Nets

WHOPES-approved LLINs will be deployed in mass free distribution to populations in high risk VDC and in continuous distribution through ANC in high and moderate-risk VDCs. Monitoring of coverage, use and physical durability will be strengthened.

- Complete the roll-out of LLIN distribution campaigns targeting 54 VDCs in the high risk areas.
- Provide continuous distribution of LLINs through Antenatal Clinics in High and Moderate Risk VDC.
- Conduct surveys to monitor coverage, use and physical durability of LLINs after deployment
- Update database on LLIN distribution and link to malaria risk maps
- Implement behavior change communication activities for proper LLIN use
- Review feasibility of public-private partnerships for improving access to LLINs, including use of long-lasting treatment kits for conventional nets.

2.3. Indoor residual spraying

Nepal has a long history of high-quality and effective IRS and will adopt an IRS strategy of targeted responsive spraying as part of the malaria surveillance framework (indigenous active foci, outbreak foci and imminent outbreak situations). This is required for prevention of introduction of malaria and to prevent onward transmission. Targeted responsive IRS will be guided by surveillance and epidemiological data. Also a single round of focal spraying will be carried out to further reduce transmission in high risk VDCs.

- Focal spraying once a year to further reduce and eliminate transmission in high risk wards.
- Conduct focal responsive spraying to prevent / contain outbreaks and eliminate active foci.
- Funds for IRS are provided by GoN. Cost categories in the government budget include; procurement of insecticide; transportation and storage costs; procurement of spray equipment; maintenance of spray pumps; supplies and equipment for IRS, including Personal Protective Equipment; provision of safety measures for IRS; guideline revision and printing; training and re-training of the spray teams; monitoring and supervision activities during and after spraying; behavior change communications

2.4. Elimination of foci and documentation of lessons learned

Epidemiological plus entomological investigation of the village where indigenous cases (active focus) is detected, this will involve search for fever cases in 50 house-holds around the index case plus RDT/mass blood screening if indicated by the fever screening step.

- Conduct RDT/mass blood survey, only for fever cases
- Take a blood spot for PCR on What-man filter paper from suspected but RDT/slide negative cases, depending on the availability of PCR based diagnostic facility within the country.
- Monitoring of the treatment of the cases detected during above investigation for parasite clearance.
- Review of LLIN coverage and use and topping up if necessary
- Responsive spraying to prevent/contain outbreak and eliminate the foci if the area is not sprayed in the last 12 weeks.
- Larval Source Management if deemed appropriate and effective

- Behavior Change Communications for prevention of mosquito bite and disease transmission will be carried out, to raise community awareness.

Objective 3: To improve quality of and access to early diagnosis and effective treatment of malaria.

3.1. Update the malaria diagnosis and treatment policy and manual

- Technical support: National consultant
- Two-days' workshop of concerned stake holders
- Printing and dissemination of the national malaria treatment guidelines and the clinical and treatment algorithms

3.2. Development of training package on malaria case management

- Technical support: international consultant (thru WHO); to develop training package related to malaria case management
- Workshop to develop training package related to malaria case management (in collaboration with IMCI and other relevant health programs.
- Printing of training materials

3.3. Training on case management of malaria (including training of FCHVs in remote VDCs to detect malaria using RDTs, manage uncomplicated confirmed malaria cases, and refer those who are negative for malaria and those with severe febrile illness)

- Development of training plan
- Instructional skills development training for trainers on case management of malaria
- Training on malaria case management for public sector health care providers
- Seminars for private medical practitioners on case management of malaria
- Orientation –training for FCHVS in selected remote VDCs
- International consultant (thru WHO)- to conduct instructional skills development training for trainers in case management

3.4. Expand and improve quality of malaria microscopy service

- Finalize and disseminate widely the SOP on malaria microscopy
- Establish slide banks for training and reference in malaria microscopy
- Conduct internal competency assessment of malaria lab technicians and assistant
- Conduct external competency assessment lab technicians and assistants
- Conduct instructional skills development training for trainers in malaria microscopy
- Basic training in malaria microscopy
- Refresher training in microscopy
- Training on preventive maintenance of microscopes
- Supportive supervision and monitoring of malaria microscopists
- Cross-checking / validation of blood smears
- Technical support o International consultants (thru WHO) to facilitate internal and external competency-based assessments and develop slide banks.
    - o international consultant (thru WHO) to conduct instructional skills devel-opment training for trainers in malaria microscopy
    - o international consultant (thru WHO): trainer in preventive maintenance and repair of microscopes

3.5. Expand the use of RDTs and set up QA QC of combo RDTs

- Expand the use of combo RDTs as per policy and manual on malaria diagnosis and treatment, and ensure rational use.
- Set up QA QC of RDTs.

3.6. Procurement and supply management

- Malaria medicines (ACTs, Chloroquine, Primaquine, Artesunate injections), procurement, QA testing and shipping
- Diagnostics: (Microscopy will be based at District health lab, PHCC and selected health posts. RDTs will be used in health facilities without microscopy; selected FCHVs; and foci investigation) o Microscopes
  - o Combo RDTs
- Supply management from center to districts
- Supply management form districts to health facilities
- Supply management from center to regions

Objective 4: Advocacy, social mobilization & Behavior Change Communication

4.1 Develop comprehensive strategy document and materials for advocacy, social mobilization and behavior change communication (BCC)

- Technical support: national consultant-health communications specialist; thru WHO
- Conduct formative research to develop the strategy and materials for advocacy, social mobilization and BCC
- Develop advocacy materials to maintain strong political support at all levels, attract external support and accelerate cross-border collaboration in support of malaria preelimination.
- Develop communication package to mobilize communities for malaria prevention
- Develop specific materials (print, audio and video) to improve the following behaviors: sleep under LLIN every night; seek early diagnosis and treatment for malaria, and adhere to treatment on malaria.

4.2 Implement advocacy, social mobilization and behavior change communication BCC strategy

- Radio messages
- Outdoor Advertising boards at cross roads in endemic districts
- Treatment and prevention algorithm for 1254 health facilities
- School Health Programme
- Printing materials, flip charts etc
- Social Mobilization activities in communities by the local health facilities (two meetings per year)
- Mothers group meeting in community by FCHVs during transmission season,
- Cross border collaborative activities

4.3. Multi-sector advocacy meetings at national / district levels to support malaria elimination

- Hospital Development Committee at District/Zonal/Sub-regional/Regional Hospitals
- District Health Coordination committee
- District Disaster Management Committee
- Parliamentary resolution for malaria elimination
- Advocate for innovative financing mechanism to sustain

4.4 Celebration of World Malaria Day: April 25.

4.5 Cross–border collaboration

- Cross-border meeting to exchange information and develop joint operational plan
- Monitoring of joint operations across borders

Objective 5: To strengthen programmatic technical and managerial capacities towards malaria elimination

5.1. Training key staffs

- Technical support: national consultant (thru WHO) to conduct comprehensive human resource (HR) and training needs assessment exercise in order to finalize a comprehensive (short and long-term) HR plan with clear terms of reference and appropriate structure at all levels in support of the long term goal of malaria elimination in Nepal.
- Develop tools for training needs assessment
- Conduct training needs assessment
- Develop comprehensive training plan
- Implement the plan, including international trainings for key staff (program management, malariology, malaria elimination, entomology, GIS mapping /health informatics, Case management, surveillance, M & E, etc) o Management of Malaria Elimination at District level
  - o Management of malaria elimination at facility level

5.2 Convene Malaria Technical Working Group:

- Convene TWG meetings to review progress and if necessary update policy and strategies

5.3 Periodically update the national malaria strategic plan

- Through technical support from WHO update national strategic plan taking into account current epidemiological situation, micro-stratification, recommendations of the mid-term review, recent WHO guidelines, etc.

5.5. Develop and disseminate manual of operations

- Manual describes standard operating procedures for the four key interventions outlined above: strategic information; vector control; diagnosis and treatment; BCC. Manual will also describe the focal person for key interventions./

5.6 Develop annual operational plan

- Annual operational plans will be developed at central and district level based on updated strategic plan. This plan will guide implementation and track progress towards elimination.
  - o Quarterly district and annual national review meetings

5.7 Supervision, monitoring and evaluation

- Central level, EDCD and PMU field visits to districts
- Regional Surveillance Officers and driver supportive supervision to districts
- District supervision for surveillance, foci investigation and elimination

5.8. Bi-annual joint mission

- Support provided for a joint mission by Global Fund, WHO, EDCD and representatives of CCM review progress and address challenges

5.9 Strengthen VBDRTC

- Procurement of equipment
- Capacity strengthening for malaria training and research

5.10 **Recruit and fill vacant positions at EDCD, VBDRTC, Regions and Districts**

- Staff costs, including insurance for filled positions

5.11. Strengthen partnership with other national institutions

- Promote collaboration and partnerships with VBDTRC, TU, TU/IoM, PAHS, BPKIHS and private sector academia for establishing resource centers for collaborating partnership.

5.12. WHO National Professional Officer

- A National Professional Officer and administrative supporting staff based at WHO to provide technical and management support.

5.13 Training and Capacity-building

- Support to in-country training for the key interventions, strategic information; transmission reduction; diagnosis and treatment; behavior change communication

5.14 Program Coordination

- General Management: correspondence with MoHP, Partners, RHSD and DPHO
- Review meetings at regional and district level

5.15 Office Infrastructure

- Refurbish offices at Central, Regional and District Levels

5.16 Procurement of electronic equipment and vehicles

- Computers and printers for 255 health facilities and 5 regional offices
- Scanner, teleconference set and air-conditioners in EDCD
- 4WD vehicles for improving surveillance

5.17 Program representation

- Representation at national meetings
- Representation at international meetings

5.18 Program Management, Monitoring and Evaluation

- Annual internal program evaluations and recommendations

5.19 Technical Support

- International/national technical consultants (malariologist/ entomologist/ epidemiologist/ GIS & database) through WHO

5.20 Direct operational costs

- Office supplies and insurance
- Logistics and fuel for Central office
- Logistics and fuel for Regional offices
- Running cost for Central, regional and 25 districts
- WHO PSC administrative costs

Monitoring and evaluation:

Framework for Monitoring and evaluation is attached in annex.

Monitoring key indicators

Program goals

- To achieve zero death due to malaria by 2015 and sustain it thereafter.
- To reduce the incidence of indigenous malaria cases by 90% and number of VDCs having indigenous malaria cases by 70% of current level (2012) by 2018.

Impact indicators

- Number of deaths due to *P. falciparum* or *P. vivax* malaria: **deaths due to malaria**
- Number of malaria cases by classification: **indigenous and imported malaria cases**
- Number of active foci reported per year: **VDC/wards having indigenous malaria cases**

Outcome indicators

- Proportion of confirmed malaria cases investigated and classified fully.
- Population in high risk VDCs with an average coverage of LLIN.
- Percentage of pregnant women visiting ANC clinic in High and Moderate risk areas with LLIN coverage.
- Percentage of households in targeted areas that received IRS in the last 12 months
- Percentage of suspected malaria cases examined by microscopy or RDT.
- Percentage of confirmed malaria cases that received appropriate antimalarial treatment according to national treatment protocol.
- Percentage of people living in areas under malaria risk using at least 1 preventive measure
- Percentage of health facilities in high and moderate risk VDCs (compiled and sent by the districts) submitting timely and complete reports according to national guidelines.

Tracking Progress

All levels of Ministry of Health & Population: the EDCD, the Vector Borne Disease Units in the Regional and District Public/health Offices and the network of peripheral health facilities will carry out regular monitoring and evaluation activities. Designated focal persons in EDCD-PMU, Regional Monitoring and Evaluation officers and Vector Control Officers in regional and district offices and M & E Officers recruited with GFATM assistance will play a crucial role in tracking the progress and monitoring and evaluation of malaria. The record of malaria cases which are treated in private sector is not yet captured by HMIS. To overcome this problem this plan aims to maintain an electronic data base system and utilize this system to create a web based reporting system from different public and private sectors. In addition, the M&E officers will be responsible at the district level to follow up malaria reporting from private sectors systematically and regularly.

Regular data verification is carried at the district level through monthly review meetings. Quarterly (four monthly) reviews are carried out at the district, regional and central level as a mandatory prerequisite of the National Planning Commission. A Joint Annual Review (JAR) of the program is carried out at the central level with the participation of external development partners and Govt. of Nepal. At the same time internal assessment of malaria program is carried out and an annual report is prepared by EDCD. External independent evaluation of the program is conducted every 3-5 years.

As the program is progressing towards pre-elimination and introducing new surveillance mechanisms like notification of malaria cases, case-based surveillance, community-based surveillance and weekly

reporting, at district following output indicators will be piloted to monitor surveillance activities including outbreak preparedness and control measures:

1. Weekly surveillance reports received in time at district: *percent of health facility reporting weekly in time*
   =Number of weekly surveillance reports received in time/Number of health facility expected to report in time,

2. Percent of confirmed malaria cases notified within 24 hours to district: *percent of confirmed malaria cases notified within 24 hours*
   =Number of confirmed malaria cases notified within 24 hours / Total number of confirmed malaria cases reported by all facilities

3. Outbreaks investigated and prevention and control measures launched within a week of reporting: *Percent of outbreaks investigated and prevention and control measures launched within a week*
   =Number of outbreaks investigated and prevention and control measures launched /Total number of out breaks

4. Screening of incoming individuals from malaria endemic areas at Border Malaria Check posts: *Percentage of imported malaria cases detected on cross border malaria check post*
   = Number of malaria cases detected at border malaria check post (by microscopy/RDT) /Number of confirmed malaria cases detected and treated in the district every month/yr.

5. Reporting from FCHVs (applied to selected districts and VDCs)-Malaria cases detected and treated: *Percent FCHVs reporting and treating malaria cases*
   = Number of trained FCHVs (equipped with RDTs and drugs) in diagnosing, treating and reporting malaria cases/Total number of trained FCHVs equipped with RDTs and drugs

These will be monitored weekly by M& E Officers/VCIs in DHO/DPHO. At the end of the month reports of all the weeks will be consolidated and sent to EDCD.

Detailed Budget for the period of 2014-2018 under NMSP 2014-2025

Methods of estimating cost of the intervention:

- Activity-based costing ingredient method was used to estimate the cost of the intervention. We estimated the value of all input used for the intervention. Unit cost of the input was used to estimate the cost of the intervention. Activity based costing was also used to value the activity and sub-activity of the intervention. Unit cost of the activity or sub activity was used based on past experiences, research reports or government document. Unit costs of inputs and commodity used based on market; however, allowances and wages rate used in this cost estimation are based on Government rate, based on government rules and regulations, which are usually less than the market rate.
- Share cost method was used to estimate the cost for malaria programs where integrated district system was operated. Particularly, cost of human resources at district as well as central level is estimated using share cost method because the human resources are not only involved in the malaria programs but also in some other disease control program such as JE, Dengue, Kala-azar, and so on. Share cost is calculated based on the time given by the concerned health staff to the malaria programs and their monthly salary. The information on the time given to the malaria programs was collected from two sampled district offices and central level EDCD.
- The team was fully aware of possible duplication of the programs as well as financial support with other donors while designing the programs and activities and estimating the cost for the

programs and activities for elimination of malaria. While estimating the cost for PSM, commodity price, agent fee, freight, insurance, customs clearance, storage, and distribution among others were incorporated. Twenty percent of the budget was used for buffer stock as per the international practices while estimating the cost.

- Cost of existing capital such as space, building, beds, equipment, vehicles were not estimated for this intervention due to time and resource limitation; therefore, estimated cost from the government side is hugely underestimated.
- Proposed activities and sub-activities are technically well-designed and represent the best way to achieve the desired impact, outcomes, and sustainability given the prevailing conditions at the local level. Priority of the program was given based on costeffectiveness of the programs. Where possible, lowest cost quality products have been used while estimating the cost for the activities or programs. For example, priority was given to purchase locally available instruments or labor. Similarly, allowances and wage rates were estimated based on government that is generally less than market rates.
- As much as possible, the program activities are designed to produce desired outputs at minimum cost, for example, micro-stratification was conducted and the priority service delivery areas were identified before designing intervention. If the local and global evidences are available, cost-effective interventions are selected to achieve the desired results. All programs and activities are designed with paying attention about the value for money. For example, best possible strategies were used to reduce costs of the intervention and increase impact per dollar spent and to focus investments on the highest impact interventions among the most affected populations.

  Similarly, the costs of the programs and activities are estimated with utilizing the concept of economies of scale that means two or more activities or complementary programs should be conducted together, it reduces the cost of the programs. Other features of costing strategies include knowing of absorptive capacity based on previous experiences, strictly following the government rules and regulations and implementation mechanisms, and sitting with programme people and government officials while designing the intervention packages and estimating cost of the intervention. It reflects what, how, when, to whom and where of the programmes, implementation mechanism and possible outcome or output of the intervention, for example, in which areas, how many households and members and when will receive LLIN; similarly in a training program, who will be the participants, how many participants, how many days, among other are clearly mentioned.
- It was given priority to generate allocative efficiency while allocating the resources among the different programs and activities. For example, cost of unnecessary supervision and training, possible duplication of the programs and duplication of funding sources were avoided. To establish the efficient surveillance system was focused that help to reduce possible cost of consequences activities.
- Private sector was also engaged to provide the services deliver where private sector is more efficient than public sector through public private partnership (PPP) approach, such as private sector engages to distribute LLIN throughout the priority areas.

