

Nepal Malaria Programme Review

7-16 June 2010



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Contents

	<i>Page</i>
Executive summary	v
1. Background and rationale of the programme review	1
2. Purpose of the review	1
3. Objectives of the review	2
4. Methodology	3
5. Country profile	5
5.1 Geography and climate	5
5.2 Political situation and administration	7
5.3 Demographic and socioeconomic information	7
5.4 Healthcare system	8
6. History of malaria programme in Nepal.....	11
7. Present malaria control strategy.....	12
8. Summary of the internal review in 2007 and 2010.....	14
8.1 Internal review in 2007	14
8.2 Internal review in 2010	15
9. Malaria epidemiology in the past five years	16
10. Impact on disease trends	20
11. Malaria Control Programme	21
12. Progress in scaling up of key interventions and their impact on disease trends.....	22

13.	Key findings of key interventions and recommendations.....	29
13.1	Diagnosis and treatment.....	29
13.2	Surveillance and epidemic preparedness.....	32
13.3	Entomology and vector control.....	36
13.4	Advocacy, communication, social mobilization and IEC	42
13.5	Programme management	46
14.	General recommendations.....	53
15.	Suggestions/inputs for national strategy, 2011-2015	54
16.	Acknowledgements.....	55

Annexes

1.	List of reviewers.....	58
2.	Itinerary for the reviewers of the Nepal Malaria Control Programme	60
3.	Grouping for field visit during 10-12 June 2010.....	63
4.	Literature Consulted	64
5.	Abbreviations.....	66

Executive summary

The review of the Nepal Malaria Control Programme was carried out by a team of national and international reviewers during 7-16 June 2010. The general objective of the review was to conduct a comprehensive review of the National Malaria Control Programme.

The methodology consisted of document review, attending oral presentations, interviewing of key informants, field visit to various health institutes and malaria endemic areas, in-depth discussions, analyzing data and report writing.

Overall, the programme has made progress in controlling malaria in high malaria endemic districts with financial support mainly from the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) and in partnership with several organizations. The programme successfully revised national treatment guidelines and implemented new tools such as rapid diagnostic tests, artemisinin-based combination therapy (ACT) and long-lasting insecticidal nets (LLINs). Though the health system at the peripheral level is well in place and has contributed enormously, it is weak at the national level especially in human resources. There are several challenging issues such as frequent outbreaks and malaria transmission across the international border.

In spite of a downward trend there are some programme weaknesses that need to be addressed, e.g. the surveillance system, the need to be geared towards malaria elimination, epidemic preparedness, malaria stratification, entomological studies, and other key interventions. The review team made observations, specific recommendations covering technical areas as well as general recommendations. The review team strongly recommended that the programme use the Global Fund to strengthen its national capacity and recruit essential staff in order to improve programme performance.

1. Background and rationale of the programme review

The renewed effort to control malaria worldwide and the move towards elimination in some countries is considered as the latest generation of effective tools and methods for prevention and treatment of malaria. Increasing use of long-lasting insecticidal nets (LLINs), malaria rapid diagnostic test (RDT), artemisinin-based combination therapies (ACTs) and indoor residual spraying (IRS) of insecticide provides an unprecedented opportunity to control and, in selected countries, eliminate malaria e.g. in Sri Lanka in the South-East Asia Region. In Nepal the first attempt to control malaria was made in 1954 through the Insect-Borne Disease Control Programme, supported by USAID. In 1958, the malaria eradication programme was launched as the first national public health programme in the country with the objective of eradicating malaria within a limited time period. Because of various constraints, this objective could not be achieved and consequently in 1978 the programme reverted to malaria control. Prevailing ecological, epidemiological and socioeconomic factors required changes in the malaria control strategy and as a result malaria control was revised in accordance with the Global Malaria Control Strategy of WHO in 1992. There was another revision in 2007. Malaria control services are provided to approximately 22.8 million people in areas at risk of malaria in 65 districts of the country. The National Malaria Control Programme receives financial support from the Global Fund for accelerated efforts in malaria control. There is a declining trend of malaria in the country. The Ministry of Health and Population (MoHP) requested WHO for an independent in-depth review of the programme to enable the government to further strengthen malaria control in the country and achieve the goal of malaria elimination.

2. Purpose of the review

The malaria programme performance review (MPR) is a periodic joint programme management process for reviewing the progress and performance of a malaria programme within the context of the national

health and development plans. The review aims at improving the performance and/or re-defining the programme's strategic direction and focus. The malaria control programme includes the National Malaria Control Programme (NMCP) as well as all key players and partners in malaria control at the national, sub-national and community levels.

MPR will enable Nepal to assess the current strategies and activities in order to strengthen the malaria control programme and systems used in delivery of key interventions. MPR will enable timely identification of strengths and challenges for the programme. Solutions proposed to address major constraints will help to strengthen programme scale-up and implementation. Based on the recommendations of the review, planning and resource mobilization, scaling-up delivery of malaria control services will impact malaria transmission leading to its elimination from Nepal. Programme reviews can propose solutions and identify activities required to achieve for the rapid outcomes of both the malaria control programme and the long-term sustainable outcome of the overall national health system.

3. Objectives of the review

General objective

To conduct a comprehensive review of the National Malaria Control Programme in Nepal.

Specific objectives

- (1) To review the epidemiology of malaria, including analysis of the trends in the last five years.
- (2) To review the structure, organization and management framework for policy programme development within the health system and national development agenda.
- (3) To assess progress towards achievement of the national targets.
- (4) To review the contribution of collaborative programmes on malaria control in the past five years (WHO, GFATM, and others).

- (5) To conduct analysis and formulate recommendations for incorporation into existing malaria control programme policies, strategies, and resources required for the next five years (2011-2015).

4. Methodology

The review team included external and internal reviewers from various disciplines. They were identified by WHO with the concurrence of the Ministry of Health and Population, Government of Nepal. Senior WHO staff facilitated the review. Two weeks prior to the review, all reviewers received electronically a number of key background documents and reports prepared by the National Malaria Control Programme (Epidemiology and Disease Control Division- EDCD) and WHO.

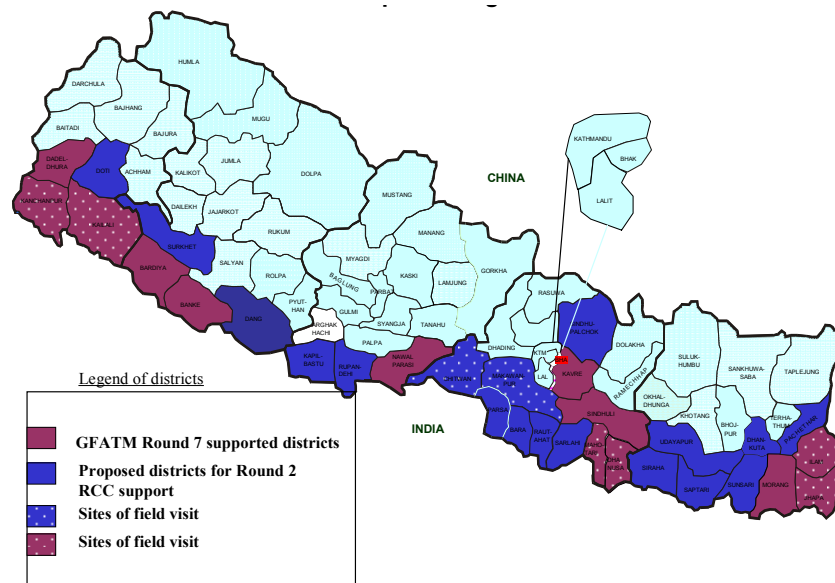
On the first day the review team was given a detailed presentation of the malaria situation and its control by Mr Rakesh Thakur, officiating chief of EDCD. This was followed by in-depth discussions. Further briefing was given by the officiating Secretary, Health, and Acting WR. The desk review started the same day. Team members examined original documents as per their specialty, discussed data and analyzed relevant information for field observations and report writing. This included EDCD reports, internal reviews, published and unpublished records, guidelines, protocols, intervention records, documents relating to finance, administration, the 2nd and 7th rounds of GFATM and CCM documents. A separate briefing was held with representatives of Population Science International (PSI) on Long-Lasting insecticidal net (LLIN) and information, education and communication (IEC) or behavioral change communication (BCC).

For the field visits the review team was divided into four groups viz., Group 1 visited Kailali and Kanchanpur districts for epidemiology, surveillance, diagnosis and treatment; Group 2 visited Makwanpur and Chitwan districts for programme management, strategy, human resource, financing; Group 3 visited Dhanusha and Mahottari districts for entomology and vector control; and Group 4 visited Jhapa and Ilam districts for community IEC/BCC and public-private partnership. Besides the specific interest of each team, all teams also reviewed cross-cutting issues such as the health system and the performance of the malaria control programme in

relation to key interventions. Sites visited are shown in Figure 1 and the grouping of the review team is given in Annex 3.

In the field, meetings were held with the director/head of the institutions (DPHO, hospital superintendent, primary health centres, health posts, sub-health posts, and communities in villages). During the visit to these institutions the malaria records, stock position of supplies (RDTs, insecticides, anti-malarial drugs, sprayers, etc.) were checked. Information was collected on quality control, availability of guidelines, IEC/BCC material, staff position, training, mobility of staff and responsibilities in malaria control. At the health posts (HP) and sub-health post (SHP), checks were made of laboratory services, cross-checking procedures, slide preparation and training component, fever cases visiting the health facilities, clinical malaria diagnosis practices, malaria tests with RDT/microscopy, information on the private sector in the area, surveillance system, record keeping etc.

Figure 1 Map showing sites of field visit



Source, EDCD, Nepal

Visits to the villages comprised of checking LLIN distribution, community acceptance of LLIN, distribution norms, sleeping habits, washing and drying practices, IEC/BCC material in villages, people’s opinion about LLIN’s usefulness and suggestions. Discussions were held at various levels on

the malaria situation, severe malaria cases and malaria deaths, if any. Meetings were held with the female community health volunteers (FCHVs) on their duties, functions and role in malaria prevention, treatment and control. Villages undergoing spraying were visited to observe spraying techniques, spray quality, training of sprayers, supervision, quality and maintenance of spray pumps, nozzle replacement, protective clothing etc. On the completion of the field visit district public health officers (DPHOs) were briefed on the observations and their responses were noted. On return from the field visit a meeting was held with Dr. G.D. Thakur, Director EDCD. He was briefed on the observations noted from the available records and field visits. Dr Thakur provided further briefing on the 2nd and 7th rounds GFATM project and the rolling continuation channel (RCC) proposal. He also shared his experience of working with various national and international partners including constraints encountered in the discharge of his duties. The WHO Representative to Nepal (Dr Lin Aung), was also briefed on the outcome of the field visit. This was followed by report writing, preparation for MPR briefing and Aide Memoire. The MPR observation and recommendations were presented in a function in the Ministry of Health and Population on the last day. The Hon'ble State Minister of Health and Population (Chief guest), Secretary, Health(Chair), Director-General and directors of different divisions of the Department of Health Services, staff of NMCP, EDCD, Joint Secretary of Ministry of Finance, members of the National Planning Commission, external development partners, members of the CCM, PSI, partner organizations and press attended the MPR dissemination .

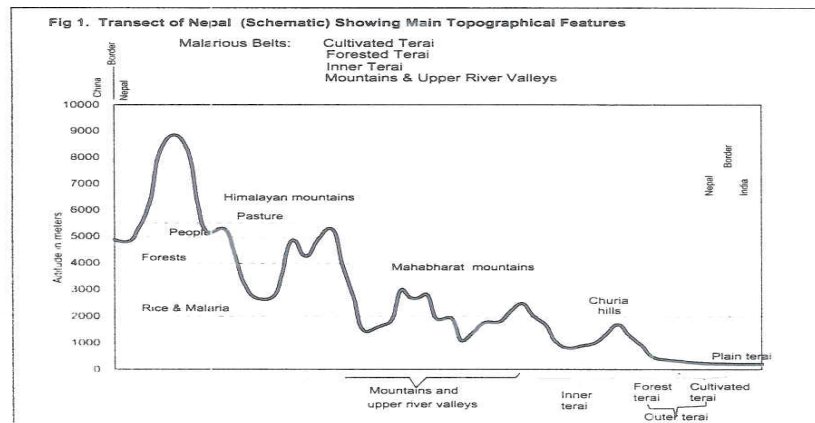
5. Country profile

5.1 Geography and climate

Nepal is a landlocked country of 147,181 square kilometers bordering India in the south, east and west and China in the north, at the southern flank of the Himalayas. The country's geographic zones vary greatly and present one of the challenges to development across the nation. A large part, of the country is under-developed and over 80% of the population lives in rural areas. Nepal is ecologically divided into three distinct ecological zones: the mountains to the north, the hills, and the terai to the south. The mountain

zone ranging from 4,877 to 8,848 meters above sea level, comprises 35.2% of the land surface and is inhabited by only 7.3% of the population. Because of the harsh terrain, transportation and communication facilities in this region are very limited. The hills comprise 41.7% of Nepal's land surface and contain 44.3% of the population, including the urban valleys of Kathmandu, Pokhara, and Surkhet. Transportation and communication facilities are much more developed here than in the mountain region. The terai region in the southern part of the country can be regarded as an extension of the relatively flat gigantic plains, and comprises only 23.1% of the total land area but contains the remaining population¹. The terai is vital to the nation as it contains the most fertile agriculture land and forests. Because of its flat terrain, transportation and communication facilities are more developed than in the other two regions of the country. The eco-system of this belt is very favourable for breeding of *Culex* and *An. annualis*, mosquitoes the proven vectors of lymphatic filariasis and malaria respectively in Nepal. Figure 2 shows the main topographical features of the country.

