Strategic Action Plan
for Malaria Control in India
2007-2012

'Scaling up malaria control interventions with a focus on high burden areas'

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PREFACE

The National strategy on malaria control has undergone a paradigm shift with the introduction of new interventions for case management and vector control, namely rapid diagnostic tests, artemisinin based combination therapy and long lasting Insecticide impregnated nets. Modern concepts in monitoring and evaluation have also been incorporated into the programme which take account of the new interventions.

A "Strategic Action Plan for malaria control" has accordingly been prepared by the Directorate of NVBDCP focussed around the package of these new interventions to decrease malaria transmission and increase access and improve quality of curative services over the 11th five year plan period (2007-12) and beyond. The document sets the direction and provides defined timelines for planning and implementation of the national malaria control programme.

This document is intended to convey how the Government of India plans to reduce the malaria burden over the 11th five year plan period (2007-12). It focuses on the urgently needed intensified public health action in those areas where the disease remains a major cause of morbidity and mortality in the diverse ecological and epidemiological contexts encountered in India. It includes estimates of the human resources, major commodities, infrastructure and financing required for malaria case management and vector control in the whole country.

The plan also includes briefly the estimates of requirements from the year 2012 to 2017 for scaling up of interventions to meet the MDG malaria goals by 2015. Finally, it includes an outline of the long-term strategic plan for malaria control for the period from 2017 to 2022 aimed towards state/region wise elimination of malaria.

The document has been prepared by incorporating additional inputs of experts from the WHO, World Bank and the states. It may also be used as a reference material by all programme personnel involved in planning malaria control activities at national and state levels.

Contents

Section – 1: Introduction

1.1 Demographic and socioeconomic profile

The Republic of India is the seventh largest country by geographical area and the second most populous country in the world. The total population of India is 1.15 billion (2008 estimate). India is the largest democracy of the world consisting of 28 states and 7 union territories. The states of India are further divided into 628 districts.

India is at present the world's twelfth largest economy and its GDP is US $ 1.089 trillion and the per capita GDP per annum is US $ 2,900. However, the percentage of people living below the poverty line was still high at 42% in 2005 as per the new international poverty line. India's nominal per capita income of US $ 977 is ranked 128th in the world. The adult literacy rate is 67.6%.

The health of the population of India has improved significantly over the past 50 years. Life expectancy has risen from 33 to 64 years. The crude birth rate (CBR) has declined from 41 to 23.5 and the crude death rate (CDR) from 25 to 7.5.[1] The infant mortality rate (IMR) has fallen from 148 to 55 per 1,000. The maternal mortality ratio per 100,000 live births has declined to 301.

1.2 National Health Policy (2002)

The guiding declaration on health in India is the *National Health Policy (2002).* It includes the following criteria for a more equitable and effective health care system:

- Universal access to an adequate level of health care without financial burden.
- Fair distribution of financial costs for access, rational care and capacity.
- Ensuring that providers have the competence, empathy and accountability for delivering quality care and for effective use of relevant research.
- Special care to vulnerable groups such as women, children, the disabled and the aged.
- Service delivery by states, civil societies and other stakeholders.
- Greater emphasis on public health education and prevention.
- Improved governance in the public sector and strengthened commitment of service providers.
- Priority for four major disease problems: Tuberculosis, malaria, blindness and HIV/AIDS – including the objective of reducing malaria mortality by at least 50% from 2002 to 2012.

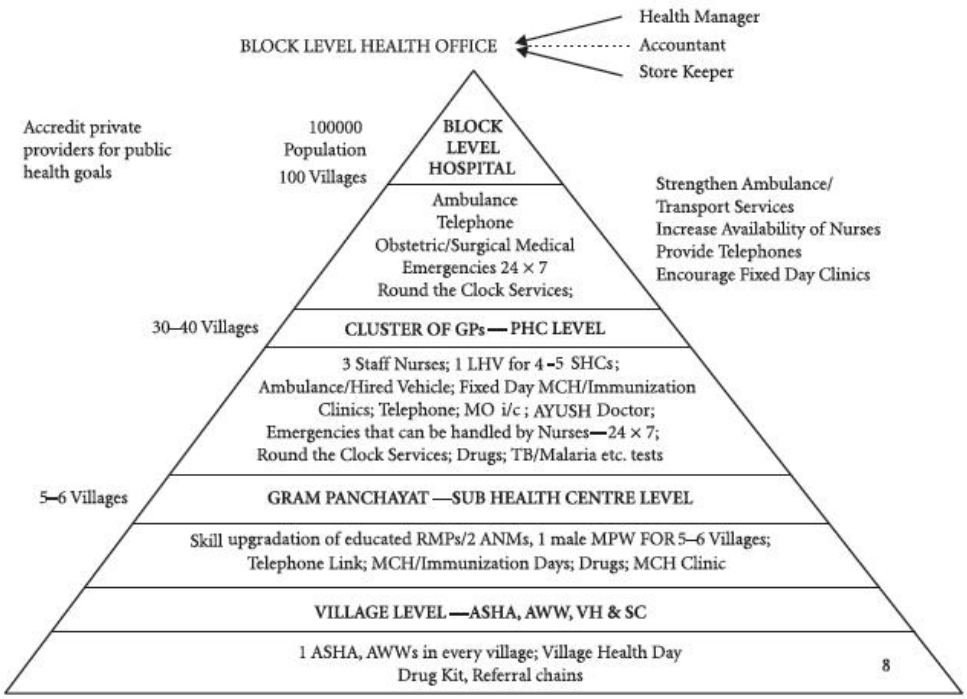
1.3 National Rural Health Mission (NRHM)