Estimated Budget by Objectives (in US$):

Objectives	Year 1	Year 2	Year 3	Year 4	Year 5	Grand Total
	Total	Total	Total	Total	Total	
1: To strengthen strategic information for decision making towards malaria elimination.	366,265	413,830	210,073	238,164	442,037	1,670,368
2:To further reduce malaria transmission and eliminate malaria foci	2,537,019	1,052,562	1,271,521	1,954,333	949,038	7,764,473
3: To improve quality and access to early diagnosis and effective treatment of malaria.	395,077	837,687	405,430	436,375	775,522	2,850,090
4: To sustain support from the political leadership and the communities towards malaria elimination.	230,614	268,853	276,150	266,509	276,150	1,318,277
5: To strengthen programmatic technical and managerial capacities towards malaria elimination.	1,265,323	1,687,719	1,250,650	1,175,455	1,909,034	7,288,181
Total funds Needed	4,794,299	4,260,650	3,413,823	4,070,836	4,351,782	20,891,390

Estimated Budget by Objectives and Service Delivery Areas (in US$):

Objectives	Service Delivery Areas	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	Year 5 Total	Grand Total
1: To strengthen strategic information for decision making towards malaria elimination.	1.Validation of micro-stratification	102,553	44,217	-	6,808	124,693	278,272
	2.Surivellance	225,327	332,619	194,241	196,540	295,391	1,244,117
	3. Research & surveys	38,384	36,994	15,832	34,816	21,954	147,980
Total Objective 1		366,265	**413,830**	**210,073**	**238,164**	**442,037**	**1,670,368**
2: To further reduce malaria transmission and eliminate malaria foci	4. LLIN Distribution	1,631,959	516,050	877,311	1,689,941	536,293	5,251,554
	5. IRS	843,466	469,286	330,168	201,402	350,808	2,195,130
	6. Delimitation of foci	61,595	67,226	64,042	62,989	61,937	317,789
Total Objective 2		2,537,019	1,052,562	1,271,521	1,954,333	949,038	7,764,473
3: To improve quality and access to early diagnosis and effective treatment of malaria.	7. Diagnosis, treatment and case management	395,077	837,687	405,430	436,375	775,522	2,850,090
Total Objective 3		395,077	837,687	405,430	436,375	775,522	2,850,090
4: To sustain support from the political leadership and the communities towards malaria elimination.	8. Advocacy, social mobilization and BCC	230,614	268,853	276,150	266,509	276,150	1,318,277
Total Objective 4		230,614	268,853	276,150	266,509	276,150	1,318,277
5: To strengthen programmatic technical and managerial capacities towards malaria elimination.	9 Capacity Building for Key Staff	228,186	252,990	357,465	240,433	368,517	1,447,592
	10. Supervision Monitoring and Evaluation	63,224	63,224	63,224	63,224	63,224	316,118
	11.Operational Management	973,914	1,371,505	829,961	871,797	1,477,294	5,524,471
Total Objective 5		1,265,323	1,687,719	1,250,650	1,175,455	1,909,034	7,288,181
Total funds Required		**4,794,299**	**4,260,650**	**3,413,823**	**4,070,836**	**4,351,782**	**20,891,390**

Budget by components

A. SUMMARY BUDGET BREAKDOWN BY EXPENDITURE CATEGORY								
SN	**Category**	**Total Year 1**	**Total Year 2**	**Total Year 3**	**Total Year 4**	**Total Year 5**	**Total Consolidated Budget**	**%**
1	Human Resources	329,683	368,051	409,688	449,236	492,738	2,049,397	10
2	Technical Assistance	942,615	1,024,871	898,345	837,764	1,204,920	4,908,516	23
3	Training	132,703	152,425	147,086	148,627	160,993	741,834	4
4	Health Product and Health Equipment	1,653,512	921,986	915,857	1,732,116	876,315	6,099,785	29
5	Medicines and Pharmaceutical Products	104,660	107,272	97,078	84,593	77,401	471,005	2
6	Procurement and Supply Management Costs	499,140	652,959	88,196	75,405	779,215	2,094,915	10
7	Infrastructure and Other equipment	47,405	9,537	6,484	12,247	39,747	115,421	1
8	Communication Materials	210,768	249,530	251,687	256,712	249,654	1,218,351	6
9	Monitoring and Evaluation	871,442	770,230	592,769	467,030	464,483	3,165,955	15
10	Planning and Administration	1,105	-	316	789	-	2,211	0
11	Living Support to Clients/Target Population	-	-	-	-	-	-	-
12	Overheads	1,263	3,789	6,316	6,316	6,316	24,000	0
13	Other	-	-	-	-	-	-	-
Total		**4,794,299**	**4,260,650**	**3,413,823**	**4,070,836**	**4,351,782**	**20,891,390**	**100**

Gap Analysis

Programmatic gap

Overall programs for the malaria intervention can be divided into two categories a) regular programs to control or maintain the downward trend malaria cases b) strengthen and improvement of quality of the intervention for elimination of malaria. Given the resource limitation, the government using tax financing and small support from WHO can only maintain the regular malaria control interventions. Required improved interventions for elimination of malaria cannot be implemented without support from additional external development partners. In fact, enhanced and quality intervention for elimination of malaria is the major programmatic gap.

The Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) has played a driving role in combating the malaria in Nepal through improving the health system capacity and improving the service delivery mechanism. Substantial strategic gaps exist in the prevention and control of malaria if the support of GFATM is not available. Such gaps include insufficient allocation of resources, insufficient service coverage, prevention with LLIN coverage of the risk groups through mass and ANC visits, vulnerable and marginalized group not accessing appropriate or adequate malaria care services, and demand side and supply side barrier to receive diagnosis and care among others. Poverty is a cause as well as an important consequence of malaria and this vicious cycle of poverty and health implies that lowering the malaria incidence means lower prevalence of poverty in the country. In addition to this, from macro perspective, GFATM plays a significant role to improve the economic growth of the country through producing the healthy and active manpower for the country because malaria targets to economically active people. If we look at the programmatic gap from the program implementation perspective, the government can continue regular programs with minimum acceptable quality. However, if we look at the outcomes of the program perspective, we can see huge gap in terms of not only the prevention and control of disease but also reduction of poverty and improving economic growth.

Financial gap:

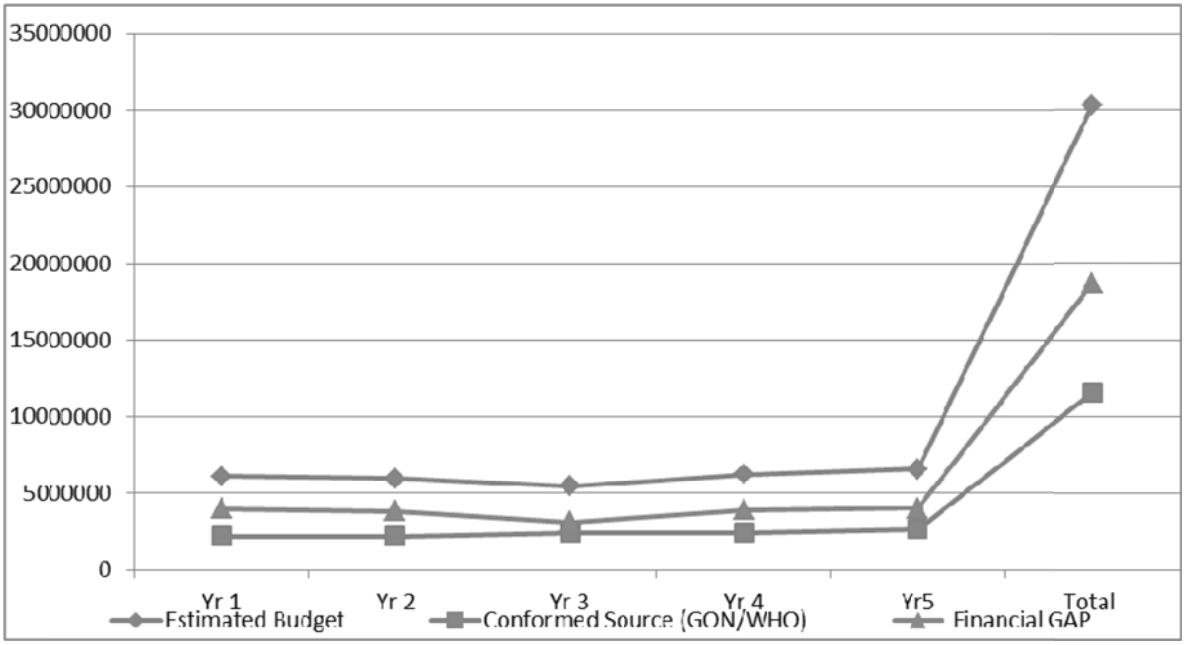
The total estimated funds required for effective implementation of Nepal Malaria Strategic Plan 2014-2025, during 2014-2018 is US$ 30,339,780 (18,696,260 gap + 11,411,020 Govt. Contribution + 232,500 WHO contribution). Government of Nepal and WHO Nepal are contributing 38% (US$ 11,643,520) of the required budget. In this context, financial gap to implement Malaria Strategic Plan during 2014-2018 comes around US$ 18,696,260.

The estimated budget shows that the government is investing around 37%, and WHO for another 1% of the total budget required for the implementation of activities in coming five years (2014-2018) as per the NMSP 2014-2025, and walking Nepal in the path for elimination by 2025. In other words, almost 20 % (6.2 million) of the estimated total budget (30.33 million) is required in maintaining the regular malaria control program and it requires additional 80% for elimination of malaria. In nominal terms an estimated USD 18,696,260 additional budget is required for five years for effective and enhanced malaria control leading towards elimination. The government and existing WHO support have approximately USD 11.6 million and has a clear short fall of (financial gap) of USD 18.7 million, accounting for around 62% of the resources required to implement the program in next 5 years.

The gap in monetary terms may not be seen as a major problem; however, important thing is that spending a single dollar on elimination of malaria is an investment. The loss of future rate of returns from elimination of malaria will be a sea gap using counterfactual of existing situation. The country, indeed, will get the rate of returns from this investment through increasing healthy labor force and

productivity and reduction of the cost of prevention and control of malaria. Elimination of malaria is a public good which has spillover effects to other vector borne diseases including kala-azar, JE, Dengue, LF and community, nation and to region. The externalities of malaria and consequences of interventions will not be limited within the endemic districts; other district will be free from the risk of malaria. Other economic benefits such as poverty reduction, improving economic welfare, and better household economy from the malaria interventions that are not reflected in natural units such as incidence, prevalence, disability adjusted life years (DALYs) of malaria. On the other hand, the intervention for elimination for malaria is directly related to equity of health care financing because malaria is a disease of the poor and benefits disproportionately contribute in favor of the poor people.

Fig.: Financial Gap analysis:



Plan of Action and Budget, 2014-2018

SDA	Objectives/ SDA / Main Activities / detailed activities	Grant Total	Responsible Partner
Objective 1: To strengthen strategic information for decision making towards malaria elimination.			
I.	**Validation of micro-stratification Micro-stratification**		
1.1	Validation of micro-stratification of malaria risk areas	158,592	EDCD/ WHO
1.2	Update Malaria micro-stratification Up to Ward level	119,680	WHO
Sub total		**278,272**	
II.	**Strengthen Surveillance and Response Mechanisms**		
1.3	Strengthen Surveillance and Response Mechanism	748,586	EDCD/WHO
1.4	Foci investigation, delimitation and elimination	495,531	EDCD/DPHO
Sub total		**1,244,117**	
III. Research and surveys			
1.5	Research and Surveys	115,559	WHO
1.6	Publication of research and survey reports	19,263	WHO
1.7	Publication of malaria annual report	13,158	WHO
Sub total		**147,980**	
Total - Objective 1		**1,670,368**	
Objective 2 : To further reduce malaria transmission and eliminate malaria foci			
IV. LLIN Distribution			
2.1	Prevention using LLINs	5,251,554	EDCD/WHO
Sub total		**5,251,554**	
V.	**IRS**		
2.2	Indoor residual spraying	2,195,130	EDCD/DPHO
Sub total		**2,195,130**	
VI. Elimination of foci and documentation of lessons learned			
2.3	Elimination of foci and documentation of lessons learned	317,789	EDCD/DPHO
Sub total		**317,789**	
Total - Objective 2		**7,764,473**	
Objective 3: To improve quality and access to early diagnosis and effective treatment of malaria.			
VII. Diagnosis, treatment and case management			
3.1	Update the national malaria diagnosis and treatment policy and manual (Treatment Protocol)	25,895	EDCD/WHO
3.2	Development of training package on malaria case management	81,283	WHO
3.3	Training/orientation on case management of malaria	151,837	EDCD/DPHO
3.4	Printing and dissemination of SoPs	1,579	EDCD

3.4.2	Establish slide bank for training and reference in malaria microscopy	610,890	VBDRTC/WHO
3.5	Expand use of combo RDT as per the national policy and manual on malaria diagnosis for the rational use.	32,490	WHO
3.6	Procurement and supply Management	1,946,116	EDCD
Sub-Total		**2,850,090**	
Total - Objective 3		**2,850,090**	
Objective 4: To sustain support from the political leadership and the communities towards malaria elimination.			
VIII. Advocacy, social mobilization and BCC			
4.1	Develop comprehensive strategy document and materials for advocacy, social mobilization and behavior change communication BCC strategy	46,607	EDCD/WHO
4.2	Implement advocacy, social mobilization and behavior change communication BCC strategy (in malaria transmission season 4 times/ 9 months/4 languages)	969,380	EDCD/NHEICC
4.3	Multi-sector advocacy meetings at national and district levels to secure support for malaria elimination	91,158	EDCD
4.4	Celebration of World Malaria Day	182,211	EDCD
4.5	Cross-border collaboration	28,922	WHO
Total - Objective 4		**1,318,278**	
Objective 5: To strengthen programmatic technical and managerial capacities towards malaria elimination.			
IX. Capacity building			
5.1	To conduct comprehensive human resource (HR) and training needs assessment exercise in order to finalize a comprehensive (short and long-term) HR plan with clear terms of reference and appropriate structure at all levels in support of the long term goal of malaria elimination in Nepal.	777,966	WHO
5.2	Strengthen Malaria Technical Working Group (TWG)	16,326	EDCD
5.3	Periodically update the national malaria strategic plan (External)	171,747	WHO
5.4	Periodically update the national malaria strategic plan (Internal)	62,316	WHO
5.4.1	Annual Health Facilities Survey	57,709	EDCD
5.4.2	Conduct Quarterly review meetings at District level	287,053	EDCD
5.4.3	Conduct annual national review meetings including Micro-planning of interventions at VDCs/Ward level and monitoring progress	74,474	EDCD
Sub-total		**1,447,592**	
X. Supervision Monitoring and Evaluation			
5.5	Supportive Supervision, and Monitoring	301,844	EDCD

5.6	Bi-annual joint mission by the GF, WHO, EDCD and representative from the CCM to review the progress and to identify and address the challenges	14,274	WHO
Sub-total		**316,118**	
XI. Operational Management			
5.7	Strengthening VBDRTC capacity	72,000	VBDRTC/WHO
5.8	Fill and continue additional expert level position at EDCD, VBDRTC and Districts	2,778,423	EDCD/DPHO/RHD
5.9	Supportive environment: Coordination and partnership development (national, community, publicprivate)	45,368	EDCD/RHD
5.10	Refurbish Offices	23,211	EDCD/RHD
5.11	Strengthening capacity of health facilities in electronic recording reporting system through computerization	1,056,316	EDCD
5.12	Program representation	40,158	EDCD/WHO
5.13	Technical Support	418,421	WHO
5.14	Direct/Operational Cost	1,090,574	EDCD/WHO
Sub-total		**5,524,471**	
Objective 5		**7,288,181**	
Grand Total		**20,891,390**	

Annexes

1. Executive summary of micro-stratification of malaria risk in Nepal,2012
2. District-wise malaria risk population,2012
3. VDC-wise malaria risk population,2012
4. Consolidated District-VDC wise risk, 2012
5. Malaria Epidemiological Information, 2000-2012
6. Summary recommendations of MTR, 2013
7. Monitoring and evaluation framework, 2014-2018
8. Program performance monitoring chart, 2014-2018
9. Detailed budget of NMSP, 2014-2018(Priority 1)
10. Detailed budget of NMSP, 2014-2018(Priority 2)
11. Program supply management (PSM) plan, 2014-2018
12. M&E Plan July 2013

References

1. Nepal Malaria Annual report, 2010-2012, EDCD, DoHS/MoHP
2. Report of the Annual Internal Assessment, 2013, EDCD, DoHS/MoHP
3. Mid-term Review of Nepal Malaria Program Performance, 2013, EDCD, DoHS/MOHP
4. Nepal malaria Micro-stratification report, 2012, EDCD, DoHS/MoH
5. Country Cooperation Strategy Nepal, 2013–2017, WHO Country Office for Nepal, 2013
6. Millennium Development Goals, 2013

Addendum to the NMSP 2014-2025

Malaria Elimination Action Framework

Introduction

Since 2000, substantial progress has been made in fighting malaria worldwide. According to the latest estimates, between 2000 and 2015, malaria case incidence was reduced by 41% and malaria mortality rates by 62%. As a result, the epidemiology of malaria in declining malaria burden settings has become more complex and profound, especially in low malaria endemic countries aiming for elimination. Malaria is increasingly imported, caused by *Plasmodium vivax*, and clustered in small geographical areas or clustered demographically into subpopulations, which are often predominantly adult men, with shared social, behavioural, and geographical risk characteristics. The shift in the populations most at risk of malaria raises important questions for malaria-eliminating countries, since traditional control interventions are likely to be less effective. Approaches to elimination need to be aligned with these changes through the development and adoption of novel strategies and methods. Knowledge of the changing epidemiological trends of malaria in the eliminating countries will ensure improved targeting of interventions to continue to shrink the malaria map.