Figure 2 : Transect of Nepal showing main topography features



Source: EDCCD, Nepal

In the terai, the mean and maximum temperature in winter fluctuates between 19°C and 38°C. In the hills the mean temperature drops during

¹ Government of Nepal, Central Bureau of Statistics, Year Book 2007: http://www.cbs.gov.np/Year%20Book%202007/frame_CBS/new3.html

winter to as low as 15°C, and it is much lower at higher altitudes of the mountain areas. The rainy season starts with the onset of the south-west monsoon, with heavy precipitation from July to mid-September. Rainfall during the other season is generally scanty. Relative humidity varies between 80% and 90% during the monsoon but declines in other months.

5.2 Political situation and administration

Nepal is a Presidential Federal Republic. The country is divided into five development regions (Eastern, Central, Western, Mid-western and Far-western), 14 zones and 75 districts. Districts are further divided into Village Development Committees (VDCs) and Municipalities. There are altogether 3,912 VDCs and 58 municipalities including one metropolitan and three sub-metropolitan cities. Each VDC is divided into nine areas (wards) with a total of 36,000 wards countrywide. The Ilaka is the administrative service level unit between the district and the VDC, where there are on an average nine Ilakas in each district.

5.3 Demographic and socioeconomic information

Nepal is among the poorest and least developed countries in the world with almost one third of its population living below the poverty line (2006) and with an unemployment rate of 46% (2004). It is ranked 144 out 177 nations on the United Nations Human Development Index (HDI) and falls well short of recent HDI gains made by the South-Asia Region as a whole. The gross domestic product (GDP) per capita (PPP) was \$1,100 in 2008. Agriculture and subsistence farming is the mainstay of the economy and provides livelihood for 76% of a labour force of 14.6 million. Intensifying difficulties for Nepal is its increased vulnerability to inflation and high prices for foodstuffs and other staple goods.

Nepal is a diverse state comprising many different ethnic and religious groups. Nepal is predominately Hindu (80%). There are 93 spoken languages and 103 ethnic/caste groups. Less than half of the population speaks Nepali (48%). Additional demographic information is given in Table 1.

Table 1: Nepal - Demographic facts, 2008

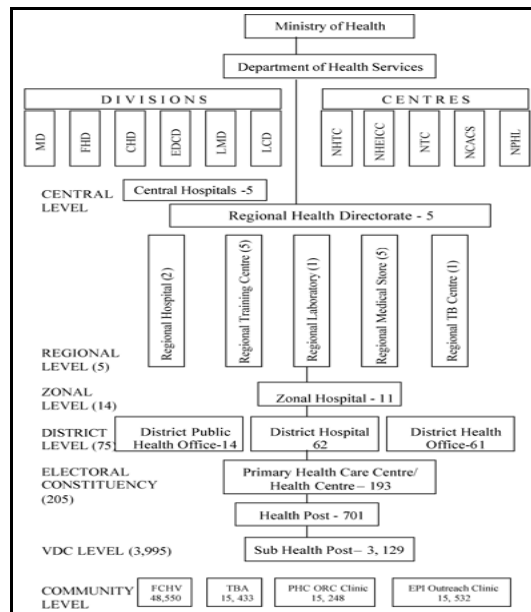
Total Population	28,563,377 Ages 0-14: 37% Ages 15-64: 58% Ages 65 and above: 4% Population density: 190/sq kilometer
Median Age	22 years
Population Growth rate	1.4%
Probability of Not Surviving past age 40	17.4%
Adult Literacy Rate (15 yrs and older)	51.4%
Net Primary Enrollment Rate (2006)*	86%
Net Secondary Enrollment Rate (2006)*	47%
Fertility Rate	3 children born/woman
Birth rate	23 births per 1000 person
Maternal Mortality Ratio	240 per 100000 live births
Infant mortality rate	48 per 1000 live births
Under-five mortality Rate	74 per 1000 live births
Population Growth	1.4%

Sources: Central Intelligence Agency, World Fact Book - <https://www.cia.gov/library/publications/the-world-factbook/geos/np.html>, Human development Report 2007/2008, Country Fact Sheets

* Nepal Demographic and Health Survey, 2006

5.4 Healthcare system

Under the Department of Health Services (DHS) there are 5 Regional Health Directorates, each located at the headquarters of each of the five development regions of Nepal. In 62 of the 75 districts, there is a District Health Office (DHO) with a District Hospital and a District Public Health Office (DPHO) under its umbrella. At the district level, each Ministry has offices that manage the planning and implementation for their respective sector. The DHO co-ordinates health development activities in the district through the District Development Committee (DDC) and is responsible for all health-related activities in the district including the organization and management of district hospitals, primary health care (PHC), health posts (HP) and sub-health posts (SHPs).

Figure 3. Organizational Structure of the Department of Health Services

(WHO, Country Health System Profile – Nepal)

http://www.searo.who.int/EN/Section313/Section1523_6866.htm

The Department of Health Services is responsible for the delivery of preventive and curative health services throughout the country and is one of the three departments under the Ministry of Health. All preventative health programmes are carried out by the DPHO which is headed by a Public Health Officer. The other staff include vector-control assistant, malaria inspector, laboratory technician and laboratory assistant.

There is one primary health centre (PHC) at each of the 205 electoral constituencies covering a population of approximately 100,000, one health post (HP) for 3-5 Village Development Committees (VDCs) and one sub-health post (SHP) for each VDC. The SHPs are the first facility-based contact point for basic health services and serve as the referral centre for volunteer health workers, such as Female Community Health Volunteers (FCHVs). A total of 15,115 Traditional Birth Attendants (TBAs), 48,850 FCHVs, several thousand mothers' group (MGs) Village Health Workers (VHWs) and Maternal and Child Health Workers (MCHWs) are working in SHPs. There is one FCHV in each VDC ward. The SHPs serve as a 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 centres in Kathmandu. The referral system was designed to ensure that

the majority of the population has access to public health care facilities and affordable treatment.² Public health facilities face constant resource constraints, poor facilities management, planning, and poorly trained staff. There is one health committee in each VDC. Recently the VDC was made responsible to run the sub-health post within the VDC. The number and types of health facilities with regard to the service delivery level and the three ecological zones are shown in Tables 2 and 3.

Table 2: Types of service delivery level and number of public sector health facilities in Nepal

Service Delivery Level	Type of Facility	Number
Specialized	Hospital	3
Capital	Hospital	5
Region (5)	Hospital	2
Sub Region	Hospital	1
District (75)	PHOs/HOs/ Hospitals	14/61/67
Electoral Constituency (205)	PHCs/HPs	193/701
Village Development Committee	SHPs	3,129
Ward (Community)	Female Community Health Volunteers (FCHV)	48,550
	TBAs	>12,000
	Outreach Clinics	15,248
	Immunization Centres	15,532

Source: DHS Annual Report 2001-2002

Table 3: Topographic distribution of the health care facilities in Nepal

Type of institution	Total	Mountain	Hill	Terai
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² World Health Organization: http://www.searo.who.int/EN/Section313/Section1523_6866.htm

Hospital	85	16	45	24
PHC/HC	193	20	94	79
Health Post	701	152	379	170
Sub-Health Post	3,129	387	1,606	1,136

Source: DHS Annual Report 2001-2002

6. History of malaria programme in Nepal

The malaria control programme started in Nepal in 1950 with the establishment of a malaria control unit for the Gandki hydro power project: An operational field research on malaria control was carried out at Hetauda. Its main objective was to prove that a team of field workers from Kathmandu could carry out malaria control activities and survive in the highly malarious area of Hetauda. During 1954, the Insect-borne Disease Control (IBDC) unit was initiated with assistance from the United States Overseas Mission (USOM), US government. Its main objective was to control malaria, mainly in the terai and inner terai belt of eastern and central Nepal. On 4 December 1958 under the Nepal Malaria Eradication Organization, the Malaria Eradication Programme was launched as a vertical programme with assistance from USOM and WHO. Its objective was to eradicate malaria from the country in a time-bound manner. The organization was under an autonomous body called the Nepal Malaria Eradication Board (NMEB) under the chairmanship of the Secretary, Ministry of Health. For the purpose of malaria eradication, the country was initially divided into three malaria zones, i.e. Eastern Zone, Central Zone and Western Zone. The east zone was divided into seven Areas – EZ 1 to 7 with EZ 1 to 4 being divided into three sub-areas each and EZ 5 to 7 being divided into two sub-areas in the East zone. Activities were carried out as per planning. As per the recommendations of the Review Team consisting mainly of members from USAID and WHO the objectives and strategy of the programme were changed in July 1978 from malaria eradication to malaria control. However, the name of the programme was retained as the Nepal Malaria Eradication Organization which continued to be under the autonomous NME Board. In 1987, the Ministry of Health underwent a major structural change. The central office of the Department of Health Services was abolished and all the functions, power, responsibilities and activities were decentralized to the five Regional Health Services Directorates. Malaria control programme

management was integrated in the primary health care approach. The autonomous body NMEB was dissolved in July 1990, and the NMEO was converted into the Malaria Control Division directly under the Ministry of Health (MoH). The central office of the Directorate of Health Services which was abolished in 1987, was re-established in July 1993 under the MoH. Of the many divisions set up under the Department of Health Services, the Epidemiology and Disease Control Division (EDCD) was one. The division has three sections – Disaster Management, Epidemiology and Disease Control. The Disease Control Section is responsible for the control of vector-borne diseases such as malaria, kala-azar, Japanese encephalitis, etc.

7. Present malaria control strategy

The National Malaria Control Strategic Plan 2007/08-2011/12 has been implemented since 2007. The National Malaria Control Strategy is based on the principles and practices of WHO's Global Malaria Programme and the Revised Malaria Control Strategy of SEA Region 2006-2010.

The programme objectives are as follows:

- (1) Overall incidence of (probable and confirmed) malaria in 'population at risk' reduced from 4.1/cases per 1000 in 2005 to less than 2 cases/1000 by 2011.
- (2) Hospital-based severe malaria case fatality rate reduced to less than 15% by 2010.
- (3) Weekly incidence of malaria (probable and confirmed) in all outbreak wards brought below outbreak threshold level within six weeks of outbreak detection.

Target coverage of key interventions

- (1) 80% of people in high risk areas (stratum 1 VDCs) sleeping under LLIN (last night) by 2011.
- (2) By 2008, the annual routine IRS campaign will cover 80% of households in target VDCs.
- (3) 80% of malaria cases reported by public sector health facilities in high risk areas (stratum 1) confirmed by microscopy or RDT by 2011.

- (4) 80% of care providers at rural public sector health facilities providing appropriate treatment for malaria by 2011.

There are four strategic elements specific to malaria control and for improving programme management, as follows:

- (1) Vector control and personal protection
- (2) Early diagnosis and appropriate treatment
- (3) Malaria surveillance and epidemic preparedness
- (4) Behavioural change communication (BCC)
- (5) Improving programme management

Vector control and personal protection

In high risk areas (Stratum I) the intervention includes indoor residual spraying and free distribution of LLINs to the general population with special emphasis on pregnant women attending ANC. At present, alphacypermethrin and only pyrethroid group of insecticides are used for IRS in Nepal. Organochlorine including DDT is banned. Because alphacypermethrin provides protection against vectors for about three months, two rounds of IRS are conducted. The first round is undertaken during May-June and the second in August-September. IRS is an important component of the integrated vector control management of malaria and kala-zar elimination programme.

Early diagnosis and appropriate treatment

The diagnosis includes clinical diagnosis, microscopy and RDT (in peripheral areas where microscopy is not available). Quality control for microscopy and RDT is an integral part of malaria diagnosis. All antimalarial drugs are provided free of charge at all public health facilities and through the FCHVs. Artemisinin-based combination therapy (ACT) is provided for laboratory-confirmed falciparum cases throughout the country. As per the national malaria treatment protocol 2009 the combination selected is artemether/lumefantrine. There is a policy to disseminate the national treatment protocol to all public health facilities and private health care providers.

Malaria surveillance and epidemic preparedness

In addition to the existing surveillance network, a simplified early warning system of malaria outbreak will be established in selected public health facilities by 2009. An emergency stockpile of RDT, drugs and insecticides are to be made available at central and regional level.

Emphasis is given to hospital-based surveillance for severe malaria and associated mortality. Monitoring of drug and insecticide resistance is conducted regularly at the sentinel sites

Behavioural change communication (BCC)

This includes a comprehensive communication strategy that will be developed by relevant implementing partners in collaboration with EDCD. The communication strategy includes five methodologies: interpersonal communication, primary and secondary education, mass media, special events (campaign, etc) and high level advocacy. BCC materials will be provided through outsourcing.

Improving programme management

This includes training of staff, establishing technical working groups, a national technical advisory group, improving coordination with partners and neighbouring countries and developing the Vector-borne Disease Research and Training Centre (VBDRTC) in Hetauda as the national centre for research and training on VBDs including malaria.

8. Summary of the internal review in 2007 and 2010

8.1 Internal review in 2007

Internal reviews of the malaria control programme have been conducted intermittently. An internal review was conducted in June-July 2007 to review the epidemiology and progress of malaria and kala-azar control programme during 2004 to 2006. It was stated that trends of malaria were stable during the review period though a significant decrease in malaria cases was observed over a seven-year period (i.e. 4969 cases in 2009 and 12786 cases

in 2002). This followed major outbreaks in 2002. It was noted that malaria transmission was intense in the southern districts bordering India. Twelve districts were prioritized as having high malaria cases and incidence rate (API). The review report emphasized the persistence of malaria incidence in Jhapa district and the outbreak in Banke district in 2006.

High numbers of blood slides were taken through active case detection and mass blood survey (approximately 50% of total blood slides). Microscopy was the mainstay for diagnosis whereas RDT was introduced into the programme in 1999 and scaled up in 2004. The first-line treatment of uncomplicated falciparum was sulfadoxine/pyrimethamine (SP). A comparative study of ACT and SP was conducted and the results suggested that ACT was superior to SP which was the current treatment regimen. Indoor residual spraying seems to be the only vector control method available during the review period. There is no report of coverage of IRS which was conducted twice yearly. An absolute number of households and population covered by IRS in each round during the review period was documented. LLIN has not been introduced though there was a report on small-scale procurement of LLIN by the 2nd Round GFATM project in 2006.

8.2 Internal review in 2010

Following the internal review in 2007, the national malaria control strategy was revised based on the recommendation of the review. Subsequently, EDCD submitted the proposal in the 7th Round GFATM which was granted. The next round of internal review was conducted in May 2010 to review the progress of the malaria control programme during 2007-2009. The report was used as an input for the external review in June 2010.

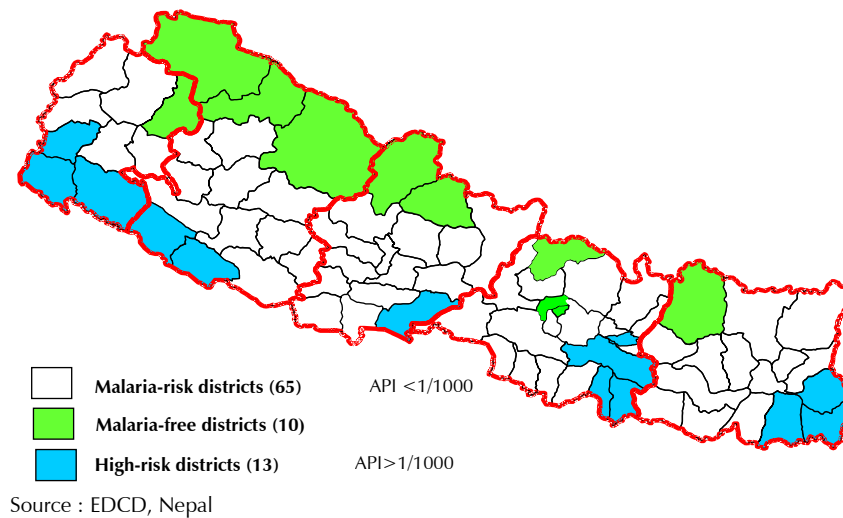
The review team included staff of EDCD, from a university and from the GFATM project. The review team acknowledged a good number of policy documents, guidelines and protocols that were regularly updated. The review reported success in the introduction of new and powerful interventions such as RDT and LLINs. The efforts in malaria control were intensified in the priority districts through financial support provided by GFATM. This resulted in high case detection (ABER) in the project districts. The review team observed a significant reduction in malaria cases and deaths despite several focal outbreaks. Overall, the programme's achievements are satisfactory. The good performance of both the principal

recipients (PRs) of the 2nd Round GFATM project implementation was also noted. On the contrary, implementation of EDCD in the 7th Round GFATM grant was relatively lower (i.e. rated at B1). The recommendations made mainly covered issues like on shortage of staff especially at the central level (EDCD), clear roles of the Hetauda VBDRTC and improving coordination between the two principal recipients (PRs, i.e., EDCD and PSI).

9. Malaria epidemiology in the past five years

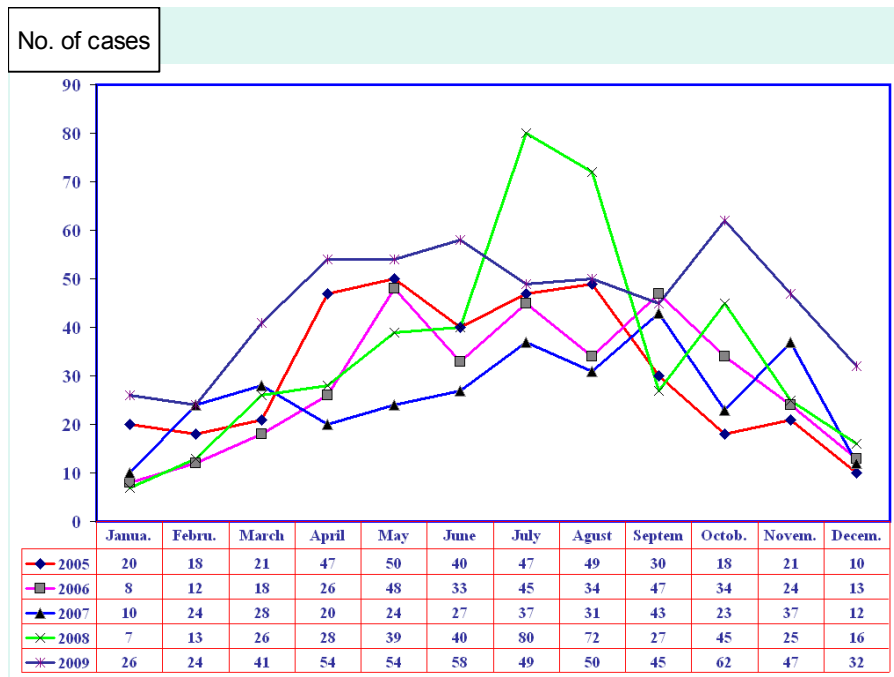
Malaria cases are being reported from 65 of the 75 districts of Nepal. A population of approximately 22.8 million (83% of Nepal's population) lives in these malaria-endemic districts. Amongst them 2.03 million live in high-risk areas. The high-risk areas include the foothills and river belts, forest fringes, forests of the terai, valleys and inner terai districts. Malaria in SEAR disproportionately affects ethnic minorities, the poor, mobile population groups, young adults and those living in border areas. Malaria and poverty are intimately connected. Malaria is both a cause and a consequence of poverty slowing economic growth in endemic areas. Out of 65 malaria-prone districts, 13 have been classified as being at high risk. This classification is based on an API of more than 1 per 1000. These high-risk districts are Ilam, Jhapa, Morang (located in the eastern development region), Dhanusha, Mahottari, Kavre and Sindhuli (located in the central development region), Nawalparashi (located in the western development region), Banke and Bardiya (located in the mid-western development regions), Kailali, Kanchanpur and Dadeldhura (located in the far western development region). All of these high-risk districts are being supported by the 7th round GFATM grant. It is important to note that malaria cases are not reported from all Village Development Committee (VDCs) of the endemic districts as the malaria transmission is not homogenous throughout the VDCs. The malaria VDCs in terai districts are located near the hilly borders of the district. Fifty-two districts of Nepal were classified as malaria-risk districts on the basis of an API of less than 1 per 1000 population at risk. Malaria transmission has not been recorded in eight mountainous, Kathmandu and Lalitpur districts. These 10 districts were classified as malaria free.

Figure 4: *Distribution of malaria in Nepal*



Out of four species of malaria parasites causing malaria in humans, two species namely *Plasmodium vivax* and *Plasmodium falciparum* are the only parasites detected in Nepal till date. However, once or twice in the last five years, *Plasmodium ovale* has also been reported by private sector health care providers, from patients returning from Africa. *Plasmodium vivax* is the predominant parasite since 1963 ranging from 60%-94% and *Plasmodium falciparum* (6%-39%) of the total malaria cases in different years. In the last five years, the percentage of *P. falciparum* remained between 17%-26% of the total confirmed malaria cases. In malaria outbreak pockets *Plasmodium falciparum* is the dominant infection. Malaria transmission is mainly regulated by the presence of *An. fluviatilis*, in some areas supported by *An. annularis* and *An. maculatus*. Malaria cases are reported throughout the year. However, malaria transmission increases after the monsoon due to the creation of innumerable streams where the vectors breed. The anopheline density begins to increase after May and peak density is observed in June and July and by August vector density declines. With the increase in anopheline density, an increase in reporting of malaria cases is observed in Nepal. A majority of malaria cases are reported between May and July (Figure 5). Malaria is reported amongst all age groups, but a majority of cases are reported amongst adult males.

Figure 5: Month-wise malaria positive cases during (2005-2009)



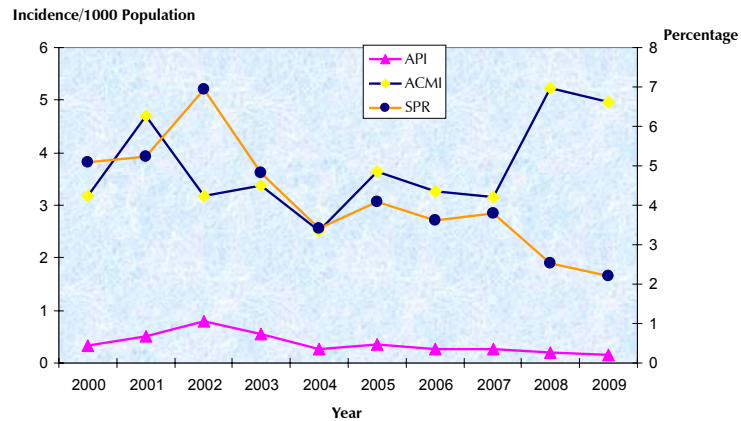
Source ; EDCD, Nepal

After scaling up of the Integrated Management of Childhood Illness (IMCI) programme in 2008 in 75 districts, the incidence of clinically suspected malaria (CSM) has increased, whereas the slide positivity rate of malaria has consistently declined (Figures 6). The focus of IMCI is to prevent child mortality and to achieve this target, the programme uses a less specific case definition of malaria. As a result the clinically-diagnosed malaria incidence has increased from 3.16 per 1000 in 2007 to 4.96 in 2009. In absolute numbers 46,087 CSM cases in 2004 and 103,412 CSM cases in 2009 were reported. However, laboratory -confirmed cases of malaria have continued to decline during the last five years. In 2004, 4,895 malaria cases and 3,335 cases in 2009 were confirmed by microscopy or RDT. The data suggest a steady decline in malaria cases by 33% amongst laboratory-confirmed malaria cases in the last five years. There is a wide gap between CSM and laboratory confirmed cases suggesting the need for a more rigid case definition of clinical malaria.

In Nepal, 73%-88% of laboratory-confirmed cases of malaria from 2004 and 2009 were caused by *P. vivax* and the remaining cases were either

caused by *P. falciparum* or were mixed infections. *P. falciparum* percentage was at a low of 12.8% in 2003 and 27.3% in 2006. The mean proportion of *P. falciparum* infections during the last three years was 21.3%. However, the number of *falciparum* cases has declined by 75% since 2002. As a result, malaria-attributed mortality also declined and has ranged from 1-10 cases per year in the last five years.

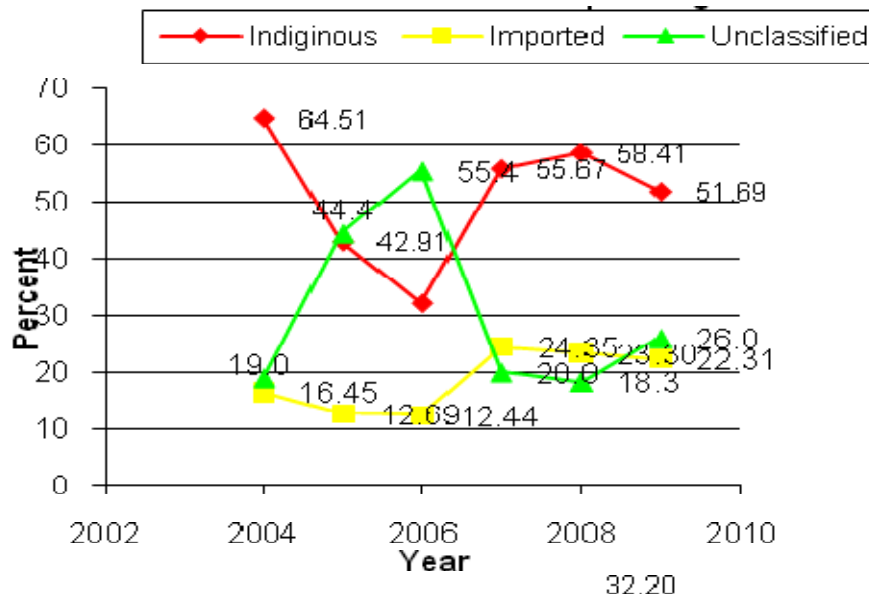
Figure 6: Malaria incidence and slide positivity rate in Nepal, 2000-2009



API= annual parasite incidence (per 1000), Annual clinical malaria incidence (per 1000),
 SPR = Slide positivity rate (%)
 Source: EDCD, Nepal

Malaria from India, brought across the international borders, mostly through migrant labour is a serious concern. For example in 2004, 65% of cases were indigenous, 16% were imported and 19% were unclassified. Due to an improvement in the malaria situation indigenous cases are declining whereas there is no change in the imported cases thereby percentage of imported cases increased during the last five years. At the same time a steady increase in the number of imported cases has been noted. In 2009, 22.31% of the cases were imported. A majority of the imported cases had a history of travel to malaria-endemic areas in India. In 2002, 80% of confirmed malaria cases were reported from the 13 high endemic districts. These districts have received support from the Global Fund (GFATM) since then and preventive, diagnostic and curative interventions have been accelerated. The malaria disease burden in these districts has decreased and in 2009, only 58% of total confirmed malaria cases were reported.