Background

Despite remarkable achievement in surpassing the targets set by the Millennium Development Goals, yet malaria remains a public health priority in Nepal primarily as a result of the threat of malaria outbreaks. This is primarily due to favorable malaria receptivity and vulnerability characteristics of the country.

The results of the last micro stratification of malaria risk areas provided the evidence that transmission of malaria is not throughout the district but rather it is clustered in certain Village Development Committees of the district. This is to say that transmission of malaria is limited to small geographical areas and may even be limited to certain subpopulations with shared behavioral risks. A Mid-term Malaria Program Review was conducted in 2010 and an external Malaria Program Review was conducted in 2013. Both the Malaria Program Reviews confirm the decline in malaria trend over the last decade coupled with a universal LLINs/IRS coverage of the population at risk of malaria. The decline in malaria burden, the shrinkage of malaria map, and the achievement and maintenance of universal coverage positioned the country towards the aim of malaria elimination.

National Malaria Strategic Plan (NMSP) 2014-2025 was developed based on the epidemiology of malaria derived from 2012 micro-stratification, 2013 Mid –Term Malaria Program Review, and the updated WHO guidelines, particularly for elimination in low endemic country. This plan has inherent Government of Nepal's commitment and seeks appraisal of external development partners, including the Global Fund, for possible external funding and technical assistance. The aim of NMSP is to attain "Malaria Free Nepal by 2026".

The strategic plan was divided into two phases: achieve Malaria Pre - Elimination by 2018 and attain Malaria Elimination by 2026. Malaria pre-elimination targets were set to achieve and sustain zero deaths due to malaria by 2015, reduce the incidence of indigenous malaria cases by 90%, and reduce the number of VDCs having indigenous malaria cases by 70% of current levels by 2018. The baseline year was taken as 2012.

Strategy

The strategy to achieve the targets was identified as follows:

i) to strengthen strategic information for decision making towards malaria elimination
ii) to further reduce malaria transmission and eliminate the foci wherever feasible
iii) to improve quality of and access to early diagnosis and effective treatment of malaria
iv) to develop and sustain support through advocacy and communication, from the political leadership and the communities towards malaria elimination and
v) to strengthen programmatic technical and managerial capacities towards malaria elimination.

Current Achievement

By 2016, National Malaria Program had achieved 54% reduction in indigenous malaria cases compared to 2012, death was recorded in an imported case of malaria, and no foci have been cleared of malaria transmission.

Rationale for amending the NMSP

Nepal is primarily a low malaria endemic country with around 80% of malaria cases due to P. vivax and the remaining burden due to P falciparum with occasional case reports of P. ovale or P. malariae mostly imported from Africa. Vivax parasites have unique biological and epidemiological characteristics that pose challenges to control strategies that have been principally targeted against *Plasmodium falciparum*. Infection with *P. vivax* typically results in a low blood-stage parasitemia with gametocytes emerging before illness manifests, and dormant liver stages causing relapses. As a consequence of low parasitemia, high prevalence of asymptomatic infection and difficulty in detection of the parasites, ability to infect mosquitoes before development of clinical symptoms, and appearance of relapse within months to years of the primary infection; P vivax pose a great challenge to malaria elimination. Radical cure with at least 2 weeks of Primaquine is required to clear the hypnozoites but the drug can only be given after a normal G6PD test. Besides, current point of care rapid tests may not identify heterozygotes G6PD deficient female despite a normal rapid test and such a case may hemolyze on exposure to Primaquine. *P. vivax* tolerates a wider range of environmental conditions and is more likely to lead to geographical expansion. Conventional control methods of minimizing human contact with mosquito vectors through insecticide-treated mosquito nets and indoor residual spraying – may be less effective against *P. vivax*. This is because, in many areas where *P. vivax* predominates, vectors bite early in the evening, obtain blood meals outdoors and rest outdoors. In addition, vector control has no impact on the human reservoir of latent hypnozoite stage parasites residing in the liver, which are responsible for an appreciable proportion of morbidity.

To recollect, National Malaria Strategic Plan has to address the following issues:

1. P. vivax is the overwhelmingly predominant parasite species in Nepal and strategy should reflect the importance of P vivax in elimination programme and it should target P vivax with novel and innovative interventions.
2. Traditional conventional interventions are neither effective for P vivax control nor elimination.
3. Novel interventions based on strong evidence are required to clear hypnozoites in the liver and prevent relapse, point of care tests to detect asymptomatic and sub – microscopic infections, and new community based testing and treatment methods to increase access to quality assured and quality controlled diagnosis and prompt effective treatment. Ensure G6PD point of care test and roll out radical cure treatment for P vivax infection.
4. Without interrupting P vivax (reduction will not be sufficient) transmission, achieving malaria elimination is unlikely.

Process: National Strategy Updates

With this in mind, EDCD convened in January 2017 a multi-stakeholders meeting to draw a framework for updating the NMSP (2014 – 2025). A core team was formed to review the existing strategic plan and suggest an action framework for guiding the country towards malaria elimination. The framework was shared in the multi-stakeholders meeting and each identified objectives were discussed in groups at length and a draft presentation of the suggestions were collected. The suggestions of the meeting were aligned in the draft action elimination framework and the final draft was shared with all the stakeholders. The feedback was discussed in the core team meeting and relevant alignment was done and the final Malaria Elimination Action Framework was shared in a meeting with EDCD and multi- stakeholders. The suggestions of the meeting were addressed in the final Malaria Elimination Action Framework and the framework was presented to the Technical Working Group/ Malaria for endorsement.

Elimination Framework: Objectives & Activities

The updated National Malaria Strategic Plan identifies the following key activities to implement in order to achieve the vision of "malaria free Nepal" by 2025.

1. Strengthen strategic information for decision making and implement surveillance as a core intervention towards malaria elimination

Malaria Burden

Progression towards malaria-free status is a continuous process, and not a set of independent stages. As intervention coverage is increased and malaria incidence is reduced, the heterogeneity in incidence and transmission rates is likely to further increase whereby malaria infection and disease are more likely to be concentrated in a small proportion of individuals, such as small groups of households, or hotspots that are at a substantially increased risk of malaria transmission. Hotspots maintain transmission and targeting hotspots is a highly effective and efficient way to reduce malaria transmission.

A key approach to ensure optimal response will be a structured malaria programme based on risk stratification by malaria burden and an analysis of past malaria incidence, transmission risk determinants, the environment and an analysis of access and use of health care services. The burden of malaria and the geographical area at risk of malaria will be defined by evidence based on the microstratification study, 2016. This will be validated by Malariometric Survey, 2017 and Health Facility Survey 2017.

Malaria risk is defined up to the smallest unit of community - the wards, which are classified as high risk wards, adjoining wards to high risk wards, moderate risks, low risk, and no risk wards. Targeted interventions based on risk stratification are likely to be more effective, efficient, and may add more value to money.

Malaria information from private sector is mostly unreported. Despite an estimated adjustment of additional 20 % to HMIS data based on the concept of free drug for malaria treatment in only public health facilities throughout Nepal, yet actual private sector data is lacking and estimate of adjustment may be an understatement.

Notification

A legal framework to notify each and every case of malaria in the public as well as private sectors should be in place by 2018. National Malaria Elimination Steering Committee (NMESC) will develop the legal framework for notification.

Web Based Reporting and Recording

Malaria Disease Information System (MDIS) should be implemented in both the public and private sectors throughout the country. Only targeted districts are currently reporting through MDIS with minimal engagement of private sectors. Private sectors inclusion and scale up of MDIS throughout the country should be operational by 2018.

Case Based Surveillance

Each reported malaria case should undergo investigation to confirm and classify the case within 72 hours of notification. Investigation should be conducted by local health facility with support from the district. Case finding in the households and among the neighbors around an indigenous case should be conducted within 3 days of notification. An assessment to identify and classify the characteristics of malaria transmission in the area (focus) and respond appropriately to clear the foci within 7 – 10 days of notification should be implemented by 2017. A malaria data bank with detail line listing of all malaria cases should be operational by 2018 in the districts and the data should be compiled and collated in to a national data bank in NMETF/EDCD.

Foci Identification

Districts should identify, classify, respond and update malaria foci in their districts with support from the region and center. Although foci activity has just started recently, scale up of the activity will be implemented by 2017 to gradually achieve target coverage of 15% cleared foci by 2018, 35% cleared foci by 2019, 60% of cleared foci by 2020, 80% of cleared foci by 2021, and 100% of cleared foci by 2022; and sustain it thereafter. Foci response will target early quality diagnosis and effective treatment in the community using community testing, malaria mobile clinics, and detection and treatment of asymptomatic and sub-microscopic malaria; achieving universal coverage with LLINs distribution, and focal IRS spraying to clear the area from transmission of malaria. Mapping hot spots and hot pops within a focus may be beneficial for more effective and efficient targeted interventions.

Drug Efficacy Study

Regular first line drug efficacy study will be conducted for ACT and Chloroquine. Although, the number of cases may be difficult to enroll in the study from one study site, the use of multiple sites as one study site should be helpful for the study.

Operational Research

Map active foci with qPCR to identify asymptomatic and sub microscopic malaria and define hot spots and hot pops for more effective and efficient targeted interventions by 2018.

Implement MDA in closed and isolated setting with MPPT for P. vivax after G6PD testing by 2017-2018 and disseminate the results by 2019-2020.

Imported Malaria

As countries move toward malaria elimination, imported infections become increasingly significant as they often represent the majority of cases, can sustain transmission, cause resurgences, and lead to mortality. The changing epidemiology of imported malaria in Nepal is a big challenge to malaria elimination. Imported malaria is one of the main threats to achievement and maintenance of elimination, with greatest risk for countries neighboring high-endemic areas such as Nepal with an open border with India. Despite consistently low reports of malaria cases, a major epidemiological shift is taking place within the country: imported cases have risen from 16% of the total confirmed malaria cases in the country in 2004 to 45 % in 2016. Large `numbers of Nepalese go to work in neighboring malaria endemic states of India such as Assam, Gujrat, West Bengal and Maharashtra and may return with malaria infection. Besides, seasonal migration for work for couple of months during the peak malaria season to endemic states and home coming for celebrating major festivals is way of life in Far West and Mid-West Regions. An operational research to map migrant and mobile population will be conducted along with social networking, developing awareness through IEC about malaria prevention and increase in early health seeking behaviors, enhanced surveillance and increase in health-care access through Malaria Mobile Clinics in high and moderate risk areas from March to October. Reduction in malaria receptivity in such high risk mapped areas by LLINs distribution and focal IRS spray and personal protection by distribution of prevention package during transit will be promoted. Screening incentives will be explored at the border entry with enhanced health seeking behaviors and target networks and use of mobile alerts and reminders on return. Cross border collaboration needs to move away from just being an idea to be actually implemented with concrete mechanisms and focal points to exchange data with the Indian National Vector Borne Disease Control Programme (NVBDCP) and agreed chain of actions in areas where cases are originating. Such mechanisms and agreement on actions to be undertaken in the affected areas (in both India and Nepal) require formal and regular meetings with EDCD's counterpart in India. WHO is best placed to hold/gather such meetings at a high level to get firm commitment from India after the past failed attempts.

Mapping the Private Sector

Engagement of private sector will ensure reliable information on malaria burden and the state of diagnosis and treatment in the sectors. An operational research to map and estimate private sector contribution to malaria service will be conducted in 2017. This will be the basis of starting a dialogue process with the private sectors targeted towards compliance with malaria case notification, recording & reporting, and also ensuring compliance with NMTP 2016. But, In order to bring the private sector facilities aboard, a *"win win"* strategy and agreement based on 1) EDCD/MoH action and support to strengthen diagnostic and treatment capability and quality of private facilities and 2) compliance of private facilities with notification, reporting and NMTP 2016, will be rolled out by the end of 2017 (see objective 4.)

2. To further reduce & interrupt malaria transmission and eliminate foci.

Integrated Vector Management (IVM)

Integrated Vector Management (IVM) has been adopted as the key vector control strategy and IVM guidelines have been endorsed by TWG/malaria. IVM guidelines will be rolled out by 2017. The guidelines highlights evidence based information on vectors, insecticides, and effectiveness and efficacy along with intersectoral partnerships and collaboration and community engagement and participation.

Universal Coverage: LLINs

Universal coverage with mass LLINs distribution will be promoted in high risk wards and adjoining wards and moderate risk wards. Continuous distribution of LLINs to pregnant women will be promoted in high risk wards and adjoining wards and in moderate risk wards through ANC visit. Mass LLINs distribution by government agency will be explored from 2018.

The coverage, use, and durability of LLINs after 3 -6 months of distribution will be tracked as a baseline and a longitudinal study will be conducted after 12, 24, and 30 months. Operational research related to technical and economic feasibility of using WHOPES-approved long lasting insecticide treatment of conventional nets (IconMaxx) will be explored.

Vector Bionomics & Behaviors

A detail vector lists with their bionomics and behaviors should be prepared based on the geo-ecological strata of the country. Updated vectors lists and their bionomics and behaviors in each of the geographical and ecological strata where transmission of malaria is possible should be documented by 2017. Regular five yearly updates will be sufficient in the coming years. Entomology study conducted in 2016 – 2017 may be identified as the baseline year and may be of particular interest in framing the document since similar exercise was conducted way back in the 1990S. A plan for strengthening entomology capability should be finalized by 2017 and it should be rolled out by 2018.

Vector Susceptibility Monitoring

Regular yearly sentinel site monitoring for vector susceptibility to insecticides should guide the use of insecticides. This approach will be implemented as a core activity of an Integrated Vector Management (IVM).

Entomology Capacity Building

A long term plan to strengthen entomology capability in the country should start with a roll out of a diploma/bachelor course in entomology by 2018. In the meantime, short term plan to conduct month long field based training should continue with facilitation by national and international entomologists.

IRS

As outlined in the IVM guidelines, IRS will be conducted as follows:

- During malaria outbreak / epidemic
- During humanitarian crisis and national disasters in malaria endemic areas
- In areas where API is more than 1/1,000.
- As responsive measure to clear malaria foci

IRS will be conducted in an integrated manner to address other vector borne diseases such as Dengue and Kala-azar.

Interrupt Transmission:

Foci Identification and Delimitation

Each district will identify and classify malaria transmission foci in their district with support from region and center by the end of 2017. Foci are classified as Active, Non-active Residual, or Cleared. An active focus is defined as an area with ongoing malaria transmission with locally acquired case(s)

detected during the current malaria season. A non-active residual focus denotes recent interrupted transmission meaning last locally acquired case(s) was detected in last season or up to 3 years ago (1 – 3 years ago). A cleared focus denotes an area with previous cases but no current transmission or within the last 3 years (only imported, induced or relapsing case) detected this year. No locally acquired case detected up to 3 years earlier.

Each district will implement foci response and delimit foci in the district as follows: (cumulative) – 15 % foci by 2018, 35 % by 2019, 60 % by 2020, 80% by 2021, and 100% of foci responded by 2022 and sustained it thereafter. Foci identification will be conducted by DHO/DPHO with participation of local health facilities and with active support from the center in the first year, but during foci updates in subsequent years DHO/DPHO will conduct the exercise.

Appropriate response to delimit and eliminate the foci consists of early diagnosis and prompt complete treatment (in addition to 3 days ACT, single low dose Primaquine for uncomplicated falciparum malaria and for uncomplicated vivax malaria administer G6PD test and on normal test result treat with 3 days Chloroquine and 14 days Primaquine).

Increase access to diagnosis and treatment in the area is ensured through community test treat and track by FCHVs (or modified approach) and Malaria Mobile Clinics. Universal coverage with LLINs and /or IRS spray will ensure further reduction in transmission in the area. Case based surveillance along with detection of asymptomatic and sub clinical malaria by PCR done at designated centers further drains the infectious pool of reservoirs in the community. Foci will be mapped with PCR to target hotspots & hot population and implement MMCs in the focus to increase early diagnosis and prompt complete treatment. Updated malaria foci, malaria hot spots and hot pops information will be maintained at METF in the center.