Figure 7 : Classification of malaria cases as per origin of infection



Source: EDCD, Nepal

10. Impact on disease trends

Malaria incidence in Nepal decreased from 4.1 per 1000 in 2005 to 0.15 per 1000 in 2009. However, calculations were made on total population residing in 65 districts rather than the population at risk. The slide positive rate (SPR) declined from 6.93% in 2002 to 2.69% in 2009, and has remained stable in the last three years. Though the ABER in GFATM project areas is high (Internal review in 2010), the country-wise ABER however is less than 1%, affecting the validity of the above observation. It is therefore recommended that ABER should be increased by revising the case detection policy of the current EDCD guideline to ensure that all fever cases (i.e., suspected malaria) are tested.

Determination of the disease burden in the country should be carried out through a national survey. Population prevalence surveys conducted in Jhapa and Kanchanpur in 2008 indicated parasite prevalence rates of 0.82% and 1.92%. The parasite formula during the period 2002 to 2009 indicates a fluctuation in the proportion of falciparum ranging from a low of 12.8% in 2003 to a high of 27.3% in 2006. The mean proportion of falciparum infections during the last three years was 21.3%. However, the absolute

number of falciparum cases reported during this period has decreased by approximately 75% since 2002.

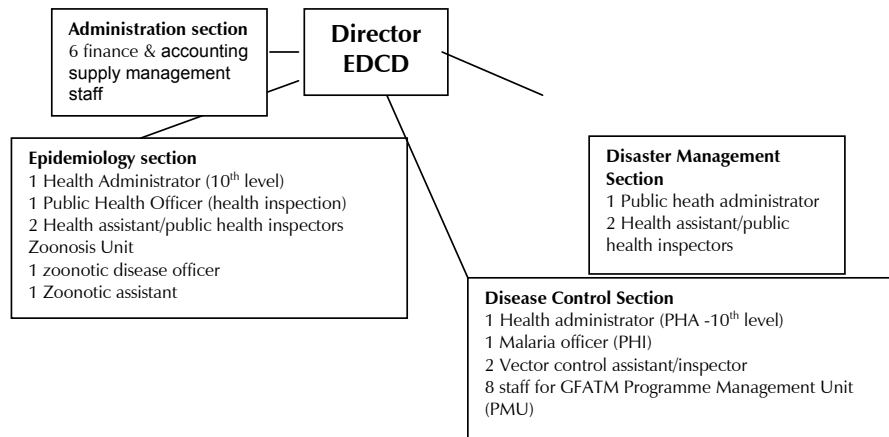
There have been no outbreaks of malaria since 2006. Deaths due to malaria during an epidemic in Banke in 2006 were 42, but the country-wide figure has remained less than 10 per year since 2002. Similarly, CFR was 12.7% in 2006 in Banke dropping to 3.8% in 2007 and rising to 5.4% in 2009. The proportion of confirmed malaria cases reported from the 13 high-risk districts declined from 72.1% in 2005 to 58% in 2009. Information was not available to assess the percentage of health care providers who were able to treat malaria at rural public sector health facilities. As health facility surveys and community surveys were not conducted by EDCD, information was not available to assess the coverage of some outcome indicators for the “diagnosis and treatment component” and BCC activities.

According to current epidemiological data, Nepal has achieved the Millennium Development Goals (MDGs) related to malaria morbidity and mortality ahead of time. The target for malaria morbidity to be achieved by 2015 is 50 per 100,000 population at-risk population and in 2009 it was 16. Similarly, the target for malaria mortality for 2015 is 0.03 per 100,000, and at present the malaria mortality rate is 0.01 (in 2009 there were 10 deaths and no severe malaria). The programme is faced with the challenge of sustaining the achievements gained in malaria control. There is therefore need for high vigilance and pre-emptive action to prevent/abort the establishment of new foci.

11. Malaria Control Programme

Structure of EDCD and peripheral level and VBDRTC

Figure 8: Organogram of EDCD



Staffing

There are three technical sections (Epidemiology, Disease Management and Disease Control) and 14 sanctioned posts of which 13 are filled. The Director of EDCD who oversees the three sections has six administrative staff (finance, supply unit, etc). Besides the government staff, there are three staff members who work mainly on the GFATM project in a small unit called “Project Management Unit (PMU)”. They are assigned to work on other routine activities of the EDCD such as surveillance report. Three assistant entomologists from the Central Development Region were assigned to work temporarily for EDCD on loan basis for many years.

12. Progress in scaling up of key interventions and their impact on disease trends

The targets and indicators as per the national malaria control strategic plan 2007-2011 are as follows:

Impact level

- Overall incidence of (probable and confirmed) malaria in ‘population at risk’ brought down to below two cases per 1,000 population by 2011 (2005 baseline: 4.1 cases per 1,000).

- Hospital-based severe malaria case fatality rate reduced to below 15% by 2011.
- By 2010, weekly incidence of malaria (probable and confirmed) in all outbreak wards brought below outbreak threshold level within six weeks of detection.

Coverage level

- 80% of people in high-risk areas sleeping under LLIN (last night) by 2011.
- By 2008, the annual routine IRS campaign will cover 80% of households in target VDCs.
- 80% of malaria cases reported by public sector health facilities in high-risk areas confirmed by microscopy or RDT by 2011.
- 80% of care providers at rural public sector health facilities providing appropriate treatment for malaria by 2011.

Outcome indicators for malaria surveillance and epidemic preparedness

- (1) By 2009 teams sent to investigate all reported outbreaks within 48 hours of detection.
- (2) By 2009, 90% outbreaks detected within one week of onset.
- (3) By 2009, weekly incidence of malaria (probable and confirmed) in all outbreak wards was brought below outbreak threshold level within six weeks of detection.

Achievements of the Malaria Control Programme in 2009 as compared to the baseline data in 2005 are elaborated in Table 4. Several key information/indicators are not available.

Table 4. **Programme achievements in 2009 as compared to baseline in 2005**

SN	Indicators	Targets	Baseline (2005)	Achievement (2009)	Remarks
	Impact				

SN	Indicators	Targets	Baseline (2005)	Achievement (2009)	Remarks
(1)	Overall incidence of (probable and confirmed) malaria in 'population at risk'	brought below two cases per 1,000 by 2011	4.14 cases per 1,000	5.12 cases per 1000	Larger number of probable cases in 2009
	Annual Parasite Incidence	NA	0.27 per 1000	0.15 per 1000	
(2)	Hospital-based severe malaria case fatality rate	reduced to below 15% by 2011	4.8%*	5.4%*	*Denominator may include both severe & uncomplicated malaria inpatients
(3)	Weekly incidence of malaria (probable and confirmed) in all outbreak wards brought below outbreak threshold level	Brought below threshold level within six weeks of detection by 2010		No outbreak since 2006	
	Coverage				
(1)	% of people in high-risk areas sleeping under LLIN (last night)	80% of people in high-risk areas sleeping under LLIN (last night) by 2011			Data not available
	% of under -5 in high-risk areas sleeping under LLIN (last night)		48.2% (2006)	91.5%	
(2)	The annual routine IRS campaign coverage % of households in target VDCs	By 2008, the annual routine IRS campaign will cover 80% of households in target VDCs			Data not available
(3)	% of malaria cases reported by public sector health	80% of malaria cases reported by public sector health	6.4%	3.0%	Larger number of probable

SN	Indicators	Targets	Baseline (2005)	Achievement (2009)	Remarks
	facilities in high-risk areas confirmed by microscopy or RDT	facilities in high-risk areas confirmed by microscopy or RDT by 2011			cases in 2009
(4)	% of care providers at rural public sector health facilities providing appropriate treatment for malaria	80% of care providers at rural public sector health facilities providing appropriate treatment for malaria by 2011			Data not available
	Outcome				
	Vector control & personal prevention				
(1)	% of households in target VDCs covered by routine IRS campaign	At least 80% of households in target VDCs covered by routine IRS campaign from 2009			Data not available
(2)	% of households in high-risk areas with sufficient LLINs	80% of households in high-risk areas with sufficient LLINs by 2011 (1LLIN per 2 persons)			Data not available
	% of households in high-risk areas with at least one LLIN		89.5% (2006)	99.2%	
	Outcome				
	Early diagnosis and appropriate treatment				
(1)	% of public sector health facilities in	80% of public sector health			Data not available

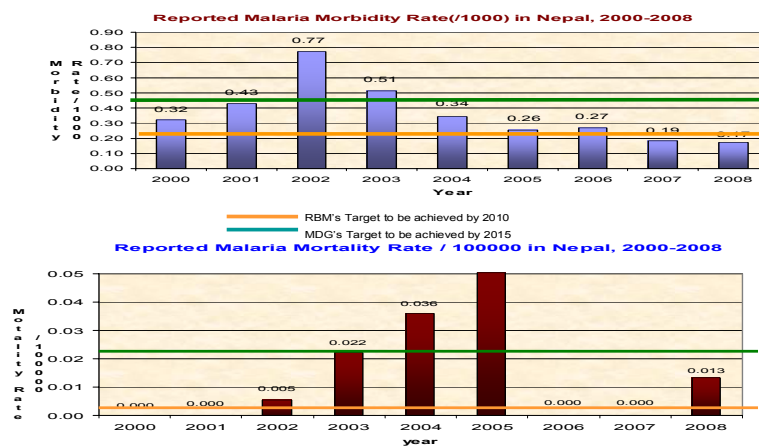
SN	Indicators	Targets	Baseline (2005)	Achievement (2009)	Remarks
	endemic districts have clinical staff trained in the use of ACT	facilities in endemic districts have clinical staff trained in the use of ACT by 2009			
(2)	% of public sector health facilities with no stock-out of nationally recommended antimalarials (continuously for one week) during transmission season	80% of public sector health facilities with no stock-out of nationally recommended antimalarials (continuously for one week) during transmission season			Data not available
	Outcome				
	Malaria surveillance & epidemic preparedness				
(1)	Teams sent to investigate all reported outbreaks within 48 hours of detection	By 2009 teams sent to investigate all reported outbreaks within 48 hours of detection		No outbreak since 2006	
(2)	% of outbreaks detected within one week of onset	By 2009, 90% outbreaks detected within one week of onset		No outbreak since 2006	

SN	Indicators	Targets	Baseline (2005)	Achievement (2009)	Remarks
(3)	Weekly incidence of malaria (probable and confirmed) in all outbreak wards was brought below outbreak threshold level within six weeks of detection	By 2009, weekly incidence of malaria (probable and confirmed) in all outbreak wards was brought below outbreak threshold level within six weeks of detection		No outbreak since 2006	
	Outcome				
	BCC				
(1)	% of men and women in high-risk area (stratum 1 VDCs) know the preventive benefits of LLINs	90% of men and women in high-risk area (stratum 1 VDCs) know the preventive benefits of LLINs by 2011			Data not available
(2)	% of men and women in high-risk area (stratum 1 VDCs) know the preventive benefits of early diagnosis and appropriate treatment	80% of men and women in high-risk area (stratum 1 VDCs) know the preventive benefits of early diagnosis and appropriate treatment by 2011			Data not available
(3)	% of private sector providers in stratum 1 counsel clients regarding the benefits of LLINs and early diagnosis and appropriate treatment	60% of private sector providers in stratum 1 counsel clients regarding the benefits of LLINs and early diagnosis and appropriate treatment by 2011			Data not available

Progress of Roll Back Malaria initiatives and efforts towards achieving United Nations Millennium Development Goals (MDGs)

The malaria control programme has achieved the RBM targets and MDG No 6 on malaria morbidity in 2007 and 2004, respectively. Regarding malaria mortality the programme has achieved the MDG target in 2008 but not yet achieved the RBM target. The review team feels that if the programme sustains its efforts the RBM Targets and MDGs could be fully achieved. However, as the country has to deal with large scale migration across the southern border the continued introduction of malaria could be seen as a major threat with possible focal outbreaks of falciparum. Therefore the programme should not be complacent and relax its efforts but strengthen epidemic preparedness.

Figure 9: Status of achievements of RBM and MDGs



Source: EDCCD, Nepal



13. Key findings of key interventions and recommendations

13.1 Diagnosis and treatment

Early diagnosis and appropriate treatment is one of the key strategies to achieve the goals of the National Malaria Control Programme. Early diagnosis and effective treatment greatly reduces the risk of developing any of the potentially fatal complications associated with falciparum malaria and greatly reduces the level of morbidity associated with both *vivax* and *falciparum* malaria. The strategy emphasizes the importance of diagnosis and treatment of cases before the production of gametocyte in the blood in order to prevent the transmission of malaria. Artemisinin-based combination therapy (ACT) is a highly potent drug to clear parasites from the blood.

Microscopic facility was made available at district hospitals, PHCs, and at some HPs with high malaria case load. Falciparum-specific RDT was distributed to the health facilities with microscopy services as a backup diagnosis during out-of-office hours. All SHPs and some HPs without microscopic facility were supplied with pan-antigen RDT. In public health facilities, all falciparum confirmed cases were treated with ACT and *vivax* cases were given chloroquine and primaquine course. At IMCI clinics, malaria cases were treated on clinical grounds without laboratory diagnosis. Health facilities reported 103,412 clinical malaria cases in 2009. In the same year, 150,984 fever cases were diagnosed with RDT or microscopy. Out of 3,163 total positives, 1,709 *vivax* cases were treated with chloroquine and primaquine, 572 falciparum cases with ACT and 187 mixed infection cases with ACT and primaquine course.

The current malaria diagnosis policy is to identify suspected malaria cases using malaria diagnostic algorithms as well as IMCI community and health facility guidelines. At the community level FCHVs are expected to refer all suspected malaria cases to a health facility for confirmation and appropriate treatment, but in some cases they treat the clinically suspected cases. Where there is no RDT patients are treated clinically with chloroquine only. All hospitals and PHCs have the support of laboratory technicians to conduct malaria microscopy through a hospital laboratory or a public health laboratory. SHP and HP are supplied with RDT to test for *P. falciparum* and

in a few instances with the combined RDTs to test for both species (*P. falciparum* and *P. vivax*). Where RDT specific for *P. falciparum* is negative all clinically suspected cases are treated for *P. vivax* and recorded as clinically suspected vivax cases.

There is a well established but inconsistently utilized laboratory quality control system. There is evidence of feedback from the laboratory technician based in the EDCD, regional health directorate and VBDRTC in Hetauda. There is a need to develop a national malaria diagnosis reference centre. Strengthening linkages between the national public health laboratory, hospital laboratory system, disease control laboratories and VBDRTC will complement the network for quality control, parasite genotype tracking, research and training.

All uncomplicated falciparum cases in 13 high-transmission districts are treated with ACT (artemether/lumefantrine) for three days. Primaquine is not being used for radical treatment of *P. falciparum*. Similarly all *P. vivax* cases are treated with chloroquine for three days and with primaquine for five days. In view of the programme moving towards malaria elimination, primaquine should be given to all falciparum cases in order to reduce transmission potential. Primaquine should be given for 14 days for vivax malaria as per the revised national treatment guidelines and recommendations of WHO.

There are no malaria registers to ensure case investigation and case follow up for compliance and completion of treatment for three days for falciparum cases or 14 days for vivax cases. Public IEC for diagnosis and treatment could be intensified to minimize treatment noncompliance to national protocol by private chemists and doctors. IEC job aids for interpersonal communication for busy health workers for effective management of fever cases and suspected or positive malaria is absent. In moderate and low transmission districts malaria treatment appears to be inappropriate as it is still based on the treatment protocol of 2004. Severe malaria cases are mostly self-referred to hospitals. The primary health care centres rarely see severe cases even in high risk districts and do not have pre-referral intramuscular form of quinine or injection form of artemether or artesunate. However, severe malaria diagnosis and management in districts, zonal and regional hospitals and medical schools is inconsistent with the national protocol, especially in the low endemic districts.

Malaria diagnosis and treatment is free in public health facilities excluding charges such as registration fees and additional diagnostic and hospital charges. The private sector uses varieties of RDT including antibody-based RDTs and treatment with artemisinin monotherapy as well as other forms of malaria combination treatment

The mortality due to malaria is low and case fatality is below 1%. Community malaria deaths appear rare. The few deaths in hospital due to malaria are not investigated with regard to promptness of referral and management. Previous malaria management guidelines and treatment wall charts are available in some health units but the updated policy, diagnosis and treatment guidelines of 2009 are yet to be widely disseminated and orientation of health workers needs to be provided highlighting the changes.

There is more than adequate supply of microscopy slides and reagents, RDT, ACT and quinine for all health facilities supported by a logistic management system and stock-outs are minimal. However, there are a number of commodities approaching expiry by end of 2010 which may not be utilized. The storage of RDT and ACT requires attention with reference to manufacturer's recommendations on cold chain system maintenance especially in the hot terai districts.

Health workers especially in SHPs, HPs and PHCs continue to be trained in uncomplicated and severe malaria but there is a need to ensure systematic annual pre-season refresher training especially in high-risk transmission districts. Drug resistance monitoring has been conducted in Dhanusha and AMDA hospital sentinel sites in 2007 and 2009 respectively. To date drug resistance to ACT (artemether/lumefantrine) has not been reported.

Recommendations

- (1) Laboratory diagnosis of malaria should only be based on detection of antigens or microscopic detection of parasites. Procurement of antigen-based RDTs should be standardized and quality assurance of products should be centralized and carried out regularly. To ensure early diagnosis and radical treatment as per the WHO guidelines the availability of combo (Pv/Pf) RDTs of high sensitivity and specificity should be expanded throughout the country. Health workers should be trained and encouraged to

use the RDTs to confirm diagnosis of all fever cases in malaria-endemic areas. This will facilitate the use of antimalarials only in laboratory-confirmed malaria cases.

- (2) There is a need to develop a national reference laboratory for malaria diagnosis. The capacity of laboratory technicians (microscopists) at hospitals and PHCs should be strengthened to also facilitate the use of antimalarials only in laboratory-confirmed malaria cases. The existing quality control system of malaria microscopy should be further strengthened through regular supervision.
- (3) WHO guidelines should be followed for early diagnosis and radical treatment. The availability of combo (Pv/Pf) RDTs of high sensitivity and specificity should be expanded throughout the country. Malaria treatment should be administered only to parasite confirmed cases (RDT or microscopy) and should be species specific. Radical treatment should be given for all malaria cases, both *P. vivax* and *P. falciparum* in the government and private sector health facilities. Roll out of ACT should be nationwide through the dissemination of new radical treatment guidelines, wall charts and IEC.
- (4) Concurrently referral, monitoring and management of severe malaria should be strengthened in district, zonal and regional hospitals and academic institutions.
- (5) Post-treatment follow-up of all patients should be carried out to ensure radical cure and compliance with treatment guidelines. Treatment failures and adverse drug reactions should be reported within 24 hours to EDCD.
- (6) The National Malaria Control Programme should make efforts to ensure rapid response to positive cases, severe cases and deaths within 48 hrs.

13.2 Surveillance and epidemic preparedness

Records of the EDCD show a satisfactory reporting system e.g., monthly HMIS, monthly Global Fund report (with its format), the weekly Early Warning and Reporting System (EWARS), weekly community sentinel surveillance for outbreak, monthly logistic management report and annual

report. The monthly HMIS, which gives comprehensive malaria indicators has been implemented by EDCD since 1996. The EWARS started in 1996 provides weekly information on admitted malaria cases and deaths from 40 out of 85 hospitals to EDCD through VBDRTC. Community sentinel sites for epidemic outbreak control were established in 2009 at 13 districts, each having two sites at PHC level. While the weekly report goes to HMIS districts the monthly report goes to EDCD. The malaria logistic management report is sent from the periphery to district level, from district to EDCD on a three-month basis. Essential information for epidemiology and surveillance such as: yearly data, monthly data, laboratory-confirmed cases as well as clinical malaria cases, species-wise information, classification of cases according to source of infection (indigenous, imported) is available at different levels of the health services (VDC level, district level and central level). Computers with access to internet at DPHO offices and PHC level, and telephone connection up to HP level facilitate the reporting system. Annual track survey for LLIN coverage and utilization has been conducted by an independent research group since 2006 annually. A good register keeping system (laboratory register, community sentinel surveillance for epidemic outbreak control register) is functioning properly. Mapping VDCs at risk of malaria, mapping LLIN distribution in the VDCs, mapping PHCCs and HPs with laboratory facility for microscopy are in place at the DPHO offices. Data are used for planning interventions such as where to distribute LLIN and where and when to spray at district level. An outbreak response team is already in place at the district level. A manual for “community sentinel surveillance for epidemic outbreak control” is available with the health staff.

The health reporting system does not cover unsecured areas and the private sector of health care. There is no regular health facility and community-based surveys for assessing coverage of outcome indicators in relation with diagnosis and treatment component. Malaria incidence due to cross-border population movement is gradually increasing. EWARS system only gives data on all admitted malaria cases, but not on admitted severe cases. Clinical suspected malaria is not a specific indicator. According to the national malaria data, out of many slides collected for blood examination, very few come out as positives. A large proportion of the CSM cases are assumed to be non-malaria fever cases. Peripheral health centres without microscopic facility were previously provided with RDT which can detect only *P. falciparum*. All the RDT negative cases were put under the categories of CSM cases and treated as vivax malaria with chloroquine and

primaquine. IMCI protocol has not been revised to follow the national malaria treatment guidelines and therefore the IMCI programme remains to encourage treatment on clinical ground. Community sentinel surveillance for epidemic outbreak is not properly functioning at PHC centres in some districts. Health workers did not follow the weekly schedule of reporting. Even if over-threshold level was observed, no action has been taken. Outbreaks usually start at the periphery of the district. Patients arrive at the hospital only at the late stage of outbreaks. *P. vivax* is the predominant species in most of the areas. In case of vivax epidemics, patients may not be severe enough to be admitted to the hospitals. Hospital-based EWARS system is not appropriate to detect outbreaks within 2 weeks after onset.

Recommendations

- (1) The Malaria Control Programme should move towards malaria case based surveillance and notification with line listing followed by household investigation with mass parasite screening and radical treatment of all persons in the VDC and/or within a 2-km radius of positive cases, irrespective of the fever status. The case investigation and malaria foci investigation should always be carried out in combination with vector surveillance and control.
- (2) It is recommended that ABER be increased to ensure that all fever cases (i.e., suspected malaria) are tested. Malaria elimination strategy requires that blood from all fever cases are subjected to diagnosis for malaria by microscopy or RDT, preferably within 24 hours of the fever onset. This is to ensure that “probable malaria” is reduced as much as possible.
- (3) Spot mapping of all malaria positive cases in the health facility catchment areas should be conducted to identify malaria transmission foci or hotspot to target interventions for maximum impact and early identification of outbreaks. It is recommended to map the positive cases reported during 2008, 2009 and 2010 by VDC and prepare a spot map of local and imported cases by primary health facility catchment areas.
- (4) Strategies and activities should be developed for delivery of malaria control services to Nepali migrants from the hills to the plains, internally displaced people and those returning from India and for cross-border control of malaria with India.

- (5) Standardized report formats should be provided to produce timely quarterly and annual malaria reports at district and central level.
- (6) The EDCD should link the two systems, i.e., malaria outbreak surveillance in 13 high burden districts and EWARS from 40 hospitals, and national epidemic outbreak surveillance at district and central level for comprehensive epidemiological analysis and rapid epidemic response.
- (7) Population affected by natural disasters, migrant population (cross-border and labor returning from malaria endemic states in India) and forest dwellers should receive adequate information on protection against malaria. All fever cases or patients with a history of fever must be tested for malaria at the international borders and those found positive should be given radical treatment. Mosquito repellents may be introduced particularly for the forest-dwelling population.
- (8) Health facility surveys and household surveys for assessing the coverage of (outcome indicators) diagnosis and treatment component should be conducted in a similar way to that carried out by PSI which has experience in assessment of LLIN coverage
- (9) Population prevalence surveys conducted in Jhapa and Kanchanpur in 2008 indicated parasite prevalence rates of 0.82% and 1.92% respectively. A similar study to determine the disease burden in the country should be carried out through a national survey. Integrated malaria indicator surveys on all outcomes should also be conducted every two years.
- (10) Once laboratory facilities either microscopy and RDT become available up to the peripheral level, CSM cases should not be used as an indicator for monitoring and evaluation.
- (11) Malaria case definitions, definition of CFR and their targets should be reviewed and updated. The EDCD should ensure that all health facilities apply standardized definitions.
- (12) Newly introduced community sentinel surveillance for epidemic outbreak control should be properly implemented according to the instruction manual.

- (13) Collection and reporting of data on all malaria in-patients, severe malaria cases and malaria deaths should be included in the routine HMIS system.
- (14) EDCCD (through VBDRTC) should increase the epidemiology training and support and supply of laptop computers to DPHO and VCO.
- (15) To facilitate fast reporting and management of malaria cases, EDCCD may consider pilot testing of cellular phone for VCO to facilitate timely reporting and analysis of malaria positive cases, severe cases and deaths. Response to positive cases, severe cases and deaths should be ensured within 48 hours after receiving reports.
- (16) The annual blood examination rate (ABER) is less than 1%, affecting validity of the disease burden. ABER should be increased to ensure that all malaria suspected fever patients are blood tested. The new target of ABER should be carefully considered through a revision of the current EDCCD guidelines on case definition and criteria of blood taking.

13.3 Entomology and vector control

Entomology

Mosquito fauna surveys have revealed 42 anopheles species in Nepal. The following anophelines were responsible for malaria transmission in Nepal:

- (1) *Anopheles minimus* (not reported since its elimination during the eradication phase)
- (2) *Anopheles fluviatilis* (primary malaria vector)
- (3) *Anopheles maculatus* (vector of secondary importance)
- (4) *Anopheles annularis* (vector of secondary importance)
- (5) *Anopheles culicifacies* (suspected vector in terai region).

This information is based on old records and spot surveys undertaken by the entomological unit of the EDCCD. Although *An. fluviatilis* is assumed as the major malaria vector in Nepal but it has not been incriminated. Other important studies on mosquito behaviour such as the human blood index,

dispersal, biting behaviour etc. were also not undertaken. Susceptibility to various synthetic pyrethroids (lambdacyhalothrin, deltamethrin, alphacypermethrin) has been tested as per the WHO procedure in 2005, 2007 and 2009. All anophelines are fully sensitive to the insecticides in use.

The entomological component at the EDCD is weak and unable to cope with the essential services required in the planning, monitoring, evaluation and control of malaria. Out of 41 positions in entomology nine persons are in place e.g. two against six entomologists, none against six assistant entomologists, six against 23 Junior entomologist (malaria inspectors), and one against 16 laboratory aids). This inadequacy is adversely affecting the programme. During field visits it was observed that even this staff has not received adequate training in entomological techniques. Furthermore, there is a need to provide transport facilities and a laboratory for processing the field-collected biological material. A similar situation was observed in the districts. Staff shortages are reflected by the fact that vector activities listed in the national guidelines could not be accomplished.

It may be underscored that high malaria risk is attributed to the abundance of vector mosquitoes, mobile and vulnerable population, environmental and socio-economic factors and inaccessibility of the area. These areas have witnessed epidemics, and continue to have epidemic potential as evidenced by an epidemic in 2006 in Banke district killing 36 people.