3. Improve quality of and increase access to early diagnosis and effective and complete treatment of malaria.

Quality Diagnosis

Quality malaria microscopy is a critical issue in National Malaria Programme. An external review of malaria microscopy diagnosis in Nepal recommends roll out and scale up of quality assured and quality controlled RDTs (capable to detect Pf & Pv- Combo) in most areas with establishment of designated strengthened microscopy centers at strategic locations for cross check and quality control.

Community diagnosis and up to PHCs and private sectors malaria diagnosis should be done by Quality Combo RDTs throughout the country. Trained microscopists if available in PHCs and private sectors may utilize microscopy for diagnosis but quality assured and control guidelines should be in place. All positives and 10 % negatives RDTs, should undergo cross checking and quality control. Prepare thick and thin slide of the sample and each week send the slide for quality control to designated district microscopy center. Feedback should be sent within a week. Conduct basic, refresher and competency assessment in malaria microscopy for as public and private health care facilities, designated microscopy and referral centers respectively.

Equivocal slides and random sampling of positive and negative slides should be sent to the designated referral centers for review. Feedback should be sent within a week.

Drain Reservoirs in the Community

The spectrum of malaria infection is wide ranging from asymptomatic, sub-microscopic, symptomatic case, relapse case, and recrudescent case. In order to reach elimination, strategy has to address this

pool of reservoirs in the community. Malaria Mobile Clinics (MMCs) using RDTs in the community will target proactive case detection (malaria case and asymptomatic infection) in the community in areas of malaria transmission. MMCs will be established through contracts with private health entities which will also involve Village Health Workers operating in the communities. In addition, to interrupt malaria transmission, sub-microscopic and asymptomatic malaria should be detected by qPCR (blood sample collected in DBS and transported to QA/QC designated PCR centers in the regions) and treated as per the national guidelines. Three designated PCR centers are in operation and scale up of further two centers would cover the country.

Disseminate NMTP 2016

NMTP 2016 should be disseminated to public and private health care providers by April 2017. The orientation should target the following:

- Physicians & Medical Officers in public and private sectors
- Health Care Providers in public – AHWs, HAs/
- Drug dispensers in private sectors.

The big challenge is to comply with complete treatment particularly in vivax malaria treatment as per NMTP 2016. There is currently three treatment regimen in operation for P vivax treatment without G6PD testing: a. chloroquine only; b. chloroquine and 5 days Primaquine; c. chloroquine and 14 days Primaquine. Drug adherence, monitoring, and follow up are not implemented. A point of care test (RDTs) will be pre- positioned by Malaria Programme by 2017. Although current point of care test will not address female heterozygotes for G6PD and on exposure to Primaquine they may hemolyze, careful counseling and provision of FST facility in each district may minimize the risk. It is envisioned that within a year, point of care test will address the issue of female heterozygotes. Primaquine administration for 14 days for radical cure of P vivax malaria after a normal G6PD test is the critical element in compliance with treatment protocol.

PSM/Logistics Plan

The Procurement and Supply Management plan requires new interventions that will foster an enable environment for decision making based on evidence for 1) a more accurate forecasting of needs of drugs and diagnostics commodities, 2) a more regular control of stock data reported to avoid stock-out, 3) a stronger quality assurance system, and 4) a more robust plan for minimizing drug expiry and guarantee adequate waste management.

Proposed activities include (but are not limited to):

- Establish and train a central forecasting committee for malaria commodities at EDCD comprising members from Logistic Management Division (LMD), Save the Children (STC), WHO, Department of Drug Administration (DDA), local USAID mission health section. The Terms of Reference for such committee should be completed by July 2017.
- Set-up and conduct monthly meeting to cross-check data reported to LMD and EDCD (LMIS versus MDIS, as well as data reported by VCIs, DHOs or other channels). A joint LMD-EDCD team will conduct these meeting and produce reports to the TWG and NMESC.
- Develop product specifications, prepare cost estimates for procurement and validate the specifications during an annual workshop with national stakeholders.
- Develop updated SOPs on drug dispatch, drug receiving, inventory management, expiry handling, and waste management and make them available to all district drug stores.

- Develop sampling protocols for collecting quality control samples of antimalarial commodities at different points of supply chain. Conduct regular quality control operations.
- Obtain quotation for quality control tests from WHO – pre qualified laboratories and send samples for quality testing

Case Management

Conduct malaria case management training for physicians, medical officers, and health care providers in public and private sectors. Case management will focus on severe malaria in order to address increasing imported cases of severe malaria seeking health care mostly in private sectors.

Community Test, Treat, and Track

Although FCHVs have been trained to recognize malaria on the basis of travel and symptoms yet community testing has been implemented with a modified joint approach with support from local health facility. Early diagnosis and prompt treatment in the community is a pre-requisite for limiting onward transmission from the case. A review of current community test approach will be evaluated by 2017 with participation of all the stakeholders. EDCD will build a strong case for community testing by FCHVs to be implemented in hard to reach remote high and moderate risk districts. Although in the past TWG/Malaria rejected community testing by FCHVs, but recent decision of NPHL to allow piloting the concept in HIV is encouraging. Community testing by FCHVs in hard to reach, remote areas will be piloted in 2017 and the results shared with the stakeholders and TWG/Malaria. If community testing by FCHVs is not recommended by the group then scale up of current approach will be ensured with trained FCHVs sending SMS to the focal person in the local health facility. Focal person respond within 24 hours and visit the community and with support from FCHV conducts community testing and treatment in the community and FCHVs keep track of the case. Trained FCHVs ensure patient adheres and complies with treatment and keeps track of the cases. Community testing is further augmented by roll out of MMCs in high and moderate risk wards targeting proactive case detection and treatment.

4. Develop and sustain support through advocacy and communication, from the political leadership and the communities towards malaria elimination

National Malaria Elimination Steering Committee (NMESC)

NMESC is required for policy, advocacy, and partnerships building. Such committed would include high level representatives of the Ministries of Health, Education, Environment, Agriculture and Finance, as well as representatives of Economic Development Partners (EDPs) such as WHO, USAID, UNICEF, DFID, GIZ, AFD, etc.

NMESC would meet annually to review progresses accomplished by the malaria program and examine the current challenges, bottlenecks and requests for policy changes, support or funding.

Develop Private Sector Engagement Strategy

In order to bring the private sector facilities aboard, a *"win win"* strategy and agreement based on 1) EDCD/MoH action and support to strengthen diagnostic and treatment capability and quality of private facilities and 2) compliance of private facilities with notification, reporting and NMTP 2016, will be rolled out by the end of 2017.

As describe under objective 1), such strategy requires first a clear mapping of private facilities by legal registered status, size (visits), specialty of care, and location.

Private sector will report or comply if incentives mechanism (not monetary) or formal partnerships are established including but not limited to:

- EDCD/MoH providing for free the full range of BCC materials, guidelines, protocol materials, RDTs and drugs for quality diagnostic and treatment.
- EDCD providing training, mentoring and monitoring to private facilities staff.
- EDCD inviting private sector representative at District and Central Levels to regular coordination meetings.
- EDCD setting up a recognition system for best reporting/performing facilities (annual awards during annual review of private sector data/achievements for instance).
- Private facilities reporting on a monthly basis the number of clinical cases, diagnosis results and treatment provided following national treatment and case management protocol.
- Private facilities referring cases (severe or not) to recommended public facilities when not able to provide necessary and appropriate services to patients.
- Private facilities offering testing and treatment for free when receiving commodities and training from government.
- Private facilities participating in regular coordination meetings with district or national level authorities.

A national level meeting should be held with government authorities (EDCD, MOH, DHOs) and representative of the private sector organizations/associations to agree on partnership conditions and review on a regular basis the data generated from both sectors.

BCC targeting High Risk Groups

High risk groups (soldiers, forest guards, refugees, etc.) have not been targeted and received specific BCC interventions and materials. There is a lack of data/evidence/documentation on the assumption of the existence of such high risk groups. Studies identifying such groups by evidence are needed. Once identified, specific BCC approaches and packages will be developed.

Cross Border Collaboration

In order to make collaboration with India effective, EDCD will develop a formal proposal to the Government of India and its dedicated program (NVBDCP). Such proposal will list 1) the type of information that should be shared by both countries in order to decrease the number of imported cases by targeting identified foci on both side of the border, 2) the data transmission mechanism and focal points, and the 3) chain of actions/responses to be undertaken by both parties in affected districts/communities where imported cases are originating from.

It is expected that WHO would play the role of mediator to establish such collaboration but initially hosting a bilateral high level meeting on that matter to introduce both parties to each other, recommend the collaboration, assist EDCD to present its proposal and drive the discussion towards a formal commitment and agreement framing on the collaboration.

In addition EDCD can unilaterally establish and test the relevance of health/check posts at the border of high risk districts which would provide on-site testing, communication materials and prevention commodities packages (prophylaxis, LLINs, repellants, etc.) to targeted migrant workers/populations.

5. Strengthen programmatic technical and managerial capacities towards malaria elimination

Malaria Elimination Task Force

A Malaria Elimination Task Force will be established by 2017 and will function as a gateway for malaria data banking and management; document success and failures monitor and evaluate the progresses made toward malaria elimination. METF will present the updated progress, success and failures, constraints and challenges in malaria elimination programme to TWG/Malaria for guidance, approval or support. Monthly reports will be sent from the METF to the TWG/M members.

Because the METF staff will be dedicated to the Malaria Program to fully focus on this disease, EDCD will develop specific Job Description for these position, describe the level term of references, responsibilities and authority of the METF, and will internally restructure/shift its organigram to include this team while keeping the same number of employees.

Technical Working Group

Malaria Technical Working Group (TWG/M) will guide the malaria programme towards elimination. The TWG/M will meet upon request from the METF as needed to provide programmatic, technical or strategic guidance, to approve new interventions or changes in the work plan, and to seek additional political, financial or technical support as needed.

Malaria Programme Review

An internal Malaria Programme Review should be conducted in 2017, 2020 and 2022 to review and measure progresses made toward elimination and update as needed the NMSP.

Annual Work Plan

To ensure that all interventions are planned and budgeted in a timely fashion and that activities follow a clear roadmap, the METF will develop every year a work plan that will be reviewed and approved by the TWG/M.

Malaria Elimination Action Framework

Objective 1.	To strengthen strategic information for decision making and implement surveillance as a core intervention towards malaria elimination

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
1.	Estimate malaria Burden – Burden of malaria is defined by Updated Micro-stratification and validated by Malariometric study 2017.					
A. Malaria Burden	1.1.Risk stratification	High Risk (adjoining wards), Moderate Risk, and Low and No Risk wards identified by 2017.	Number of High Risk (adjoining wards), Moderate Risk, and Low and No Risk wards identified.	March 2017	PR/EDCD	None
B.Notification , Reporting and Recording	1.2. Web based recording and reporting.	Scale Up of malaria notification within 24 hours of diagnosis by SMS and web based recording and reporting by public and private sectors throughout the country. Collect and maintain data bank including line listing of all malaria cases from 2017.	Percentage of confirmed cases notified within 24 hours (disaggregated by public and private sectors).	All districts by end of 2017	Unit Chief, Disease Control Division And District VCIs	TBD
	1.3. Case based surveillance.	Each notified malaria case investigated to confirm and classify the case. Investigation should be conducted by local health facility with support from the district if required within 3 days of notification by end of 2017.	Percentage of confirmed cases fully investigated.	By March 2018	In charge of the local health facility, DHO/DPHO/ VCIs	TBD

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
	1.4. Drain Reservoir in community – Increase access to test, treat, and track by targeting active foci. Address early, prompt quality diagnosis & treatment, relapses, asymptomatic and sub microscopic malaria detection. Universal Coverage by LLINs/IRS	Reactive case detection and potential for transmission of malaria assessed and Foci identified, classified, and appropriate response instituted by 7 – 10 days of notification with support from district, region, and if required from the center. Early quality diagnosis and prompt effective and complete treatment given in the community. Effective interventions to achieve universal coverage by LLINs and/or targeted IRS conducted in the foci to clear the foci.	Number of Foci identified and classified. Number of Foci Cleared	By March 2018	In charge of the local health facility, DHO/DPHO/ VCIs, Regional Entomologist, Regional Surveillance Medical Coordinators (SMCs), Regional Health Office Director	TBD
	1.5. *Malaria Mobile Clinics (MMCs)*	Roll out *Malaria Mobile Clinics (MMCs)* – implement Proactive case finding in the community to ensure increase in access to Test, treat, and track by	MMCs functional in all high and adjoining wards and moderate risk wards.	May 2017	PR Private organizations VHWs	TBD

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		2017.				
	1.6. Asymptomatic/Sub-microscopic malaria	Asymptomatic and Relapse will be identified and treated to drain the reservoirs in the community. PCR used for detection of sub-microscopic, asymptomatic infection by 2018.	Proportion of asymptomatic /sub microscopic infection.	May 2017	5 designated PCR laboratories	TBD
	Asymptomatic/Sub-microscopic malaria	Map foci with PCR to target hotspots & hot population and implement MMCs. Update yearly malaria hot spots and hot population.	Update malaria hot spots/hot pops map by 2018 and every year thereafter. Update hot spots and hot pops.	May 2017	5 designated PCR laboratories and VCIs	TBD
	1.7. Operational Research – MDA	*MDA may be a potential option in closed setting after operational* research findings.	Conduct MDA (one potential site) in 2018 and disseminate the results by 2019.	May 2018	Unit Chief, Disease Control Division	TBD
	1.8. Therapeutic drug efficacy study.	Conduct first line drug efficacy study every two years. Study is ongoing in 2017.	Number of drug efficacy studies conducted.	ongoing	PR	None
	1.9. Imported Malaria.	Operational research for migrant and mobile population mapping, reporting and networking by	Use of mobile phones for reporting/tracking and mobile population networking	August – Sept 2017	PR-EDCD-PMI (MCSP)	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		2017.				
C. Imported Malaria	1.10. Border check posts.	- Prevention Package distribution at exit border sites by 2017.	Number of prevention package distributed to targeted population.	Aug-Sept 2017		
	1.11. Cross Border Collaboration.	- Screening facility and dissemination of improved health seeking behavior and networking among migrant and mobile community on return to their villages at entry border sites by 2017.	Number of migrant/mobile population screened/oriented at site.	Sept-Oct. 2017	PR-EDCD-PMI (MCSP Advisor)	
	1.12. Private Sector -Malaria burden in private sector.	Map & conduct operational Research to estimate Private Sector contribution by 2017.	Research conducted.	May 2017	PR contracted organization	

Objective 2	To further reduce & interrupt malaria transmission and eliminate foci.

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
A. Reduce Malaria Transmission – IVM, LLINs & IRS	1.1Vector Control	IVM	Implement guidelines by 2017	March 2017	Unit Chief, Disease Control Division	TBD
	1.2. Vector bionomics and behaviors.	Update vectors and their bionomics and behaviors in each of the geographical and	Updated vector list with behaviors study conducted.	July 2017	PR Entomologists Regional Entomologist	TBD

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		ecological strata where transmission of malaria is possible by 2017.			s VCIs	
	1.3. Vector susceptibility study.	Monitor vector susceptibility / resistance to insecticides.	Number of insecticides resistance study conducted.	July 2017	PR Entomologists Regional Entomologists VCIs	TBD
	1.4. Entomology capacity.	Strengthen entomology capability by conducting in country courses by 2018 and continue one month trainings.	Diploma /Bachelor level course started by 2018. Conduct one month field trainings.	Sept 2017	EDCD Director	
	2. Universal Coverage LLINs.	Mass distribution in all high risk wards. Continuous distribution in high risk wards & adjoining wards and in all moderate risk wards by 2018.	Number of long-lasting insecticidal nets distributed to at-risk populations through mass campaigns. Number of long-lasting insecticidal nets distributed to targeted risk groups through continuous distribution.	LLINs distributed by April 2017 Through the year	PR/SR DPHO/DHO	Already budgeted
	3. LLINs study.	Conduct study to assess coverage and use of LLINs. Assess the physical durability and effectiveness of LLINs	Proportion of population that slept under an insecticide-treated net the previous night. Proportion of children under five years old who slept	Sept 2017	PR contracted organization	Already budgeted

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		(2017 & 2018)	under an insecticide-treated net the previous night. Number of study conducted after distribution cycle.			
	4. IRS	Primarily reserved for malaria outbreaks and for foci delimitation/ elimination response but also for humanitarian and emergency situation such as after natural disasters. Additional targeted focal spray may be conducted in areas with API > 1/ 1000 population. IRS may be applicable as a component of IVM.	Proportion/Number of households sprayed by IRS within the last 12 months.	On-going during malaria season	EDCD/DPHO/DHO/VCIs	
B. Interrupt Malaria Transmission	5. Foci Identification and delimitation	Each district will identify and classify malaria transmission foci in their district with support from region and center by the 2017. Foci are classified as Active, Non-active Residual, or Cleared.	Total Number of Foci by year.	By Dec 2017	SMCs, regional entomologists and VCIs	
		Appropriate	Number of foci	Through the	SMCs,	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		response to delimit and eliminate the foci as outlined above in 4.1 by 2018.	cleared by year.	year	regional entomologists and VCIs	
		Each district will implement foci response and delimit foci in the district as follows (cumulative) – 15 % foci by 2018, 35 % by 2019, 60 % by 2020, 80% by 2021, and 100% of foci responded by 2022 and sustained it thereafter.	Proportion of foci cleared per year.	Through the year	SMCs, regional entomologists and VCIs	

Objective 3	To improve quality of and increase access to early diagnosis and effective and complete treatment of malaria.