Malaria control in the declining phase requires greater vigilance and perfection. Therefore there is a need to fill this gap by organizing entomological work to provide information on mosquito fauna of the country, vector distribution map, trends of vector densities over time, vector surveillance and incrimination, vector biting and resting behaviour, mosquito breeding sites, susceptibility status to insecticides, monitoring the impact of interventions etc. It is therefore recommended to undertake "staff needs assessment" commensurate with the work load as per the revised malaria control strategy, appropriate training. Travel of staff should be ensured for field work and a laboratory is established for entomological work. This would strengthen malaria control and also provide vital information on vectors of other prevalent diseases in Nepal e.g. lymphatic filariasis, dengue fever, kala-azar and Japanese encephalitis.

The review team wishes to highlight that malaria control is progressing towards pre-elimination and has the potential to proceed to the elimination phase. This is the most critical time and an important opportunity to strengthen entomology for progressing towards malaria pre-elimination and elimination.

Vector control

Village Development Committees (VDCs) have been stratified into: (a) high risk, (b) medium risk, and (c) low risk. This stratification is based on the API in 1994. Stratification should be updated annually and interventions introduced especially in VDCs lacking LLIN/IRS. At present population affected by natural disasters, migrant population (population at the borders in India and labour returning from malaria-endemic Indian states), and forest dwelling population is outside the ambit of IRS/LLIN strategy. This population normally belongs to the high-risk group and must be protected from malaria. Use of repellants may be encouraged through IEC/BCC for protection from mosquito bites, particularly in the forest dwelling population.

Long lasting insecticidal nets (LLINs)

LLINs are replacing indoor residual spraying (IRS) in malaria control in Nepal. The WHO Pesticide Evaluation Scheme (WHOPES) approved LLINs "Supanet®" were procured and distributed free of charge by the PSI (an NGO-PR). LLIN distribution is being done as per the EDCD guidelines i.e. @ one net for two adults + child under five years. EDCD distributed 40,605 in 2005. The number of LLINs distributed through social marketing amounted to 56,167 from 2006 to 2008, and thereafter social marketing stopped and PSI took over the LLIN distribution. LLIN campaign started in one third target VDCs per year in each district so as to cover the entire high risk VDCs by the end of the third year. Delivery of LLINs was supervised by PSI, managed by international NGOs, national NGOs and other partners, and implemented by community-based organizations. Through this distribution system, PSI distributed a total of 751,609 LLINs during 2006 to 2009. LLINs were also provided free by DPHO to all pregnant women attending ANC clinics at the government facilities in targeted VDCs since 2009. A total of 73,905 LLINs were distributed by the DPHOs from 2008 to 2009.

Based on the data provided by PSI, LLIN coverage was >95% and >90% people slept under the LLIN in the previous night. The percentage of under 5 years in high risk areas sleeping under LLIN (last night) rose from 48.2% in 2006 to 91.5% in 2009. During the field visit high net coverage was confirmed but some families protested that they need more nets because of sleeping habits and sociological problems. Since some people were left out we can still assume that coverage exceeds 80%. The distribution norms of LLINs should be re-visited and additional nets provided to genuine cases, including displaced persons, people affected by natural disasters, labour force etc.

LLINs are supposed to last for at least three years in providing protection from mosquito bites. These nets can withstand 20 washings without the loss of their efficacy in killing mosquitoes. Bioassay tests on the LLINs (procured by PSI from the GFATM grant) were carried out to see the efficacy of nets in killing mosquitoes after washing. It may be noted that villagers normally wash LLIN by using detergent powder and soap and dry it in sunlight for 4-5 hours. LLINs are normally washed at 2-3 month interval. In 2008 vector susceptibility and bio-assays were done in Kabhre, Makwanpur, Kanchanpur and Dhanusha. The wash history at this time was not more than three washings and the result was 100% mortality. In 2009 vector susceptibility and bio-assay was done in Morang, Dhanusha, Nawalparasi, Dang, Banke and Kanchanpur. The wash history as reported by the women users of LLIN in villages was not more than two and the result was 100% mortality. There is a sharp decline after the fourth washing to 42% in Kanchanpur district and a declining trend in Kailali district. Results of this study are given in Table 5. There is a need to regularly monitor the efficacy of the LLINs, BCC for correct washing and drying, proper use and upkeep of the LLINs. Operational research must be taken up concurrently to ensure any corrective steps required so that LLINs produce sustained results in malaria control.

**Table 5: Results of bio-assay test on LLIN SupraNet®
(wash history and mosquito mortality)**

Washing of nets	Mosquito mortality rate (%)				
	No washing	One washing	Two washings	Three washings	Four washings
Kanchanpur District	100%	100%	99%	82.3%	42%
Kailali District	100%	100%	99.4%	94%	90%

Source: EDCD entomologist Shri P. Gautam

Indoor residual spraying (IRS)

Since 1990 synthetic pyrethroid insecticides viz., lambda-cyhalothrin 10% WP @0.025mg/sq. m; deltamethrin 2.5%WP @0.022mg/sq.m, or alphacypermethrin 5%WP 0.025mg/sq.m were sprayed in rotation to control malaria in Nepal. Susceptibility tests using WHO test procedure showed that all anophelines were susceptible to deltamethrin, permethrin, alphacypermethrin and lambda-cyhalothrin. Currently alphacypermethrin was sprayed in houses and cattle sheds in March and June each year in 15 districts (13 high malaria risk districts and two districts for kala-azar control). As per the guidelines, two rounds of IRS are required annually in high risk (stratum 1 VDCs). In the event of limited insecticide stocks, round two of the IRS campaign was withheld and target VDCs were prioritized according to the malaria burden.

Routine IRS operations were carried out during March and April before the peak transmission period and in June and July. IRS covered 19.6% of the population in 2008 and 16.6% of the population in 2009 at at-risk VDCs. IRS coverage is poor. Observations during the field visit revealed that the second round was not sprayed or only focal spray was done. This was due to the shortage of insecticides. A large number of old and damaged compression sprayers (Indian and Hudson) were lying in stock for a decade or more. Compression sprayers (e.g. Hudson sprayer) with spare parts may be procured and used in the programme. Nozzle replacement is not practiced due to lack of spare parts and therefore quality of spray would be uneven and poor.

IRS is an expensive malaria control strategy therefore all efforts should be made to correctly spray the insecticides to take full advantage of the spraying. Insecticides for IRS should be procured from the manufacturers and with specifications of their effectiveness for at least six months. This would obviate the need of two rounds and save scarce resources and prevent pollution.

Recommendations

- (1) IRS should remain an important intervention for vector control in the country, even with high coverage of LLINs in target districts. IRS should be prioritized to malaria foci and areas with API higher than 1 per 1000 to prevent and control transmission. Adequate quantities of insecticides should be held in reserve to tackle emergency situations. IRS would be required for fighting malaria outbreaks, and for spraying huts in the forest and forest fringes. Integrating IRS and the monitoring and evaluation system of malaria control with the kala-azar programme will benefit both programmes.
- (2) An important site of contracting infection is the forests. Huts in the forests may be sprayed and people visiting/staying in forests should be encouraged through IEC and BCC to use personal protection measures e.g., repellents.
- (3) Stocks of damaged compression sprayers should be repaired and sprayers found unsuitable auctioned. It is recommended to procure WHO qualified sprayers (e.g. Hudson sprayer) with spare parts for use in the programme.
- (4) Nozzle replacement is not practiced due to non-availability of quality nozzles. Over-use of nozzles would deliver uneven and poor spray on the walls. Spray nozzles must be changed as per the recommended norms to ensure uniform spray deposits.
- (5) WHOPES approved quality assured insecticides with an efficacy of about six months should be procured in adequate quantities to ensure full spray coverage in identified locations and buffer stocks should be maintained for dealing with emergency situations.
- (6) The current LLIN norm of one LLIN per two people should be relaxed to give an overall distribution of one LLIN per 1.8 persons

taking into consideration the need to provide protection to all people in households based on socio-cultural practices and the number of sleeping areas. LLIN coverage and utilization patterns including efficacy must be assessed by the EDCD on an annual basis. FCHVs should always be involved in the distribution, hanging up, improving utilization through regular follow-up, educating and monitoring of washing and drying practices.

- (7) National integrated vector management (IVM) policy/strategy should be available with the EDCD for adoption.
- (8) Vector biology and ecology should be worked out in various ecological settings including identified sentinel sites to understand malaria epidemiology and plan evidence-based interventions.
- (9) Laboratory facilities may be created at the national level and districts for processing the field-collected biological material.
- (10) Routine monitoring of the efficacy of vector control interventions (susceptibility studies and bio-assays) for both IRS and LLINs should be conducted annually.
- (11) A shortage of entomologists and supporting staff is affecting the good work of the EDCD in planning, organizing, supervising, and monitoring interventions. It is recommended to conduct a need assessment and take appropriate steps to strengthen the entomology in EDCD, regions and at the district level.
- (12) A training curriculum may be developed as per the technical requirement of the EDCD. Staff strengthening in entomology is vital to study vector biology and ecology for planning evidence-based interventions and monitoring of efficacy of vector control interventions (susceptibility studies and bioassays) for both IRS & LLINs.

13.4 Advocacy, communication, social mobilization and IEC

Behavioural change communication (BCC) is an important component of the National Malaria Control Strategy 2007-2008 to 2011-2012. This includes a comprehensive communication strategy to be developed and implemented by the EDCD and partner organizations. In brief five methodologies were applied in IEC/BCC viz., interpersonal communications, primary and secondary education, 'mass media', special events (campaigns

etc); and high level advocacy. BCC materials are also provided through outsourcing. The National Health Education Information and Communication Centre (NHEICC) is a focal point of the IEC/BCC activities for all health programmes. 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. The IEC/BCC malaria materials and messages are devised by the Technical Working Group coordinated by EDCD. No specific unit/person is designated for malaria IEC/BCC at the central level. At the lower level, IEC/BCC activities are undertaken by five regional centres and district health education technicians. The regional centres provide technical support, monitor and supervise IEC/BCC at the district level. The health education technician functions as the focal point for all IEC/BCC activities at the district level. Since the last 3-4 years, after the involvement of PSI, no IEC/BCC materials have been produced by NHEICC except two TV programmes. At the VDC and ward level FCHVs play an active role in inter personal communication (IPC), LLINs survey and distribution, and referring suspected malaria cases to health facilities.

Available data on knowledge and practices on malaria treatment and prevention in both rural and urban areas reflect gradual achievements of the IEC/BBC, although more updated data are needed. A NHEICC (2006) study revealed a high percentage of respondents correctly reported on: *malaria symptoms* (fever in the evening 90.4% by women and 91.6% by men; shivering 73.8% by women / 75.6% by men; and fever 67.2% by women and 64.6% by men), *mode of transmission* (mosquito bite 95.4% by women and 94.7% in by men), *preventive measure* (use bed nets at sleeping time 93.8% by women and 93.2% by men) and *place of treatment* (hospital 88.0% by women and 86.1% by men, HPs and SHPs 67.7% by women and 67.7% by men).

Radio was mostly mentioned as the main source of information from mass media by both male and female and rural and urban respondents. Some different patterns were revealed on the role of FCHV and printed media/poster/newspaper. Although FCHV was referred as a source of information by about 16%-21% of respondents, yet, in detail, it was women who chose FCHV as their source of information more than men (25.0% and 18.4% respectively). The role of printed materials (poster, pamphlet/booklet) was generally much less than the others (5.2%-9.5% of respondents),

although a little bit higher among rural men and highest among urban men (15.6%). The rest, student, teacher, hoarding board/wall painting, training workshop, cinema and malaria patient as information sources were least mentioned (1% or less). The malaria TRaC (Tracking Results Continuously) study by PSI focused on the evaluation of BCC and LLIN use.

IEC materials were rarely seen in health facilities, households, public places or in the community in all high and low risk areas visited. Neither the malaria hoardings nor flex boards were seen in strategic public places. Job aids and flip charts for OPD, ANC and FCHV were not observed. In areas where malaria cases are reported among migrants, no IEC/BCC programme/activities were found. In Jhapa, although there is an action plan for malaria control, most of the activities including IEC/BCC were conducted in the second quarter of the fiscal year. A district health education professional is crucial for all IEC/BCC related activities in the malaria programme (however, in one district, the district IEC officer was inadequately involved in the malaria control programme). FCHVs have been reported playing an active role on IPC but the availability of IEC material is limited. In some areas, FCHVs were poorly recognized for their IEC work in malaria control. IEC/BCC for appropriate and correct use and care of LLINs was not consistently observed in all areas. IEC materials for LLIN (SupaNet(R)) were found inadequate. Only a few Supanet® LLIN posters were seen in some health posts and none at the community level. IEC/BCC activities before and during the conduct of IRS aimed at the spraying teams, and the households were found lacking. In some areas, the community still believed that all mosquitoes can cause malaria and neither the health workers nor the FCHVs could identify malaria causing mosquitoes. Similarly, awareness on mosquito breeding sites and biting habits was inconsistent. Self-medication and treatment by private providers was observed suggesting a need for greater emphasis on IEC/BCC by the EDCD/PSI/NHEICC.

Best practices

During the field visit the review team observed a few best practices as follows:

- (1) **Female Community Health Volunteers (FCHV):** FCHVs are a highly devoted and committed group of workers. They participate *inter alia* in delivery of medicines and refer suspected malaria cases to the health facility. FCHVs work very closely with

the community and are the key functionaries on community mobilization and health delivery.

- (2) **Public private partnership:** In Nepal, LLIN distribution was taken up in partnership with the Population Services International (PSI), an international NGO. PSI achieved 98% coverage of the target group as per the EDCD guidelines, and worked closely with the DPHO and FCHV in LLIN distribution.
- (3) **Stratification to delimit target VDCs:** Stratification of VDCs for intensified malaria control with high malaria risk is cost effective, reduces reliance on insecticides, enhances sustainability and prevents pollution.

Recommendations

- (1) A well organized production and distribution of IEC materials in public places and households in the target population is strongly recommended. Self-medication and treatment by private providers was observed suggesting need for greater emphasis on dissemination of IEC/BBC activities by the EDCD/PSI/NHEICC.
- (2) The retaining of the health education technician's post and more delegation of authority to the district health education technician in malaria control is recommended to achieve a good, integrated IEC/BCC programme.
- (3) A systematic plan should be in place for recognition of the role of FCHVs in malaria control at the community level. FCHV's knowledge should be refreshed in terms of training/re-training and regular supply of materials and manuals on malaria.
- (4) PSI should play a leading role in transferring/sharing IEC/BCC material/messages, designing and implementing IEC/BCC programme/activities to local health staff and the community organizations as a priority in programme implementation. EDCD/PSI should launch a special programme of teaching malaria control in schools. To implement the recommendation, a health education curriculum on malaria and vector control should be developed.

- (5) The national and local programmes on IEC/BCC should specifically target the control of malaria among migrants as part of the malaria control strategy on cross-border migration.

13.5 Programme management

Malaria control strategy

The current National Malaria Control Strategy was developed on the principles and practices of WHO's Global Malaria Control Programme and Revised Malaria Control Strategy for the South East Asian Region 2006 - 2010. It aims at four main service delivery areas namely:

- (1) Multiple preventive measures (LLIN, IRS)
- (2) Early diagnosis and prompt treatment
- (3) Epidemic preparedness and response
- (4) Information, education and communication interventions
- (5) Programme management.

The national control strategy is technically accepted as it includes key interventions and tools that are recommended by WHO. Interventions were selected based on epidemiological information and malaria stratification criteria.

Area stratification

Area stratification is generally applied for implementation of the national malaria control strategy. The criterion for stratification was developed in 1994. The geographical areas of the country are divided into five strata as follows: (a) forested related malaria; (b) malaria in the plains; (c) highland malaria; (d) malaria in the upper river valleys; and (e) very low or no transmission areas

However, the criterion was developed in 1994 without any revision despite the rapid evolving situation of malaria epidemiology of the country. Area stratification was applied at the national level but not at village (VDC) level – i.e. micro-stratification is not applied.

Malaria stratification should be updated annually using API by village level; and complemented with malaria prevalence surveys and vector mapping as required for micro-stratification.

Guidelines and protocols

Technical guidelines for management of malaria patients and use of IRS and the introduction of LLINs have been developed by EDCD, but need to be updated based on the current epidemiological situation in the country. Many of the other guidelines available in the country are several years old and need to be revised urgently. The guidelines should be revised in line with current global strategies and best practices, and should address key technical areas such as diagnostics; case management; monitoring drug resistance; entomological monitoring including monitoring of insecticide resistance, vector control and IEC/BCC to facilitate the scaling up of key interventions. The development of these guidelines could be outsourced to the World Health & Research Centre, Kathmandu (NGO) as a sub-recipient of GFATM grants (appropriate re-programming of grant funds to be carried out) under the guidance of EDCD and WHO.

Programme financing & GFATM activities

The national programme is currently funded by the Government of Nepal and through donor-assisted funding by GFATM, WHO and other sources.

The country received GFATM funding in the 2nd round for implementing the project in 12 high -endemic districts for the overall approved budget of US\$ 7.6 million for five years starting in April 2004 and ending in September 2009 with six months no cost extension. There were two principal recipients where PR1 is EDCD and PR2 is an international NGO (Population Science International – PSI). The overall project aimed to implement the national malaria control strategy in six priority districts in the project Phase I and expanded to 12 priority districts in Phase II. During the project period three new interventions were introduced (RDT, ACT and LLINs). The PR2 was responsible for procurement and distribution of LLINs and IEC/BCC activities related to LLINs. The remaining activities, such as diagnosis and treatment, surveillance and epidemic preparedness were the responsibility of the PR1. A part of the funds received by PR1 were

transferred to WHO for technical assistance in training, monitoring, evaluation, entomology and vector control.

Nepal received the second GF grant in the 7th round. The total budget approved is US\$ 19.4 millions. The 7th round project aims to continue scaling up key interventions of the 2nd Round in 13 high endemic districts. There is a one-year overlapping period of the 2nd and 7th round grants (September 2008-September 2009).

The overall performance of the 2nd round was ranked “A” by the GFATM but the rate was lower in the 7th round due to delay in distribution of LLINs.

With the good performance of PRs in the 2nd round project the country was eligible for the fast tracking system - i.e, was invited to submit the “Rolling Continuation Channel” (RCC) proposal in 2009. The country successfully submitted the RCC proposal which was subsequently approved but the grant has not yet been released. The RCC proposal aims to sustain the achievements made during the 2nd round project and expand to cover 18 more malaria-endemic districts.

It was noted that several staff (five technical and three administrative) were recruited to work for GFATM projects as a so-called “Project Management Unit–PMU” attached to EDCD.

While the overall funding for health has increased, much of this increase has been for improvement in tertiary care services, and the finances for primary care services have decreased. Although the allocations for EDCD have seen incremental increases, in real terms there appears to have been no increase in funding. It is important that current levels of funding are maintained if no increase is possible due to financial constraints.

Human resources

Sufficient trained and productive human resources, as well as strong administrative and technical management is essential to deliver the services planned above. All aspects of programme management including planning, coordination, procurement and logistics, financial management, organizational development, operational research, monitoring and evaluation should have been strengthened to achieve the national strategy

objectives and to optimally utilize available Global Fund resources. While some degree of strengthening has been achieved through the partial staffing of the Project Management Unit at EDCD as mentioned above, this is clearly inadequate to ensure adequate absorption of available funds and to achieve programme goals. Although a total budget of over US\$ 50 million was estimated to be available for the period of five years, including the RCC proposal, significant delays and losses have occurred due to these weaknesses. However, the planned strengthening of the capacity of the National Malaria Control Programme has not taken place, adversely affecting the achievement of key target indicators and the absorption of funds. The continuation of such a situation could potentially affect the availability of donor funding to the programme. Therefore, the support of all stakeholders, national and international partners, will be essential for the successful implementation of the programme.

The findings of the programme review indicate that the current programme remains weak in critical areas, particularly at national and regional levels. Unavailability of key designated staff appears to impact the ability of the programme to achieve key indicators spelt out in the National Malaria Control Strategy (NMCS) and is also affecting on the achievement of key activities under the Global Fund grants. The recent retirement of many highly skilled and knowledgeable senior staff has made it imperative that new cadres of malariologists to manage technical aspects of the programme are recruited and trained immediately. Administrative constraints relating to constitutional amendments currently underway in the country appear to have delayed these recruitments. As an interim measure it is recommended that key staff are recruited under the GFATM grants on a contract basis to strengthen the national programme capacity. This should include the position of an epidemiologist, entomologist and communication specialist for the national programme at EDCD, and five entomologists for the five regions and supporting technicians. These positions can be created through the re-programming of grant funds so as not to affect key indicators.

It is also recommended that early action be taken to complete recruitment to the already identified positions in the PMU, i.e. Programme Coordinator and M & E Officers (7). In addition, other support staff such as computer programmers, data entry operators, GIS specialists should also be recruited as appropriate. All the cadres recruited should be provided with the necessary and appropriate training as a matter of priority and adequate incentives should be provided for long-term staff retention.

The Vector-borne Disease Research and Training Centre in Hetauda, Central Development Region serves as a national training centre for malaria and other VBDs. The VBDRTC was a part of EDCD but was made independent during 2003-2005 and was aimed to be upgraded as an international training centre under sponsorship of USAID through the Environmental Health Project (EHP). However, this initiative was not successful. At present the VBDRTC is independent of EDCD but is supposed to work in close collaboration. The VBDRTC is seriously understaffed. There are only six staff members against 20 sanctioned posts.

Capacity building

Addressing the weaknesses in the programme on training and research needs it is proposed that a technical unit for research and training should be setup at national level through the re-staffing of the VBDRTC, which should be brought under the management of the Director, EDCD. The appropriate staff requirements for such a unit should be based on national need and staff should be recruited by the Government of Nepal. The repositioning of the VBDRTC under the Director, EDCD will facilitate more effective use of resources available at the VBDRTC for training and research needs of the national programmes which is currently under the Director, EDCD.

The difficulties associated in carrying out the above recruitments to the national programme and the training units due to administrative reforms currently taking place in the country and the need to provide the necessary training and guidance to the proposed new recruits to the programme and the training unit makes it imperative that the RCC grant is signed early and the suggested technical assistance from WHO is provided through a malariologist and an entomologist as early as possible. The WHO malariologist once recruited should be tasked with carrying out training national cadres and facilitating the implementation of GFATM grants in the country.

The performance by EDCD in the existing Round 7 grant is currently rated as B1 and the programme should be supported to achieve A rating. The partnership with PSI should be consolidated and efforts made to involve local non-governmental organizations as sub-recipients and principal recipients in future malaria grants enhancing local ownership.

In-service training of some categories of staff is currently carried out but such training is infrequent and inadequate. Regular and planned in-service training of existing staff categories to maximize their potential and to motivate staff should be included in the human resource development plan with defined frequencies. All in-service training should include a pre- and post-test evaluation of training provided, and should be based on updated technical guidelines. Computer literacy among staff was found to be inadequate and an obstacle to storing and analyzing data.

Supervision

Some check lists have been recently developed in-country but should be accompanied by appropriate supervisory guidelines developed for national, regional and district levels describing the frequency of supervisory visits, aims and outcomes which should be shared with lower levels through a feedback of findings. Monitoring of progress and corrective actions taken following such supervision should be conducted.

Staff mobility at the EDCD, regions, district, PHC and HP levels should be ensured for better coordination, field supervision and data collection

Logistic management

Asset and logistics management tools available should be improved and strengthened using computer-based systems. Adequate and appropriate storage capacity should be made available at district level for the storage of RDTs, and other supplies. The MOHP is encouraged to work towards the removal of taxes and tariffs on WHOPES-approved long lasting insecticidal nets, RDTs imported by the MOHP, ACTs as well as insecticides imported for indoor residual spraying. It is believed that this will further contribute to scaling-up of critical interventions necessary for effective malaria control and facilitate the achievement of targets of universal accessibility of antimalarial treatment and key preventive interventions.

The national programme should provide necessary communication and computer facilities to the regional offices and key affected districts to minimize delays in sharing of critical data. Inadequacy of transport facilities was also found to be an obstacle to effective implementation of programme activities. Overall, it is recommended that a health system strengthening

grant be submitted to round 11 of the GFATM addressing these key areas and targeting malaria elimination from the country.

Adequate planning of logistics requirements to achieve defined national targets should be carried out and incorporated into a national procurement and supply management plan. The plan should be based on national requirements of critical supplies such as RDTs, anti-malarial treatment, insecticides for IRS, LLINs and other items, and should not be limited to high-risk districts. Product specifications based on WHO guidelines and the current epidemiological situation in the country should be defined and recommendations for quality assurance of products procured should be specified.

Operational research

A number of operational research projects have been conducted during the past five years. Operational research priorities should be defined to achieve programme goals and a planned programme carried out to conduct these in association with research institutes and academia in the country. Some research priorities have been identified, but efforts should be made to identify other priorities that would be beneficial to the programme.

Suggested research priorities

- (1) Monitoring the efficacy of the LLINs and proper use and upkeep of the LLINs, sleeping habits, washing and drying practices.
- (2) Monitoring and evaluation, and impact assessment of key IEC/BCC interventions. (The most recent one done by NHEICC was in 2006).
- (3) Community social-behavioural research using a qualitative approach should be done on health seeking behaviour, lay beliefs and local medical practices on malaria and fever and on the impact of IEC/BCC.
- (4) Involvement of the community through a participatory action research approach should be done in the targeted elimination VDCs.
- (5) Research on population movement and malaria problem.

14. General recommendations

The review team after thorough deliberations made recommendations to improve the performance of the programme. Recommendations of a technical nature are given in each section after observations. Recommendations of a general nature with technical and policy issues are given below:

- (1) The Disease Control Unit of EDCD should be strengthened for more effective malaria control through urgent recruitment of key staff using the GFATM grants on contract basis as an interim measure while government posts are being created to strengthen the national programme capacity – epidemiologist, entomologists(5) and supporting technicians and communication specialist. The post of district health education technician should be retained. Existing vector control officers and malaria inspector posts at regional and district level should be revitalized and filled early to scale-up the delivery of high quality malaria control.
- (2) EDCD should be a principal recipient in all GFATM grants to support the malaria programme. EDCD has achieved B1 rating and this should be supported by all partners to move towards A rating.
- (3) EDCD should consolidate partnership with PSI and widen the malaria partnership and move towards a nation- wide malaria programme by scaling-up the use of malaria ACT, RDT, LLIN and IRS in all districts of Nepal where required to promote, prevent and treat malaria, required as part of the integrated health sector support programme.
- (4) EDCD should expedite signing of RCC grant agreement and the consolidation with round 7 to facilitate the continued capacity building of EDCD and WHO technical support through recruitment of a malariologist and an entomologist. The vacant positions in PMU to support the EDCD should be filled early.
- (5) The Government of Nepal and MOHP and MOF should consider removing taxes and tariffs on all approved long lasting insecticidal nets, RDT, ACT and insecticides for IRS, both in the public and private sectors till 2015 to allow reaching universal access and MDG targets.