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
A. Treatment Protocol	1. Ensure treatment compliance with NMTP 2016	Disseminate NMTP 2016 : - Physicians &Medical Officers in public and private sectors - Health Care Providers in public – AHWs, HAs/ - Drug dispensers in private	Number of dissemination conducted. Ideally % of cases treated in compliance and treated completely (although very hard to measure)	May 2017	PR - EDCD	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		sectors.				
		Implement complete malaria treatment as per NMTP 2016 by 2017. Roll out G6PD deficiency test, preferably point of care test by 2017.	Proportion of confirmed malaria cases that received first-line antimalarial treatment according to national policy.	May 2017	PR - EDCD	
		Implement radical cure for P vivax malaria treatment - (Primaquine 14 days).	Proportion of vivax (ovale) malaria tested with G6PD test and treated correctly with Primaquine.	May 2017	PR - EDCD	
B. PSM/Logistics	2. PSM/Logistics Plan	Establish and train a central forecasting committee for malaria commodities at EDCD comprising members from Logistic Management Division (LMD), Principal Recipient (STC), WHO, Department of Drug Administration (DDA), local	Forecasting committee TOR and meeting minutes. Forecasting exercises conducted.	By July 2017 Annually before rainy season (by Dec.)	EDCD, LMD PR, WHO, DDA, USAID	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		USAID mission health section.				
		Set-up and conduct monthly meeting to cross-check data reported to LMD and EDCD (LMIS versus MDIS, as well as data reported by VCIs, DHOs or other channels). A joint LMD-EDCD team will conduct these meeting and produce reports to the TWG and NMESC.	Monthly data cross-checking report and recommendations Proportion of health facilities without stock-outs of key commodities.	Monthly reporting	LMD-EDCD-METF	
		Develop product specifications, prepare cost estimates for procurement and validate the specifications during an annual workshop with national stakeholders.	Specifications forms, cost estimates and workshop report.	Dec 2017	EDCD-LMD-WHO-DDA-DHOs	
		Develop updated SOPs on drug dispatch, drug receiving, inventory management, expiry handling, and waste management and make them	SOPs and regular monitoring reports	Dec 2017	EDCD-LMD-DDA-DHS	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		available to all district drug stores. Develop sampling protocols for collecting quality control samples of antimalarial commodities at different points of supply chain. Conduct regular quality control operations. Obtain quotation for quality control tests from WHO – pre qualified laboratories and send samples for quality testing	Protocols and QC reports Quotations and tests conducted with recommendations	Jan. 2018 Dec 2017		
C.1. Case Management	3 Case management	Conduct malaria case management for physicians, medical officers, and health care providers in public and private sectors.	Number of malaria case management training conducted.	April 2017	PR-EDCD	
C.2. Community Test & Treat	4. Community test, treat and track	Scale up community testing with trained FCHVs (in remote high and moderate risk) recognizing malaria case and sending SMS to local health facility. Local health provider	Proportion of suspected malaria cases that receive a parasitological test in the community.	May 2017	EDCD METF DPHO/DHO	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		with the support of FCHVs, conduct community test and treat. Trained FCHVs tracks the cases.				
C.3. Community test & treat – Malaria Mobile Clinics		Implement proactive case detection by roll out of Malaria Mobile Clinics in the community with a test and treat mechanism in high risk and adjoining wards and moderate risk wards by 2017.	Number of confirmed case detected by proactive detection.	May 2017	VCIs and MMCs contracted organizations	
D. Diagnosis	1. Quality Diagnosis	Quality Combo RDTs in HPs & PHCs. Community diagnosis and up to PHCs and private sector diagnosis done by Quality Combo RDTs throughout the country by 2017.	Proportion of cases tested by RDTs.	On-going	EDCD/DPHO/DHO	
	2. QA/QC	QA/QC-microscopy center in district hospital/DPHO by 2017. All positives and 10 % negatives RDTs, prepare thick and thin slide and each week, send the	District lab strengthened for cross- checking and validation of smear microscopy.	By May 2017	Designated Laboratories at district level, VBDRTC for tracking results	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		slide for quality control to designated district microscopy center. Feedback should be sent within a week.				
	3. Training	Improve quality of microscopy by conducting basic, refresher and competency assessment in malaria.	Number of lab tech trained.	All year long	VBDRTC	
	4. National Referral Centers	QA/QC-microscopy referral center in designated centers by May 2017. Equivocal slides and 10 % of positives and negative slides send to the designated referral centers for review. Feedback should be sent within a week.	Referral lab (5 designated) strengthened for cross-checking and % of validated smear microscopy from the districts.	All year long	Ref Labs.	

Objective 4.	To develop and sustain support through advocacy and communication, from the political leadership and the communities towards malaria elimination

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
A. Ensuring commit	1. National Malaria Eliminatio	The NMESC meets annually to review progresses accomplished by	NMESC members identified and annual presentation and meeting report	Sept 2017 and yearly afterwards	EDCD Director and METF	Meeting to be budgeted in Red Book if needed

ment for Malaria Elimination at highest level of the government, EDPs, and at private sector level	n Steering Committee	the malaria program and examine the current challenges, bottlenecks and requests for policy changes, support or funding	including action plan.			
	1.2. Private Sector Engagement Strategy	*"win win"* strategy and agreement based on 1) EDCD/MoH action and support to strengthen diagnostic and treatment capability and quality of private facilities and 2) compliance of private facilities with notification, reporting and NMTP 2016, will be rolled out by the end of 2017.	Private Sector Engagement Strategy/Guidelines including conditions for collaboration. Reports/Conclusions of coordination meeting with private sector representatives at National and District Level. Malaria officially declared a "Notifiable Disease" by law.	August 2017 and quarterly/annual meeting afterwards.	METF, EDCD director, Private sector representatives	Additional commodities to be forecasted Meeting and transportation costs
B. High Risk Groups/ Areas	2.1 Identification of high risk groups and areas	- Studies identifying high risk groups by evidence are needed. Once identified, specific BCC approaches and packages will be developed. - Awareness orientations in high /moderate risk VDCs based on mapping by 2018.	Studies/Surveys conducted, BCC and prevention packages developed and distributed Number of Awareness orientation conducted and estimated targeted population covered	June-July 2017 Sept-Oct 2017	PR-EDCD-PMI (MCSP advisor)	
C. Cross Border Collabo	3.1 Cross Border collaborati	Agreement between EDCD and India	EDCD proposal to India NVBDCP (MoU or else).	June 2017	EDCD Director, METF, WHO	Travel costs

ration Framework	on framework	NVBDCP will include 1) the type of information shared by both countries, 2) the data transmission mechanism and focal points, and the 3) chain of actions/responses to be undertaken by both parties in affected districts/communities where imported cases are originating from.	Introductory meeting report, and semi-annual coordination meetings reports afterwards. Focal points nominated. Monthly reports on cases identified, and action taken in origin foci.	Sept 2017 and semi-annually Sept 2017 Monthly from Oct 2017	representatives in India and Nepal	

Objective 5.	**To strengthen programmatic technical and managerial capacities towards malaria elimination**					
Activity	**Task**	**Description**	**Indicator**	**Timeframe**	**Person Responsible**	**Estimated Additional Budget**
A. Strengthen and focus Human Resources and Management toward Elimination	1.1. National team formed for malaria elimination.	Functional Team at EDCD by 2017.	Malaria Elimination Task Force staffed with specific Job Descriptions and ToR.	September 2017	EDCD Director and VBD Director	Desks, chairs, desktops?
	1.2. TWG/Malaria	TWG/Malaria will guide malaria elimination programme. Meeting every quarterly to review and recommend changes.	Quarterly meeting conducted and notes/recommendations produced.	On-going	METF to convoke TGW/M members and EDCD director to validate notes.	No
	1.3. Malaria Program	MPR will ensure that progresses made are in line with the NMSP	MPR reports / Progress reports / Recommendations	June 2017 (before budget		No

	Review	goal and strategy toward Elimination and will recommend updates as needed.	produced	decision) 2020 2022		
	1.4. Annual Work Plan	METF produces work plan every year to schedule and budget all activities to meet annual targets/indicators	Annual Work Plan	Red Book Budget Timeline	METF	No

Indicators

Input:

Proportion of total Malaria budget/Total Health Budget

2. Donor Budget?

Outcome:

Proportion of targeted risk group receiving ITNs

Proportion of population at risk that slept under an insecticide-treated net (ITN) the previous night

Proportion of targeted risk group receiving IRS

Proportion of population at risk protected by indoor residual spraying (IRS) in the previous 12 months

Coverage:

Annual blood examination rate

Proportion of patients with suspected malaria who received a parasitological test

Proportion of detected cases contacting health services within 48 hours of developing symptoms

Proportion of malaria cases detected by surveillance systems

Percentage of case reports received <24 hours after detection

Proportion of cases investigated and classified

Proportion of foci investigated and classified

Proportion of patients with P. vivax or P. ovale malaria who received a test for G6PD deficiency

Proportion of patients with confirmed malaria who received first-line antimalarial treatment according to national policy

Proportion of P. vivax and P. ovale patients who received radical cure treatment

Proportion of expected health facility reports received at national level

Proportion of health facility without stock outs of first-line treatments

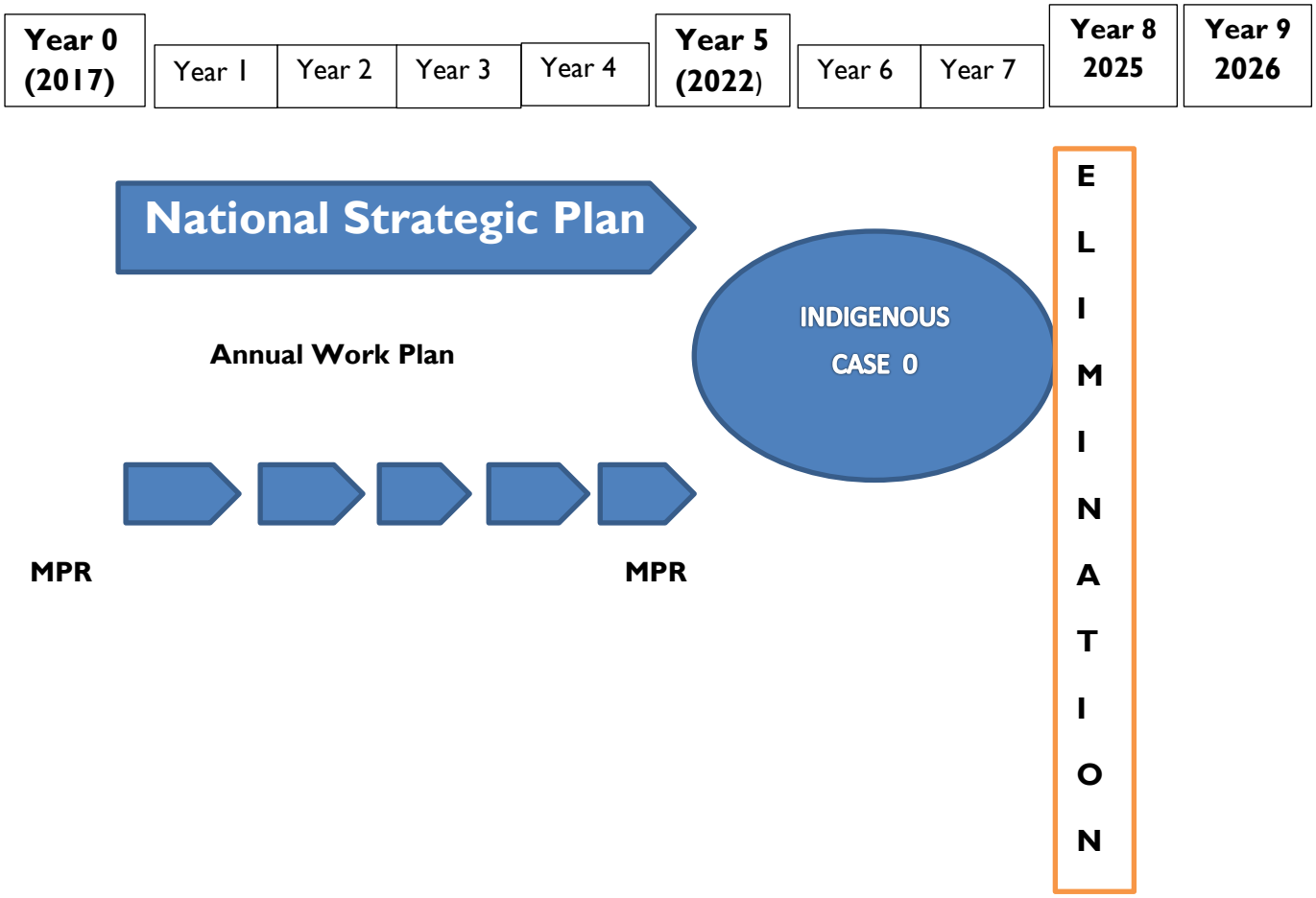
Impact:

Malaria case incidence: number of confirmed malaria cases per 1000 persons per year

Number of foci by classification.

Planning – Strategic Plan / Annual Work Plans

An internal Malaria Programme Review will be conducted in 2017 with a focus on defining the malaria trend and the changing malaria epidemiology, sharing the success and lessons learned on malaria pre-elimination, and develop consensus on effective and efficient strategy for malaria elimination. An annual costed work plan will be developed with defined targets and appropriate timelines.



Milestones: Elimination/ Prevention of re-establishment

Data Generation:

Diagnostic testing - All suspected malaria cases get tested by 2017.

Data recording - Case investigation form in operation by 2017.

Case investigation - All cases including reactive case detection by 2018.

Master list of health facilities/ reporting units - Public & private facilities current by 2018.

Catchment/ target populations - Populations of foci known by 2017.

Information Reported:

Immediate notification of all confirmed malaria cases by 2017.

Reporting of cases by classification by 2017.

National cases register in place by 2017.

Reporting rates:

Reporting rates systematically tracked Null values for when nil cases by 2018.

Reporting rates 100% from public health facilities by 2017.

Reporting rates 100% from private health facilities by 2018.

Reports submitted within 24 hours of case detected (100%)

Addendum to the NMSP 2014-2025

Malaria Elimination Action Framework

EDCD, January 30, 2017

Introduction

Since 2000, substantial progress has been made in fighting malaria worldwide. According to the latest estimates, between 2000 and 2015, malaria case incidence was reduced by 41% and malaria mortality rates by 62%. As a result, the epidemiology of malaria in declining malaria burden settings has become more complex and profound, especially in low malaria endemic countries aiming for elimination. Malaria is increasingly imported, caused by *Plasmodium vivax*, and clustered in small geographical areas or clustered demographically into subpopulations, which are often predominantly adult men, with shared social, behavioural, and geographical risk characteristics. The shift in the populations most at risk of malaria raises important questions for malaria-eliminating countries, since traditional control interventions are likely to be less effective. Approaches to elimination need to be aligned with these changes through the development and adoption of novel strategies and methods. Knowledge of the changing epidemiological trends of malaria in the eliminating countries will ensure improved targeting of interventions to continue to shrink the malaria map.

Background

Despite remarkable achievement in surpassing the targets set by the Millennium Development Goals, yet malaria remains a public health priority in Nepal primarily as a result of the threat of malaria outbreaks. This is primarily due to favorable malaria receptivity and vulnerability characteristics of the country.

The results of the last micro stratification of malaria risk areas provided the evidence that transmission of malaria is not throughout the district but rather it is clustered in certain Village Development Committees of the district. This is to say that transmission of malaria is limited to small geographical areas and may even be limited to certain subpopulations with shared behavioral risks. A Mid-term Malaria Program Review was conducted in 2010 and an external Malaria Program Review was conducted in 2013. Both the Malaria Program Reviews confirm the decline in malaria trend over the last decade coupled with a universal LLINs/IRS coverage of the population at risk of malaria. The decline in malaria burden, the shrinkage of malaria map, and the achievement and maintenance of universal coverage positioned the country towards the aim of malaria elimination.

National Malaria Strategic Plan (NMSP) 2014-2025 was developed based on the epidemiology of malaria derived from 2012 micro-stratification, 2013 Mid –Term Malaria Program Review, and the updated WHO guidelines, particularly for elimination in low endemic country. This plan has inherent Government of Nepal's commitment and seeks appraisal of external development partners, including the Global Fund, for possible external funding and technical assistance. The aim of NMSP is to attain "Malaria Free Nepal by 2026".

The strategic plan was divided into two phases: achieve Malaria Pre - Elimination by 2018 and attain Malaria Elimination by 2026. Malaria pre-elimination targets were set to achieve and sustain zero deaths due to malaria by 2015, reduce the incidence of indigenous malaria cases by 90%, and reduce the number of VDCs having indigenous malaria cases by 70% of current levels by 2018. The baseline year was taken as 2012.