- (6) VBDRTC in Hetauda should be brought under the Director, EDCD and revitalized to facilitate the more effective use of resources to address the training and research needs of the national programme.
- (7) The MOHP should consider preparing a malaria and health system strengthening proposal to strengthen the existing system at regional and district levels through the 11th round GFATM for moving towards malaria elimination.
- (8) Government financing for EDCD needs to continue as a minimum at current levels or to be increased appropriately to sustain long-term malaria control.
- (9) Strategies should be in place for prevention and treatment of imported and cross-border malaria cases.
- (10) Quality assurance of malaria control products should follow WHO guidelines for product specifications and based on the current epidemiological situation in the country.
- (11) Updating and development of technical guidelines/SOPs in key areas based on the current epidemiological situation in the country for diagnostics; case management; entomological surveillance, monitoring drug and insecticide resistance; vector control; IEC/BCC to facilitate the scaling up of key interventions should be undertaken.

15. Suggestions/inputs for national strategy, 2011-2015

The National Strategy 2011-2015 should aim towards malaria elimination and to identify and minimize the existing threats. Thus, surveillance and epidemic preparedness should be further strengthened and geared towards elimination. Full utilization of information for planning should be emphasized. Capacity at the national level (EDCD) and VBDRTC should be restored using the available resources (7th round GFATM and RCC grants).

It is critical that the MOHP sustains its political commitment as this is often lost in view of the rapidly declining disease trends.

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Mr Jeevan Chaulagain, VC Supervisor, Jhapa

Mr Bed Prasad Ghimire, VCO Jhapa

Mr Dal Bdr Giri, Malaria Inspector, Jhapa

Dr Uma Kant Jha, Medical Superintendent, Zonal Hospital

Dr Kapil Yadav, Physician Zonal Hospital

Dr Mishra, Radiologist, Zonal Hospital

Mr Hemanta Raj Dawadi, PHO in-charge, Chandragadhi HP (Ilaka)

Mr Laxmi Pd Shah, HA in-charge, Dhulabari PHC

Mr Bharat Khatiwada, AHW in-charge, Budhabare SHP

Annex 1

List of reviewers

External reviewers

- Dr VP Sharma, former Director, National Institute of Malaria Research, New Delhi, India (**Chairman**)
- Dr Rabindra Abeyasinghe, GFATM Project Director, Colombo, Sri Lanka
- Dr Thein Tun, former Director-General, Department of Medical Research (Upper Myanmar), Yangon, Myanmar
- Dr Emiliana Tjitra, Senior Researcher, National Institute of Health Research and Development, MOH, Jakarta, Indonesia
- Dr Luechai Sringernyuang, Associate Professor in Medical Anthropology, Director, Master of Art Programme in Health Social Science (International Programme), Faculty of Social Sciences & Humanities, Mahidol University, Salaya, Nakorn Prathom, Thailand
- Dr Estifanos Biru Shargie, Senior Technical Officer (Epidemiologist) Global Fund to fight AIDS, Tuberculosis and Malaria (GFATM), Geneva, Switzerland

Internal reviewers

- Dr B D Chataut, former Director-General, Department of Health Services, Ministry of Health and Population, Kathmandu Nepal
- Dr Prakash Ghimire, Associate Professor Microbiology, Central Department of Microbiology, Tribhuvan University, Kathmandu Nepal
- Dr Bal Man Singh Karki, National expert (malaria), Academic Director, Kist Medical College, Kathmandu, Nepal

- Mr Ajay K Thakur, Associate Professor, Department of Community Medicine and Family Health, Institute of Medicine, Tribhuvan University, Kathmandu, Nepal

WHO Secretariat

- Dr Shivakumaran Murugasampillay, Medical Officer-, Global Malaria Programme WHO HQ Geneva, Switzerland
- Dr Krongthong Thimasarn, Regional Adviser, Malaria, WHO Regional Office for South-East Asia (SEARO), New Delhi, India
- Dr Nihal Singh, Medical Officer, Office of WHO Representative to Nepal
- Dr Shushil Dev Pant, National Professional Officer, office of WHO Representative to Nepal

Annex 2

Itinerary for the reviewers of the Nepal Malaria Control Programme

6 June 2010 Sunday

8AM -3 PM	Greenwich Village Hotel	Arrival of the experts in Nepal
6:00 PM	Greenwich Village Hotel	Briefing by the NPO on itinerary

7 June 2010 Monday

8:00 AM	Epidemiology and Disease Control Division	Introduction of the experts to EDCD team
8:30 AM		Presentation by Dr Thakur: Introduction to the National Malaria Control Programme
9:15 AM		Presentation by Dr Gupta: Global Fund Programme
10:15 AM		Presentation by Mr Rakesh Thakur: Introduction to the HMIS and recording and reporting in malaria
11:00 AM		Presentation by Mr Purussotam Gautam: Entomology and Vector Control Unit
2:00 PM	National Public Health Laboratory, Teku	Observation and assessment
3:30 PM	Sahid Sukralal Tropical Hospital, Teku	Observation and assessment
5:00 PM	WHO Office	Courtesy call on WHO Representative to Nepal

8 June 2010 Tuesday

9:00 AM	WHO Office	Review of day 1 activities
10:30 AM	Epidemiology and Disease Control Division	Document review and in-depth interview of the EDCD staff
4:30 PM	WHO Office	Review of Day 2 activities

9 June 2010 Wednesday

9:30 AM	UN House	Security briefing
11:00 AM	PSI Office	Observation and assessment of PSI Programme
3:00 PM	Department of Drug Administration	Interview the focal person
4:00 PM	Nepal Health Research Counsel	Interview the focal person

10 June 2010 Thursday

9-11 AM	Domestic airport	Depart Kathmandu for field visit district
1:00 PM	District Public Health office	Assessment of the district programme
3:30 PM	District Hospital	Assessment of the district hospital

11 June 2010 Friday

10:00 AM	PHC	Assess community-based health facility
12:00 PM	HP	Assess community-based health facility
2:00 PM	SHP	Assess community-based health facility

12 June 2010 Saturday

10:00 AM	Community	Observe community-based malaria control programme
11:00 AM	Community	Focal group discussion with village stake holders
12:00 PM	Community	Introduction to the FCHV team and assessment of FCHV Malaria Programme
2:00 PM	Community	Assessment of community-based private practitioner/ drug vendor

13 June 2010 Sunday

9-12 AM	Domestic Airport	Return to Kathmandu
1:00 PM	WHO Office	Sharing of field visit reports and report writing

14 June 2010 Monday

9:00 AM	WHO Office	Discussion and report writing
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15 June 2010 Tuesday

10:00 AM	WHO Office	Discussion, report writing and finalization of presentation
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16 June 2010 Wednesday

9:00 AM	WHO Office	Pre-debriefing: finalization of the presentation and recommendations
2:30 PM	Ministry of Health and Population	Debriefing of the findings and recommendations of the "External assessment of the NMCP"
5:00 PM	WHO Office	Debriefing to WHO Representative to Nepal

17 June 2010

Departure of reviewers

Annex 3

Grouping for field visit during 10-12 June 2010

Scope of Group	External reviewers	Internal reviewers	Secretariat	Field Visit districts
Epidemiology Surveillance Diagnosis treatment	Dr. Thein Tun Dr. Emiliana Tjitra	Dr Prakash Ghimire	Dr. Shivakumaran Murugasampillay	Kailali and Kanchanpur
Programme management, Strategy, Human resource, Financing	Dr. Rabindra Abeyasinghe Dr Estifanos Biru Shargie	Dr B.D. Chataut	Dr. Krongthong Thimasarn	Makwanpur and Chitwan
Entomology, Vector control, Research	Dr. VP Sharma	Mr Ajay Thakur	Dr Nihal Singh	Dhanusha and Mahottari
Community IEC/BCC Public Private Partnership	Dr Luechai Sringermyuang	Dr Bal Man Singh Karki	Dr Shushil Pant	Jhapa and Ilam

Annex 4

Literature Consulted

- (1) Government of Nepal. Ministry of Health and Population. Department of Health Services. Epidemiology and disease control division. Round 7 Malaria control Programme. Year 1 Annual report 16 September 2008 to 15 July 2009.
- (2) WHO country office for Nepal. Matthew Robert Burns. Assignment report. April-December 2009.
- (3) Anonymous (2006). Post-outbreak malaria vector survey in Bankey, EDCCD, Nepal.
- (4) Thapa L.B. et al. 2007. The internal assessment of malaria and kala-azar activities 2004,2005 and 2006. Government of Nepal. Ministry of Health and Population. Department of Health Services. Epidemiology and disease control division, Teku, Kathmandu, Nepal December 2007.
- (5) National malaria treatment protocol. Epidemiology and disease control division, Department of health services, Ministry of Health and Population; 2009.
- (6) National malaria control strategic plan – Nepal (2007/008 – 2011/012). Epidemiology and disease control division, Department of health services, Ministry of Health and Population.
- (7) Environmental health project: Assessment of early warning and reporting system (EWARS) in Nepal, Activity report 126. March 2004.
- (8) Epidemiology and Disease Control Division. Internal review of malaria control programme of 2004, 2005 and 2006, Epidemiology and Disease Control Division, Department of Health Services, Ministry of Health and Population.
- (9) Internal assessment of national malaria control programme-Nepal, 2009. Epidemiology and disease control division,

Department of Health Services, Ministry of health and population.

- (10) Data sheet supplied by Epidemiology and disease control division, Department of Health Services, Ministry of Health and Population.
- (11) Power point presentations of internal reviewers and Nepal Field Visit (Kailali and Kanchanpur, Chitawan and Makwanapur, Dhanusha and Mohattari, Jhapa Districts).
- (12) PSI Malaria (2010): TRaC study evaluating LLIN use among general population and children under 5 years of age in 13 high-risk districts. 1st Round 2009.
- (13) Institute of Medicine Maharajgunj (2005): An assessment of malaria-related knowledge and health seeking behaviour of the population leading to the development of behavioural change communication messages (unpublished report).
- (14) NHEICC (2006) Formative research on BCC/IEC programmes in health.
- (15) NHEICC (2005) A framework of health education, information and communication programme in Nepal: An introduction and future perspective.

Annex 5

Abbreviations

ABER	annual blood examination rate
ACT	artemisinin-based combination therapy
AIDS	acquired immuno-deficiency syndrome
ANC	antenatal care
API	annual parasite incidence
BCC	behavioral change communications
CSM	clinically suspected malaria
DDC	district development committee
DHO	district health officer
DPHO	district public health officer
Dx	diagnosis
EDCD	Epidemiology and Disease Control Division
FCHV	Female Community Health Volunteer
GDP	gross domestic product
GF	Global Fund
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GIS	geographical information system
HFMC	health facility management committee
HDI	human development index
HE	health education
HIV	human immunodeficiency virus
HP	health post
IBDC	insect borne disease control
IEC	information, education and communication

IM	intramuscular
IMCI	integrated management of childhood illnesses
INGO	international non-government organization
IPC	interpersonal communication
IPTp	intermittent preventive treatment of pregnant women
IRS	indoor residual spraying
ITN	insecticide-treated net
LLIN	long-lasting insecticidal nets
M&E	monitoring and evaluation
MCH	maternal and child health
MCHW	maternal and child health worker.
MDG	Millennium Development Goals
MI	malaria inspector
MICS	multiple indicator cluster survey
MIS	malaria indicator survey
MoF	Ministry of Finance
MoH	Ministry of Health
MoHP	Ministry of Health and Population
MPR	malaria programme review
NGO	non-governmental organization
NHEICC	National Health Education, Information and Communication Centre (Nepal).
NMCP	national malaria control programme
NMEB	Nepal Malaria Eradication Board
NMEO	Nepal Malaria Eradication Organization
NP	national professional
OPD	outdoor patient department
Pf	<i>Plasmodium falciparum</i>

PHC	primary health centre
PHCC	primary health care centre
PMU	project management unit
PPP	public-private partnership
PR	principal recipient
PSI	Population Science International
Pv	<i>Plasmodium vivax</i>
RBM	Roll Back Malaria
RCC	rolling continuation channel (Global Fund grant)
RDT	rapid diagnostic test
Rx	A medical prescription
SEARO	WHO Regional Office for South-East Asia
SHP	Sub Health Post
SOP	standard operating procedure
SP	sulfadoxine-pyrimethamine
SPR	slide positivity rate
TBA	trained birth attendants
TRAC	tracking results continuously
TV	television
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VBDRTC	Vector Borne Diseases Research and Training Centre
VCO	vector control officer
VDC	village development committee
VHW	village health worker
WHO	World Health Organization

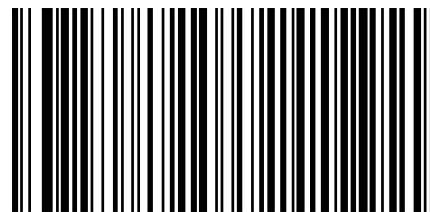
The programme review is a mechanism to assess overall programme achievements and performance as well as identifying gaps. It provides an opportunity to propose strategic directions in order to improve the programme performance. The Ministry of Health and Population of Nepal in collaboration with WHO conducted the external evaluation of the malaria control programme during 7-16 June 2010. The review team observed significant progress in the malaria situation and the Malaria Control Programme. Several new tools were proven effective and produced an impact on disease trend. However, in spite of downward trends of the disease there are some programme weaknesses that should be addressed, especially the capacity of the national office (Epidemiology and Disease Control Division). This report elaborates the rationale of programme review, process and results of the review.



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