Strategy

The strategy to achieve the targets was identified as follows:

i) to strengthen strategic information for decision making towards malaria elimination
ii) to further reduce malaria transmission and eliminate the foci wherever feasible
iii) to improve quality of and access to early diagnosis and effective treatment of malaria
iv) to develop and sustain support through advocacy and communication, from the political leadership and the communities towards malaria elimination and
v) to strengthen programmatic technical and managerial capacities towards malaria elimination.

Current Achievement

By 2016, National Malaria Program had achieved 54% reduction in indigenous malaria cases compared to 2012, death was recorded in an imported case of malaria, and no foci have been cleared of malaria transmission.

Rationale for amending the NMSP

Nepal is primarily a low malaria endemic country with around 80% of malaria cases due to P. vivax and the remaining burden due to P falciparum with occasional case reports of P. ovale or P. malariae mostly imported from Africa. Vivax parasites have unique biological and epidemiological characteristics that pose challenges to control strategies that have been principally targeted against *Plasmodium falciparum*. Infection with *P. vivax* typically results in a low blood-stage parasitemia with gametocytes emerging before illness manifests, and dormant liver stages causing relapses. As a consequence of low parasitemia, high prevalence of asymptomatic infection and difficulty in detection of the parasites, ability to infect mosquitoes before development of clinical symptoms, and appearance of relapse within months to years of the primary infection; P vivax pose a great challenge to malaria elimination. Radical cure with at least 2 weeks of Primaquine is required to clear the hypnozoites but the drug can only be given after a normal G6PD test. Besides, current point of care rapid tests may not identify heterozygotes G6PD deficient female despite a normal rapid test and such a case may hemolyze on exposure to Primaquine. *P. vivax* tolerates a wider range of environmental conditions and is more likely to lead to geographical expansion. Conventional control methods of minimizing human contact with mosquito vectors through insecticide-treated mosquito nets and indoor residual spraying – may be less effective against *P. vivax*. This is because, in many areas where *P. vivax* predominates, vectors bite early in the evening, obtain blood meals outdoors and rest outdoors. In addition, vector control has no impact on the human reservoir of latent hypnozoite stage parasites residing in the liver, which are responsible for an appreciable proportion of morbidity.

To recollect, National Malaria Strategic Plan has to address the following issues:

1. P. vivax is the overwhelmingly predominant parasite species in Nepal and strategy should reflect the importance of P vivax in elimination programme and it should target P vivax with novel and innovative interventions.
2. Traditional conventional interventions are neither effective for P vivax control nor elimination.
3. Novel interventions based on strong evidence are required to clear hypnozoites in the liver and prevent relapse, point of care tests to detect asymptomatic and sub – microscopic infections, and new community based testing and treatment methods to increase access to quality assured and quality controlled diagnosis and prompt effective treatment. Ensure G6PD point of care test and roll out radical cure treatment for P vivax infection.

4. Without interrupting P vivax (reduction will not be sufficient) transmission, achieving malaria elimination is unlikely.

Process: National Strategy Updates

With this in mind, EDCD convened in January 2017 a multi-stakeholders meeting to draw a framework for updating the NMSP (2014 – 2025). A core team was formed to review the existing strategic plan and suggest an action framework for guiding the country towards malaria elimination. The framework was shared in the multi-stakeholders meeting and each identified objectives were discussed in groups at length and a draft presentation of the suggestions were collected. The suggestions of the meeting were aligned in the draft action elimination framework and the final draft was shared with all the stakeholders. The feedback was discussed in the core team meeting and relevant alignment was done and the final Malaria Elimination Action Framework was shared in a meeting with EDCD and multi- stakeholders. The suggestions of the meeting were addressed in the final Malaria Elimination Action Framework and the framework was presented to the Technical Working Group/ Malaria for endorsement.

Elimination Framework: Objectives & Activities

The updated National Malaria Strategic Plan identifies the following key activities to implement in order to achieve the vision of "malaria free Nepal" by 2025.

1. Strengthen strategic information for decision making and implement surveillance as a core intervention towards malaria elimination

Malaria Burden

Progression towards malaria-free status is a continuous process, and not a set of independent stages. As intervention coverage is increased and malaria incidence is reduced, the heterogeneity in incidence and transmission rates is likely to further increase whereby malaria infection and disease are more likely to be concentrated in a small proportion of individuals, such as small groups of households, or hotspots that are at a substantially increased risk of malaria transmission. Hotspots maintain transmission and targeting hotspots is a highly effective and efficient way to reduce malaria transmission.

A key approach to ensure optimal response will be a structured malaria programme based on risk stratification by malaria burden and an analysis of past malaria incidence, transmission risk determinants, the environment and an analysis of access and use of health care services. The burden of malaria and the geographical area at risk of malaria will be defined by evidence based on the microstratification study, 2016. This will be validated by Malariometric Survey, 2017 and Health Facility Survey 2017.

Malaria risk is defined up to the smallest unit of community - the wards, which are classified as high risk wards, adjoining wards to high risk wards, moderate risks, low risk, and no risk wards. Targeted interventions based on risk stratification are likely to be more effective, efficient, and may add more value to money.

Malaria information from private sector is mostly unreported. Despite an estimated adjustment of additional 20 % to HMIS data based on the concept of free drug for malaria treatment in only public

health facilities throughout Nepal, yet actual private sector data is lacking and estimate of adjustment may be an understatement.

Notification

A legal framework to notify each and every case of malaria in the public as well as private sectors should be in place by 2018. National Malaria Elimination Steering Committee (NMESC) will develop the legal framework for notification.

Web Based Reporting and Recording

Malaria Disease Information System (MDIS) should be implemented in both the public and private sectors throughout the country. Only targeted districts are currently reporting through MDIS with minimal engagement of private sectors. Private sectors inclusion and scale up of MDIS throughout the country should be operational by 2018.

Case Based Surveillance

Each reported malaria case should undergo investigation to confirm and classify the case within 72 hours of notification. Investigation should be conducted by local health facility with support from the district. Case finding in the households and among the neighbors around an indigenous case should be conducted within 3 days of notification. An assessment to identify and classify the characteristics of malaria transmission in the area (focus) and respond appropriately to clear the foci within 7 – 10 days of notification should be implemented by 2017. A malaria data bank with detail line listing of all malaria cases should be operational by 2018 in the districts and the data should be compiled and collated in to a national data bank in NMETF/EDCD.

Foci Identification

Districts should identify, classify, respond and update malaria foci in their districts with support from the region and center. Although foci activity has just started recently, scale up of the activity will be implemented by 2017 to gradually achieve target coverage of 15% cleared foci by 2018, 35% cleared foci by 2019, 60% of cleared foci by 2020, 80% of cleared foci by 2021, and 100% of cleared foci by 2022; and sustain it thereafter. Foci response will target early quality diagnosis and effective treatment in the community using community testing, malaria mobile clinics, and detection and treatment of asymptomatic and sub-microscopic malaria; achieving universal coverage with LLINs distribution, and focal IRS spraying to clear the area from transmission of malaria. Mapping hot spots and hot pops within a focus may be beneficial for more effective and efficient targeted interventions.

Drug Efficacy Study

Regular first line drug efficacy study will be conducted for ACT and Chloroquine. Although, the number of cases may be difficult to enroll in the study from one study site, the use of multiple sites as one study site should be helpful for the study.

Operational Research

Map active foci with qPCR to identify asymptomatic and sub microscopic malaria and define hot spots and hot pops for more effective and efficient targeted interventions by 2018.

Implement MDA in closed and isolated setting with MPPT for P. vivax after G6PD testing by 2017-2018 and disseminate the results by 2019-2020.

Imported Malaria

As countries move toward malaria elimination, imported infections become increasingly significant as they often represent the majority of cases, can sustain transmission, cause resurgences, and lead to mortality. The changing epidemiology of imported malaria in Nepal is a big challenge to malaria elimination. Imported malaria is one of the main threats to achievement and maintenance of elimination, with greatest risk for countries neighboring high-endemic areas such as Nepal with an open border with India. Despite consistently low reports of malaria cases, a major epidemiological shift is taking place within the country: imported cases have risen from 16% of the total confirmed malaria cases in the country in 2004 to 45 % in 2016. Large `numbers of Nepalese go to work in neighboring malaria endemic states of India such as Assam, Gujrat, West Bengal and Maharashtra and may return with malaria infection. Besides, seasonal migration for work for couple of months during the peak malaria season to endemic states and home coming for celebrating major festivals is way of life in Far West and Mid-West Regions. An operational research to map migrant and mobile population will be conducted along with social networking, developing awareness through IEC about malaria prevention and increase in early health seeking behaviors, enhanced surveillance and increase in health-care access through Malaria Mobile Clinics in high and moderate risk areas from March to October. Reduction in malaria receptivity in such high risk mapped areas by LLINs distribution and focal IRS spray and personal protection by distribution of prevention package during transit will be promoted. Screening incentives will be explored at the border entry with enhanced health seeking behaviors and target networks and use of mobile alerts and reminders on return. Cross border collaboration needs to move away from just being an idea to be actually implemented with concrete mechanisms and focal points to exchange data with the Indian National Vector Borne Disease Control Programme (NVBDCP) and agreed chain of actions in areas where cases are originating. Such mechanisms and agreement on actions to be undertaken in the affected areas (in both India and Nepal) require formal and regular meetings with EDCD's counterpart in India. WHO is best placed to hold/gather such meetings at a high level to get firm commitment from India after the past failed attempts.

Mapping the Private Sector

Engagement of private sector will ensure reliable information on malaria burden and the state of diagnosis and treatment in the sectors. An operational research to map and estimate private sector contribution to malaria service will be conducted in 2017. This will be the basis of starting a dialogue process with the private sectors targeted towards compliance with malaria case notification, recording & reporting, and also ensuring compliance with NMTP 2016. But, In order to bring the private sector facilities aboard, a *"win win"* strategy and agreement based on 1) EDCD/MoH action and support to strengthen diagnostic and treatment capability and quality of private facilities and 2) compliance of private facilities with notification, reporting and NMTP 2016, will be rolled out by the end of 2017 (see objective 4.)

2. To further reduce & interrupt malaria transmission and eliminate foci.

Integrated Vector Management (IVM)

Integrated Vector Management (IVM) has been adopted as the key vector control strategy and IVM guidelines have been endorsed by TWG/malaria. IVM guidelines will be rolled out by 2017. The guidelines highlights evidence based information on vectors, insecticides, and effectiveness and

efficacy along with intersectoral partnerships and collaboration and community engagement and participation.

Universal Coverage: LLINs

Universal coverage with mass LLINs distribution will be promoted in high risk wards and adjoining wards and moderate risk wards. Continuous distribution of LLINs to pregnant women will be promoted in high risk wards and adjoining wards and in moderate risk wards through ANC visit. Mass LLINs distribution by government agency will be explored from 2018.

The coverage, use, and durability of LLINs after 3 -6 months of distribution will be tracked as a baseline and a longitudinal study will be conducted after 12, 24, and 30 months. Operational research related to technical and economic feasibility of using WHOPES-approved long lasting insecticide treatment of conventional nets (IconMaxx) will be explored.

Vector Bionomics & Behaviors

A detail vector lists with their bionomics and behaviors should be prepared based on the geo-ecological strata of the country. Updated vectors lists and their bionomics and behaviors in each of the geographical and ecological strata where transmission of malaria is possible should be documented by 2017. Regular five yearly updates will be sufficient in the coming years. Entomology study conducted in 2016 – 2017 may be identified as the baseline year and may be of particular interest in framing the document since similar exercise was conducted way back in the 1990S. A plan for strengthening entomology capability should be finalized by 2017 and it should be rolled out by 2018.

Vector Susceptibility Monitoring

Regular yearly sentinel site monitoring for vector susceptibility to insecticides should guide the use of insecticides. This approach will be implemented as a core activity of an Integrated Vector Management (IVM).

Entomology Capacity Building

A long term plan to strengthen entomology capability in the country should start with a roll out of a diploma/bachelor course in entomology by 2018. In the meantime, short term plan to conduct month long field based training should continue with facilitation by national and international entomologists.

IRS

As outlined in the IVM guidelines, IRS will be conducted as follows:

- During malaria outbreak / epidemic
- During humanitarian crisis and national disasters in malaria endemic areas
- In areas where API is more than 1/1,000.
- As responsive measure to clear malaria foci

IRS will be conducted in an integrated manner to address other vector borne diseases such as Dengue and Kala-azar.

Interrupt Transmission:

Foci Identification and Delimitation

Each district will identify and classify malaria transmission foci in their district with support from region and center by the end of 2017. Foci are classified as Active, Non-active Residual, or Cleared. An active focus is defined as an area with ongoing malaria transmission with locally acquired case(s) detected during the current malaria season. A non-active residual focus denotes recent interrupted transmission meaning last locally acquired case(s) was detected in last season or up to 3 years ago (1 – 3 years ago). A cleared focus denotes an area with previous cases but no current transmission or within the last 3 years (only imported, induced or relapsing case) detected this year. No locally acquired case detected up to 3 years earlier.

Each district will implement foci response and delimit foci in the district as follows: (cumulative) – 15 % foci by 2018, 35 % by 2019, 60 % by 2020, 80% by 2021, and 100% of foci responded by 2022 and sustained it thereafter. Foci identification will be conducted by DHO/DPHO with participation of local health facilities and with active support from the center in the first year, but during foci updates in subsequent years DHO/DPHO will conduct the exercise.

Appropriate response to delimit and eliminate the foci consists of early diagnosis and prompt complete treatment (in addition to 3 days ACT, single low dose Primaquine for uncomplicated falciparum malaria and for uncomplicated vivax malaria administer G6PD test and on normal test result treat with 3 days Chloroquine and 14 days Primaquine).

Increase access to diagnosis and treatment in the area is ensured through community test treat and track by FCHVs (or modified approach) and Malaria Mobile Clinics. Universal coverage with LLINs and /or IRS spray will ensure further reduction in transmission in the area. Case based surveillance along with detection of asymptomatic and sub clinical malaria by PCR done at designated centers further drains the infectious pool of reservoirs in the community. Foci will be mapped with PCR to target hotspots & hot population and implement MMCs in the focus to increase early diagnosis and prompt complete treatment. Updated malaria foci, malaria hot spots and hot pops information will be maintained at METF in the center.

3. Improve quality of and increase access to early diagnosis and effective and complete treatment of malaria.

Quality Diagnosis

Quality malaria microscopy is a critical issue in National Malaria Programme. An external review of malaria microscopy diagnosis in Nepal recommends roll out and scale up of quality assured and quality controlled RDTs (capable to detect Pf & Pv- Combo) in most areas with establishment of designated strengthened microscopy centers at strategic locations for cross check and quality control.

Community diagnosis and up to PHCs and private sectors malaria diagnosis should be done by Quality Combo RDTs throughout the country. Trained microscopists if available in PHCs and private sectors may utilize microscopy for diagnosis but quality assured and control guidelines should be in place. All positives and 10 % negatives RDTs, should undergo cross checking and quality control. Prepare thick and thin slide of the sample and each week send the slide for quality control to designated district microscopy center. Feedback should be sent within a week. Conduct basic, refresher and competency assessment in malaria microscopy for as public and private health care facilities, designated microscopy and referral centers respectively.

Equivocal slides and random sampling of positive and negative slides should be sent to the designated referral centers for review. Feedback should be sent within a week.

Drain Reservoirs in the Community

The spectrum of malaria infection is wide ranging from asymptomatic, sub-microscopic, symptomatic case, relapse case, and recrudescent case. In order to reach elimination, strategy has to address this pool of reservoirs in the community. Malaria Mobile Clinics (MMCs) using RDTs in the community will target proactive case detection (malaria case and asymptomatic infection) in the community in areas of malaria transmission. MMCs will be established through contracts with private health entities which will also involve Village Health Workers operating in the communities. In addition, to interrupt malaria transmission, sub-microscopic and asymptomatic malaria should be detected by qPCR (blood sample collected in DBS and transported to QA/QC designated PCR centers in the regions) and treated as per the national guidelines. Three designated PCR centers are in operation and scale up of further two centers would cover the country.

Disseminate NMTP 2016

NMTP 2016 should be disseminated to public and private health care providers by April 2017. The orientation should target the following:

- Physicians & Medical Officers in public and private sectors
- Health Care Providers in public – AHWs, HAs/
- Drug dispensers in private sectors.

The big challenge is to comply with complete treatment particularly in vivax malaria treatment as per NMTP 2016. There is currently three treatment regimen in operation for P vivax treatment without G6PD testing: a. chloroquine only; b. chloroquine and 5 days Primaquine; c. chloroquine and 14 days Primaquine. Drug adherence, monitoring, and follow up are not implemented. A point of care test (RDTs) will be pre- positioned by Malaria Programme by 2017. Although current point of care test will not address female heterozygotes for G6PD and on exposure to Primaquine they may hemolyze, careful counseling and provision of FST facility in each district may minimize the risk. It is envisioned that within a year, point of care test will address the issue of female heterozygotes. Primaquine administration for 14 days for radical cure of P vivax malaria after a normal G6PD test is the critical element in compliance with treatment protocol.

PSM/Logistics Plan

The Procurement and Supply Management plan requires new interventions that will foster an enable environment for decision making based on evidence for 1) a more accurate forecasting of needs of drugs and diagnostics commodities, 2) a more regular control of stock data reported to avoid stock-out, 3) a stronger quality assurance system, and 4) a more robust plan for minimizing drug expiry and guarantee adequate waste management.

Proposed activities include (but are not limited to):

- Establish and train a central forecasting committee for malaria commodities at EDCD comprising members from Logistic Management Division (LMD), Save the Children (STC), WHO, Department of Drug Administration (DDA), local USAID mission health section. The Terms of Reference for such committee should be completed by July 2017.
- Set-up and conduct monthly meeting to cross-check data reported to LMD and EDCD (LMIS versus MDIS, as well as data reported by VCIs, DHOs or other channels). A joint LMD-EDCD team will conduct these meeting and produce reports to the TWG and NMESC.

- Develop product specifications, prepare cost estimates for procurement and validate the specifications during an annual workshop with national stakeholders.
- Develop updated SOPs on drug dispatch, drug receiving, inventory management, expiry handling, and waste management and make them available to all district drug stores.
- Develop sampling protocols for collecting quality control samples of antimalarial commodities at different points of supply chain. Conduct regular quality control operations.
- Obtain quotation for quality control tests from WHO – pre qualified laboratories and send samples for quality testing

Case Management

Conduct malaria case management training for physicians, medical officers, and health care providers in public and private sectors. Case management will focus on severe malaria in order to address increasing imported cases of severe malaria seeking health care mostly in private sectors.

Community Test, Treat, and Track

Although FCHVs have been trained to recognize malaria on the basis of travel and symptoms yet community testing has been implemented with a modified joint approach with support from local health facility. Early diagnosis and prompt treatment in the community is a pre-requisite for limiting onward transmission from the case. A review of current community test approach will be evaluated by 2017 with participation of all the stakeholders. EDCD will build a strong case for community testing by FCHVs to be implemented in hard to reach remote high and moderate risk districts. Although in the past TWG/Malaria rejected community testing by FCHVs, but recent decision of NPHL to allow piloting the concept in HIV is encouraging. Community testing by FCHVs in hard to reach, remote areas will be piloted in 2017 and the results shared with the stakeholders and TWG/Malaria. If community testing by FCHVs is not recommended by the group then scale up of current approach will be ensured with trained FCHVs sending SMS to the focal person in the local health facility. Focal person respond within 24 hours and visit the community and with support from FCHV conducts community testing and treatment in the community and FCHVs keep track of the case. Trained FCHVs ensure patient adheres and complies with treatment and keeps track of the cases. Community testing is further augmented by roll out of MMCs in high and moderate risk wards targeting proactive case detection and treatment.

4. Develop and sustain support through advocacy and communication, from the political leadership and the communities towards malaria elimination

National Malaria Elimination Steering Committee (NMESC)

NMESC is required for policy, advocacy, and partnerships building. Such a committee would include high level representatives of the Ministries of Health, Education, Environment, Agriculture and Finance, as well as representatives of Economic Development Partners (EDPs) such as WHO, USAID, UNICEF, DFID, GIZ, AFD, etc.

NMESC would meet annually to review progresses accomplished by the malaria program and examine the current challenges, bottlenecks and requests for policy changes, support or funding.

Develop Private Sector Engagement Strategy

In order to bring the private sector facilities aboard, a *"win win"* strategy and agreement based on 1) EDCD/MoH action and support to strengthen diagnostic and treatment capability and quality of private facilities and 2) compliance of private facilities with notification, reporting and NMTP 2016, will be rolled out by the end of 2017.

As describe under objective 1), such strategy requires first a clear mapping of private facilities by legal registered status, size (visits), specialty of care, and location.

Private sector will report or comply if incentives mechanism (not monetary) or formal partnerships are established including but not limited to:

- EDCD/MoH providing for free the full range of BCC materials, guidelines, protocol materials, RDTs and drugs for quality diagnostic and treatment.
- EDCD providing training, mentoring and monitoring to private facilities staff.
- EDCD inviting private sector representative at District and Central Levels to regular coordination meetings.
- EDCD setting up a recognition system for best reporting/performing facilities (annual awards during annual review of private sector data/achievements for instance).
- Private facilities reporting on a monthly basis the number of clinical cases, diagnosis results and treatment provided following national treatment and case management protocol.
- Private facilities referring cases (severe or not) to recommended public facilities when not able to provide necessary and appropriate services to patients.
- Private facilities offering testing and treatment for free when receiving commodities and training from government.
- Private facilities participating in regular coordination meetings with district or national level authorities.

A national level meeting should be held with government authorities (EDCD, MOH, DHOs) and representative of the private sector organizations/associations to agree on partnership conditions and review on a regular basis the data generated from both sectors.

BCC targeting High Risk Groups

High risk groups (soldiers, forest guards, refugees, etc.) have not been targeted and received specific BCC interventions and materials. There is a lack of data/evidence/documentation on the assumption of the existence of such high risk groups. Studies identifying such groups by evidence are needed. Once identified, specific BCC approaches and packages will be developed.

Cross Border Collaboration

In order to make collaboration with India effective, EDCD will develop a formal proposal to the Government of India and its dedicated program (NVBDCP). Such proposal will list 1) the type of information that should be shared by both countries in order to decrease the number of imported cases by targeting identified foci on both side of the border, 2) the data transmission mechanism and focal points, and the 3) chain of actions/responses to be undertaken by both parties in affected districts/communities where imported cases are originating from.

It is expected that WHO would play the role of mediator to establish such collaboration but initially hosting a bilateral high level meeting on that matter to introduce both parties to each other, recommend the collaboration, assist EDCD to present its proposal and drive the discussion towards a formal commitment and agreement framing on the collaboration.

In addition EDCD can unilaterally establish and test the relevance of health/check posts at the border of high risk districts which would provide on-site testing, communication materials and prevention commodities packages (prophylaxis, LLINs, repellants, etc.) to targeted migrant workers/populations.

5. Strengthen programmatic technical and managerial capacities towards malaria elimination

Malaria Elimination Task Force

A Malaria Elimination Task Force will be established by 2017 and will function as a gateway for malaria data banking and management; document success and failures monitor and evaluate the progresses made toward malaria elimination. METF will present the updated progress, success and failures, constraints and challenges in malaria elimination programme to TWG/Malaria for guidance, approval or support. Monthly reports will be sent from the METF to the TWG/M members.

Because the METF staff will be dedicated to the Malaria Program to fully focus on this disease, EDCD will develop specific Job Description for these position, describe the level term of references, responsibilities and authority of the METF, and will internally restructure/shift its organigram to include this team while keeping the same number of employees.

Technical Working Group

Malaria Technical Working Group (TWG/M) will guide the malaria programme towards elimination. The TWG/M will meet upon request from the METF as needed to provide programmatic, technical or strategic guidance, to approve new interventions or changes in the work plan, and to seek additional political, financial or technical support as needed.

Malaria Programme Review

An internal Malaria Programme Review should be conducted in 2017, 2020 and 2022 to review and measure progresses made toward elimination and update as needed the NMSP.

Annual Work Plan

To ensure that all interventions are planned and budgeted in a timely fashion and that activities follow a clear roadmap, the METF will develop every year a work plan that will be reviewed and approved by the TWG/M.

Malaria Elimination Action Framework

Objective 1.	To strengthen strategic information for decision making and implement surveillance as a core intervention towards malaria elimination

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
1.	Estimate malaria Burden – Burden of malaria is defined by Updated Micro-stratification and validated by Malariometric study 2017.					
A. Malaria Burden	1.1.Risk stratification	High Risk (adjoining wards), Moderate Risk, and Low and No Risk wards identified by 2017.	Number of High Risk (adjoining wards), Moderate Risk, and Low and No Risk wards identified.	March 2017	PR/EDCD	None
B.Notification , Reporting and Recording	1.2. Web based recording and reporting.	Scale Up of malaria notification within 24 hours of diagnosis by SMS and web based recording and reporting by public and private sectors throughout the country. Collect and maintain data bank including line listing of all malaria cases from 2017.	Percentage of confirmed cases notified within 24 hours (disaggregated by public and private sectors).	All districts by end of 2017	Unit Chief, Disease Control Division And District VCIs	TBD
	1.3. Case based surveillance.	Each notified malaria case investigated to confirm and classify the case. Investigation should be conducted by local health facility with support from the district if required within 3 days of notification by end of 2017.	Percentage of confirmed cases fully investigated.	By March 2018	In charge of the local health facility, DHO/DPHO/ VCIs	TBD

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
	1.4. Drain Reservoir in community – Increase access to test, treat, and track by targeting active foci. Address early, prompt quality diagnosis & treatment, relapses, asymptomatic and sub microscopic malaria detection. Universal Coverage by LLINs/IRS	Reactive case detection and potential for transmission of malaria assessed and Foci identified, classified, and appropriate response instituted by 7 – 10 days of notification with support from district, region, and if required from the center. Early quality diagnosis and prompt effective and complete treatment given in the community. Effective interventions to achieve universal coverage by LLINs and/or targeted IRS conducted in the foci to clear the foci.	Number of Foci identified and classified. Number of Foci Cleared	By March 2018	In charge of the local health facility, DHO/DPHO/ VCIs, Regional Entomologist, Regional Surveillance Medical Coordinators (SMCs), Regional Health Office Director	TBD
	1.5. *Malaria Mobile Clinics (MMCs)*	Roll out *Malaria Mobile Clinics (MMCs)* – implement Proactive case finding in the community to ensure increase in access to Test, treat, and track by	MMCs functional in all high and adjoining wards and moderate risk wards.	May 2017	PR Private organizations VHWs	TBD

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		2017.				
	1.6. Asymptomatic/Sub-microscopic malaria	Asymptomatic and Relapse will be identified and treated to drain the reservoirs in the community. PCR used for detection of sub-microscopic, asymptomatic infection by 2018.	Proportion of asymptomatic /sub microscopic infection.	May 2017	5 designated PCR laboratories	TBD
	Asymptomatic/Sub-microscopic malaria	Map foci with PCR to target hotspots & hot population and implement MMCs. Update yearly malaria hot spots and hot population.	Update malaria hot spots/hot pops map by 2018 and every year thereafter. Update hot spots and hot pops.	May 2017	5 designated PCR laboratories and VCIs	TBD
	1.7. Operational Research – MDA	*MDA may be a potential option in closed setting after operational* research findings.	Conduct MDA (one potential site) in 2018 and disseminate the results by 2019.	May 2018	Unit Chief, Disease Control Division	TBD
	1.8. Therapeutic drug efficacy study.	Conduct first line drug efficacy study every two years. Study is ongoing in 2017.	Number of drug efficacy studies conducted.	ongoing	PR	None
	1.9. Imported Malaria.	Operational research for migrant and mobile population mapping, reporting and networking by	Use of mobile phones for reporting/tracking and mobile population networking	August – Sept 2017	PR-EDCD-PMI (MCSP)	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		2017.				
C. Imported Malaria	1.10. Border check posts.	- Prevention Package distribution at exit border sites by 2017.	Number of prevention package distributed to targeted population.	Aug-Sept 2017		
	1.11. Cross Border Collaboration.	- Screening facility and dissemination of improved health seeking behavior and networking among migrant and mobile community on return to their villages at entry border sites by 2017.	Number of migrant/mobile population screened/oriented at site.	Sept-Oct. 2017	PR-EDCD-PMI (MCSP Advisor)	
	1.12. Private Sector -Malaria burden in private sector.	Map & conduct operational Research to estimate Private Sector contribution by 2017.	Research conducted.	May 2017	PR contracted organization	

Objective 2	To further reduce & interrupt malaria transmission and eliminate foci.

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
A. Reduce Malaria Transmission – IVM, LLINs & IRS	1.1Vector Control	IVM	Implement guidelines by 2017	March 2017	Unit Chief, Disease Control Division	TBD
	1.2. Vector bionomics and behaviors.	Update vectors and their bionomics and behaviors in each of the geographical and	Updated vector list with behaviors study conducted.	July 2017	PR Entomologists Regional Entomologist	TBD

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		ecological strata where transmission of malaria is possible by 2017.			s VCIs	
	1.3. Vector susceptibility study.	Monitor vector susceptibility / resistance to insecticides.	Number of insecticides resistance study conducted.	July 2017	PR Entomologists Regional Entomologists VCIs	TBD
	1.4. Entomology capacity.	Strengthen entomology capability by conducting in country courses by 2018 and continue one month trainings.	Diploma /Bachelor level course started by 2018. Conduct one month field trainings.	Sept 2017	EDCD Director	
	2. Universal Coverage LLINs.	Mass distribution in all high risk wards. Continuous distribution in high risk wards & adjoining wards and in all moderate risk wards by 2018.	Number of long-lasting insecticidal nets distributed to at-risk populations through mass campaigns. Number of long-lasting insecticidal nets distributed to targeted risk groups through continuous distribution.	LLINs distributed by April 2017 Through the year	PR/SR DPHO/DHO	Already budgeted
	3. LLINs study.	Conduct study to assess coverage and use of LLINs. Assess the physical durability and effectiveness of LLINs	Proportion of population that slept under an insecticide-treated net the previous night. Proportion of children under five years old who slept	Sept 2017	PR contracted organization	Already budgeted

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		(2017 & 2018)	under an insecticide-treated net the previous night. Number of study conducted after distribution cycle.			
	4. IRS	Primarily reserved for malaria outbreaks and for foci delimitation/ elimination response but also for humanitarian and emergency situation such as after natural disasters. Additional targeted focal spray may be conducted in areas with API > 1/ 1000 population. IRS may be applicable as a component of IVM.	Proportion/Number of households sprayed by IRS within the last 12 months.	On-going during malaria season	EDCD/DPHO/DHO/VCIs	
B. Interrupt Malaria Transmission	5. Foci Identification and delimitation	Each district will identify and classify malaria transmission foci in their district with support from region and center by the 2017. Foci are classified as Active, Non-active Residual, or Cleared.	Total Number of Foci by year.	By Dec 2017	SMCs, regional entomologists and VCIs	
		Appropriate	Number of foci	Through the	SMCs,	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		response to delimit and eliminate the foci as outlined above in 4.1 by 2018.	cleared by year.	year	regional entomologists and VCIs	
		Each district will implement foci response and delimit foci in the district as follows (cumulative) – 15 % foci by 2018, 35 % by 2019, 60 % by 2020, 80% by 2021, and 100% of foci responded by 2022 and sustained it thereafter.	Proportion of foci cleared per year.	Through the year	SMCs, regional entomologists and VCIs	

Objective 3	To improve quality of and increase access to early diagnosis and effective and complete treatment of malaria.

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
A. Treatment Protocol	1. Ensure treatment compliance with NMTP 2016	Disseminate NMTP 2016 : - Physicians &Medical Officers in public and private sectors - Health Care Providers in public – AHWs, HAs/ - Drug dispensers in private	Number of dissemination conducted. Ideally % of cases treated in compliance and treated completely (although very hard to measure)	May 2017	PR - EDCD	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		sectors.				
		Implement complete malaria treatment as per NMTP 2016 by 2017. Roll out G6PD deficiency test, preferably point of care test by 2017.	Proportion of confirmed malaria cases that received first-line antimalarial treatment according to national policy.	May 2017	PR - EDCD	
		Implement radical cure for P vivax malaria treatment - (Primaquine 14 days).	Proportion of vivax (ovale) malaria tested with G6PD test and treated correctly with Primaquine.	May 2017	PR - EDCD	
B. PSM/Logistics	2. PSM/Logistics Plan	Establish and train a central forecasting committee for malaria commodities at EDCD comprising members from Logistic Management Division (LMD), Principal Recipient (STC), WHO, Department of Drug Administration (DDA), local	Forecasting committee TOR and meeting minutes. Forecasting exercises conducted.	By July 2017 Annually before rainy season (by Dec.)	EDCD, LMD PR, WHO, DDA, USAID	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		USAID mission health section.				
		Set-up and conduct monthly meeting to cross-check data reported to LMD and EDCD (LMIS versus MDIS, as well as data reported by VCIs, DHOs or other channels). A joint LMD-EDCD team will conduct these meeting and produce reports to the TWG and NMESC.	Monthly data cross-checking report and recommendations Proportion of health facilities without stock-outs of key commodities.	Monthly reporting	LMD-EDCD-METF	
		Develop product specifications, prepare cost estimates for procurement and validate the specifications during an annual workshop with national stakeholders.	Specifications forms, cost estimates and workshop report.	Dec 2017	EDCD-LMD-WHO-DDA-DHOs	
		Develop updated SOPs on drug dispatch, drug receiving, inventory management, expiry handling, and waste management and make them	SOPs and regular monitoring reports	Dec 2017	EDCD-LMD-DDA-DHS	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		available to all district drug stores. Develop sampling protocols for collecting quality control samples of antimalarial commodities at different points of supply chain. Conduct regular quality control operations. Obtain quotation for quality control tests from WHO – pre qualified laboratories and send samples for quality testing	Protocols and QC reports Quotations and tests conducted with recommendations	Jan. 2018 Dec 2017		
C.1. Case Management	3 Case management	Conduct malaria case management for physicians, medical officers, and health care providers in public and private sectors.	Number of malaria case management training conducted.	April 2017	PR-EDCD	
C.2. Community Test & Treat	4. Community test, treat and track	Scale up community testing with trained FCHVs (in remote high and moderate risk) recognizing malaria case and sending SMS to local health facility. Local health provider	Proportion of suspected malaria cases that receive a parasitological test in the community.	May 2017	EDCD METF DPHO/DHO	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		with the support of FCHVs, conduct community test and treat. Trained FCHVs tracks the cases.				
C.3. Community test & treat – Malaria Mobile Clinics		Implement proactive case detection by roll out of Malaria Mobile Clinics in the community with a test and treat mechanism in high risk and adjoining wards and moderate risk wards by 2017.	Number of confirmed case detected by proactive detection.	May 2017	VCIs and MMCs contracted organizations	
D. Diagnosis	1. Quality Diagnosis	Quality Combo RDTs in HPs & PHCs. Community diagnosis and up to PHCs and private sector diagnosis done by Quality Combo RDTs throughout the country by 2017.	Proportion of cases tested by RDTs.	On-going	EDCD/DPHO/DHO	
	2. QA/QC	QA/QC-microscopy center in district hospital/DPHO by 2017. All positives and 10 % negatives RDTs, prepare thick and thin slide and each week, send the	District lab strengthened for cross- checking and validation of smear microscopy.	By May 2017	Designated Laboratories at district level, VBDRTC for tracking results	

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
		slide for quality control to designated district microscopy center. Feedback should be sent within a week.				
	3. Training	Improve quality of microscopy by conducting basic, refresher and competency assessment in malaria.	Number of lab tech trained.	All year long	VBDRTC	
	4. National Referral Centers	QA/QC-microscopy referral center in designated centers by May 2017. Equivocal slides and 10 % of positives and negative slides send to the designated referral centers for review. Feedback should be sent within a week.	Referral lab (5 designated) strengthened for cross-checking and % of validated smear microscopy from the districts.	All year long	Ref Labs.	

Objective 4.	To develop and sustain support through advocacy and communication, from the political leadership and the communities towards malaria elimination

Activity	Task	Description	Indicator	Timeframe	Person Responsible	Estimated Additional Budget
A. Ensuring commit	1. National Malaria Eliminatio	The NMESC meets annually to review progresses accomplished by	NMESC members identified and annual presentation and meeting report	Sept 2017 and yearly afterwards	EDCD Director and METF	Meeting to be budgeted in Red Book if needed

ment for Malaria Elimination at highest level of the government, EDPs, and at private sector level	n Steering Committee	the malaria program and examine the current challenges, bottlenecks and requests for policy changes, support or funding	including action plan.			
	1.2. Private Sector Engagement Strategy	*"win win"* strategy and agreement based on 1) EDCD/MoH action and support to strengthen diagnostic and treatment capability and quality of private facilities and 2) compliance of private facilities with notification, reporting and NMTP 2016, will be rolled out by the end of 2017.	Private Sector Engagement Strategy/Guidelines including conditions for collaboration. Reports/Conclusions of coordination meeting with private sector representatives at National and District Level. Malaria officially declared a "Notifiable Disease" by law.	August 2017 and quarterly/annual meeting afterwards.	METF, EDCD director, Private sector representatives	Additional commodities to be forecasted Meeting and transportation costs
B. High Risk Groups/ Areas	2.1 Identification of high risk groups and areas	- Studies identifying high risk groups by evidence are needed. Once identified, specific BCC approaches and packages will be developed. - Awareness orientations in high /moderate risk VDCs based on mapping by 2018.	Studies/Surveys conducted, BCC and prevention packages developed and distributed Number of Awareness orientation conducted and estimated targeted population covered	June-July 2017 Sept-Oct 2017	PR-EDCD-PMI (MCSP advisor)	
C. Cross Border Collabo	3.1 Cross Border collaborati	Agreement between EDCD and India	EDCD proposal to India NVBDCP (MoU or else).	June 2017	EDCD Director, METF, WHO	Travel costs

ration Framework	on framework	NVBDCP will include 1) the type of information shared by both countries, 2) the data transmission mechanism and focal points, and the 3) chain of actions/responses to be undertaken by both parties in affected districts/communities where imported cases are originating from.	Introductory meeting report, and semi-annual coordination meetings reports afterwards. Focal points nominated. Monthly reports on cases identified, and action taken in origin foci.	Sept 2017 and semi-annually Sept 2017 Monthly from Oct 2017	representatives in India and Nepal	

Objective 5.	**To strengthen programmatic technical and managerial capacities towards malaria elimination**					
Activity	**Task**	**Description**	**Indicator**	**Timeframe**	**Person Responsible**	**Estimated Additional Budget**
A. Strengthen and focus Human Resources and Management toward Elimination	1.1. National team formed for malaria elimination.	Functional Team at EDCD by 2017.	Malaria Elimination Task Force staffed with specific Job Descriptions and ToR.	September 2017	EDCD Director and VBD Director	Desks, chairs, desktops?
	1.2. TWG/Malaria	TWG/Malaria will guide malaria elimination programme. Meeting every quarterly to review and recommend changes.	Quarterly meeting conducted and notes/recommendations produced.	On-going	METF to convoke TGW/M members and EDCD director to validate notes.	No
	1.3. Malaria Program	MPR will ensure that progresses made are in line with the NMSP	MPR reports / Progress reports / Recommendations	June 2017 (before budget		No

	Review	goal and strategy toward Elimination and will recommend updates as needed.	produced	decision) 2020 2022		
	1.4. Annual Work Plan	METF produces work plan every year to schedule and budget all activities to meet annual targets/indicators	Annual Work Plan	Red Book Budget Timeline	METF	No

Indicators

Input:

Proportion of total Malaria budget/Total Health Budget

2. Donor Budget?

Outcome:

Proportion of targeted risk group receiving ITNs

Proportion of population at risk that slept under an insecticide-treated net (ITN) the previous night

Proportion of targeted risk group receiving IRS

Proportion of population at risk protected by indoor residual spraying (IRS) in the previous 12 months

Coverage:

Annual blood examination rate

Proportion of patients with suspected malaria who received a parasitological test

Proportion of detected cases contacting health services within 48 hours of developing symptoms

Proportion of malaria cases detected by surveillance systems

Percentage of case reports received <24 hours after detection

Proportion of cases investigated and classified

Proportion of foci investigated and classified

Proportion of patients with P. vivax or P. ovale malaria who received a test for G6PD deficiency

Proportion of patients with confirmed malaria who received first-line antimalarial treatment according to national policy

Proportion of P. vivax and P. ovale patients who received radical cure treatment

Proportion of expected health facility reports received at national level

Proportion of health facility without stock outs of first-line treatments

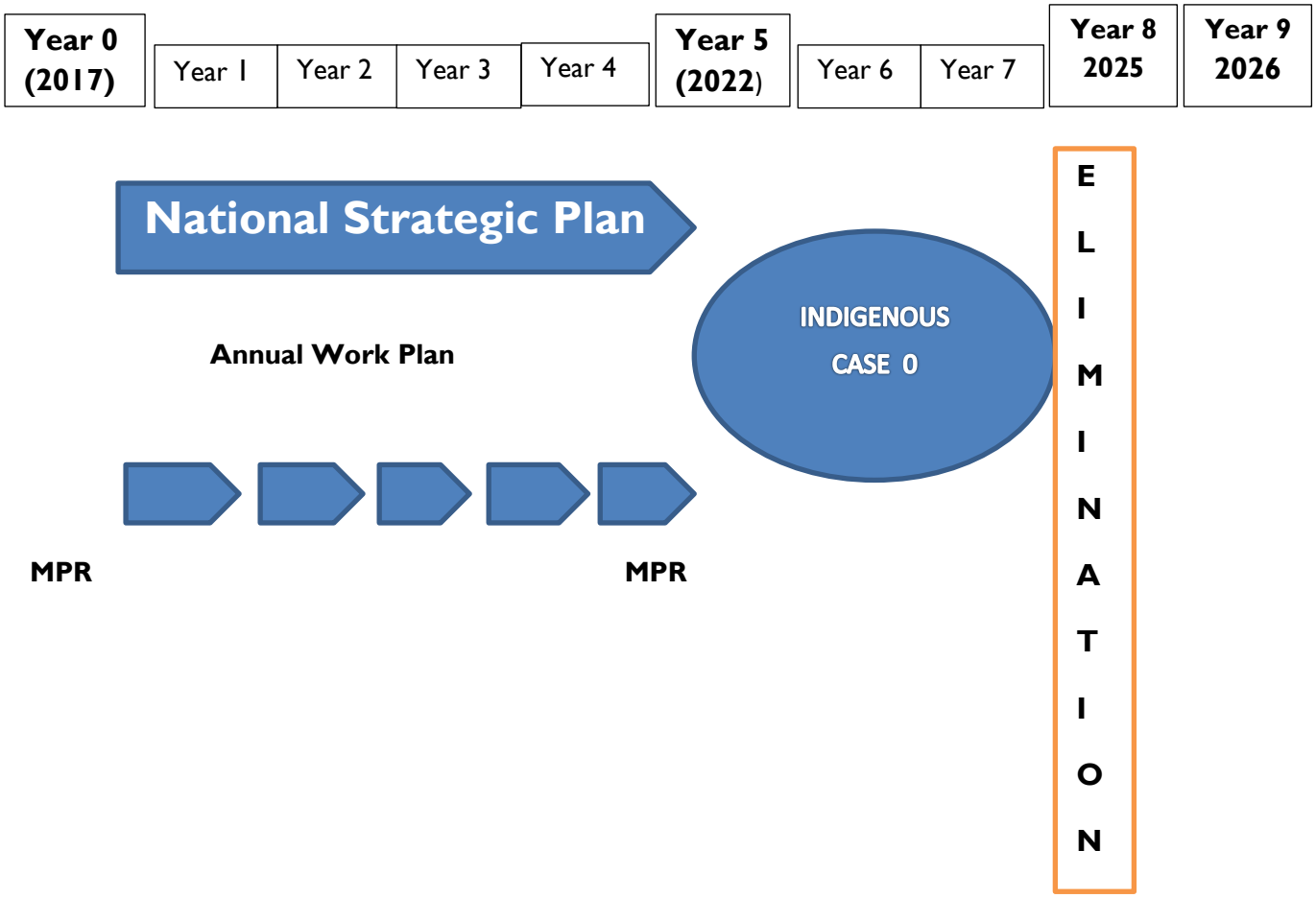
Impact:

Malaria case incidence: number of confirmed malaria cases per 1000 persons per year

Number of foci by classification.

Planning – Strategic Plan / Annual Work Plans

An internal Malaria Programme Review will be conducted in 2017 with a focus on defining the malaria trend and the changing malaria epidemiology, sharing the success and lessons learned on malaria pre-elimination, and develop consensus on effective and efficient strategy for malaria elimination. An annual costed work plan will be developed with defined targets and appropriate timelines.



Milestones: Elimination/ Prevention of re-establishment

Data Generation:

Diagnostic testing - All suspected malaria cases get tested by 2017.

Data recording - Case investigation form in operation by 2017.

Case investigation - All cases including reactive case detection by 2018.

Master list of health facilities/ reporting units - Public & private facilities current by 2018.

Catchment/ target populations - Populations of foci known by 2017.

Information Reported:

Immediate notification of all confirmed malaria cases by 2017.

Reporting of cases by classification by 2017.

National cases register in place by 2017.

Reporting rates:

Reporting rates systematically tracked Null values for when nil cases by 2018.

Reporting rates 100% from public health facilities by 2017.

Reporting rates 100% from private health facilities by 2018.

Reports submitted within 24 hours of case detected (100%)

SUMMARY BUDGET **Malaria**

				2018	2019	2020	2021	2022	Grand Total
Period Covered: from				**16-Jul-17**	**16-Jul-18**	**16-Jul-19**	**16-Jul-20**	**16-Jul-21**	
Period Covered: to				**15-Jul-18**	**15-Jul-19**	**15-Jul-20**	**15-Mar-21**	**15-Jul-22**	

B. SUMMARY BUDGET BREAKDOWN BY PROGRAM ACTIVITY

#	Module		2018	2019	2020	2021	2022	July 2017-July 2022	Budget for 16th March 2018-15th March 2021
1	Case management		**1,875,797**	**1,976,743**	**1,634,989**	**1,578,725**	**2,004,694**	**9,070,948**	5,309,703
2	Vector control		**6,568,394**	**1,384,685**	**1,646,373**	**1,725,487**	**992,433**	**12,317,371**	6,005,581
5	Program management		**2,259,081**	**1,036,191**	**1,062,737**	**971,759**	**2,570,819**	**7,900,587**	3,087,495
12	Policy and governance		**0**	**0**	**0**	**0**	**1,336**	**1,336**	-
13	RSSH: Health management information systems and M&E		**308,994**	**406,620**	**347,190**	**124,446**	**224,150**	**1,411,400**	1,086,891
		TOTAL*	**11,012,267**	**4,804,238**	**4,691,289**	**4,400,417**	**5,793,432**	**30,701,643**	**15,489,670**

C. SUMMARY BUDGET BREAKDOWN BY FUNDING SOURCE ***(if known by Grant signature time)***

#	Funding source	Name	Type of Implementing Entity	2018	2019	2020	2021	2022	July 2017-July 2022	Budget for 16th March 2018-15th March 2021
1	GFATM	Global Fund	NGO/CBO/ Academic	**6,582,452**	**2,568,842**	**2,049,918**	**1,745,250**	**2,020,429**	**14,966,891**	6,642,179
2	GoN	Government of Nepal	NGO/CBO/ Academic	**4,410,479**	**2,217,107**	**2,632,556**	**2,640,998**	**3,729,210**	**15,630,349**	8,801,244
3	WHO	World Health Organization	NGO/CBO/ Academic	**16,102**	**14,910**	**7,150**	**14,169**	**39,223**	**91,554**	37,969
4	UCSF	University of California San Francis0	NGO/CBO/ Academic	-	-	-	-	-	-	-
5	USAID			**3,234**	**3,379**	**1,666**	-	**4,570**	**12,848**	8,278
			TOTAL*	**11,012,267**	**4,804,238**	**4,691,289**	**4,400,417**	**5,793,432**	**30,701,643**	**15,489,670**

D. SUMMARY BUDGET BREAKDOWN BY FUNDING SOURCE WITH PRIORITIES ***(if known by Grant signature time)***

#	PR/SR/EDCD	Name	Type of Implementing Entity	2018	2019	2020	2021	2022	July 2017-July 2022	Budget for 16th March 2018-15th March 2021
	GFATM	Absolute		5,561,926	1,920,060	1,478,971	1,243,602	1,346,834	11,551,393	4,846,014
		High		162,065	193,036	182,414	177,775	113,568	828,858	455,622
		Medium		675,014	414,201	328,834	308,294	304,615	2,030,958	1,218,526
		Low		183,447	41,545	59,699	15,579	255,411	555,682	122,017
	GoN	Absolute		345,022	915,159	835,569	1,174,676	1,119,707	4,390,133	2,925,404
		High		2,951,543	1,064,567	1,504,250	1,373,523	1,089,518	7,983,400	5,194,620
		Medium		1,105,926	81,382	132,053	92,798	1,519,985	2,932,144	356,548
		Low		7,989	155,999	160,683	-	-	324,672	324,672
	WHO	Absolute		-	-	-	-	-	-	-
		High		8,758	14,910	7,150	14,169	28,208	73,196	37,969
		Medium		7,343	-	-	-	11,015	18,358	-
		Low		-	-	-	-	-	-	-
	UCSF	Absolute		-	-	-	-	-	-	-
		High		-	-	-	-	-	-	-
		Medium		-	-	-	-	-	-	-
		Low		-	-	-	-	-	-	-
	USAID	Absolute		942	2,127	-	-	942	4,011	3,069
		High		2,292	1,252	1,666	-	2,292	7,501	5,209
		Medium		-	-	-	-	1,336	1,336	-
		Low		-	-	-	-	-	-	-
			TOTAL*	**11,012,267**	**4,804,238**	**4,691,289**	**4,400,417**	**5,793,432**	**30,701,643**	**15,489,670**

E. SUMMARY BUDGET BREAKDOWN BY FUNDING AVAILABILITY ***(Proposed Budget from GFATM)***

#	Availability		Type of Implementing Entity	2018	2019	2020	2021	2022	July 2017-July 2022	Budget for 16th March 2018-15th March 2021
GFATM	Within Allocation	Absolute		5,500,014	1,714,065	1,263,235	1,027,866	1,131,098	10,636,277	4,208,547
		High		-	-	-	-	-	-	-
		Medium		-	-	-	-	-	-	-
		Low		-	-	-	-	-	-	-
	PAAR	Absolute		61,912	205,995	215,736	215,736	215,736	915,115	637,467
		High		162,065	193,036	182,414	177,775	113,568	828,858	455,622
		Medium		675,014	414,201	328,834	308,294	304,615	2,030,958	1,218,526
		Low		183,447	41,545	59,699	15,579	255,411	555,682	122,017
			TOTAL*	**6,582,452**	**2,568,842**	**2,049,918**	**1,745,250**	**2,020,429**	**14,966,891**	**6,642,179**