[1] www.mohfw.nic.in

In 2005, GOI launched the *National Rural Health Mission* (NRHM), a flagship national programme to improve rural health outcomes. It has been operationalized throughout the country, with special focus on 18 states which includes 8 Empowered Action Group states (Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Uttar Pradesh, Uttarakhand, Orissa and Rajasthan), 8 North-Eastern States (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim), Himachal Pradesh and Jammu and Kashmir. The duration of NRHM is on 2005-12.

The main aim of NRHM is to provide accessible, affordable, accountable, effective and reliable primary health care facilities, especially, to the poor and vulnerable sections of the populations. It also aims at bridging the gap in rural health care services through creation of a cadre of female community volunteers known as Accredited Social Health Activists (ASHAs) and improved hospital care, decentralization of programme to district level to improve intra and inter-sectoral convergence and effective utilization of resources. The ASHAs undergo extensive training and are incentivized for particular health activities, mainly related to maternity and child health and disease control programmes. The NRHM further aims to provide an overarching umbrella to the existing programmes of Health and Family Welfare including RCH-II, malaria, blindness, iodine deficiency, filariasis, kala-azar, tuberculosis, leprosy and integrated disease surveillance. Further, it addresses the issue of health in the context of a broad sector-wide approach including sanitation and hygiene, nutrition and safe drinking water. The mission also seeks to build greater ownership of the programme among the community through involvement of the Panchayati Raj institution, NGOs and other stake holders at national, state, district and sub-district levels to achieve the goals of National Population Policy (2000) and National Health Policy (2002). The generic rural health service infrastructure promoted by NRHM is shown in Figure 1.

Fig.1: Health pyramid in rural areas



Notes: TB = Tuberculosis, MO = Medical Officer, MCH = Maternal and Child Health.

NRHM incorporates a number of innovative approaches, including use of untied block grants, district-level planning, and new initiatives aimed at community mobilization and accountability. The vision of NRHM is:

- To provide effective healthcare to rural population throughout the country with special focus on 18 states, which have weak public health indicators and/or weak infrastructure.

- To increase public spending on health from 0.9% of GDP to 2-3% of GDP, with improved arrangement for community financing and risk pooling.

- To undertake architectural correction of the health system to enable it to effectively handle increased allocations and promote policies that strengthen public health management and service delivery in the country.

- To revitalize local health traditions and mainstream AYUSH into the public health system.

- Effective integration of health concerns through decentralized management at district level, with determinants of health like sanitation and hygiene, nutrition, safe drinking water, gender and social concerns.

- Address inter-state and inter-district disparities.

- Time bound goals and report publicly on progress.

- To improve access to rural people, especially poor women and children to equitable, affordable and effective primary health care.

The malaria related expected outcome of the NRHM is reduction of malaria mortality by 50% by 2010 and an additional 10% by 2012.

The NRHM has already had tangible results. The number of government hospitals had increased from 4,751 in 2000 to 7,663 in 2006. There has been a scale up of ASHAs in malaria endemic and tribal areas and a total of 481,308 ASHAs have been selected.

1.4 Health financing and planning

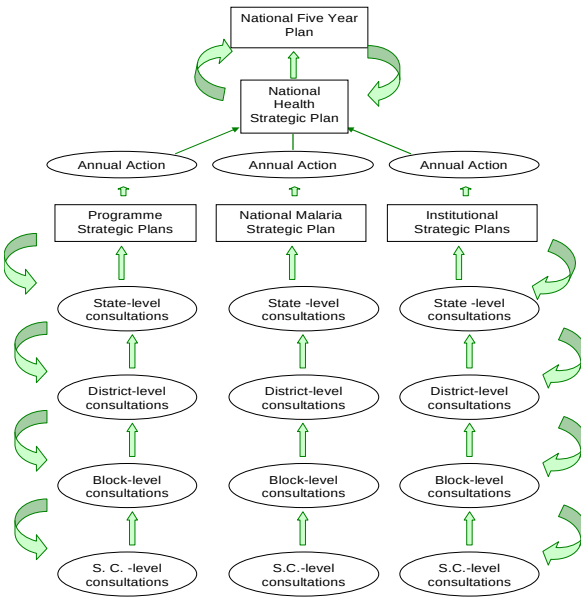
During the 10th five year plan 2002-07, malaria accounted for 76% of the expenditure for vector borne diseases. The central directorate responsible for prevention and control of malaria was initially the Directorate of National Anti Malaria Programme and had the main budget line for malaria control. The contribution for prevention and control of other vector borne diseases was much less (24%). It is worth noting that the allocation on malaria from GOI accounted for about 45% of the total budget for all disease control programmes including NLEP, RNTCP, NIDDCP, NPCB and IDSP. In addition to allocation and expenditure by GOI, the states also allocate the resources for vector borne disease control (staff, operations & certain commodities).

There has been an increase in fund allocation under NRHM for disease control programmes as well as for NVBDCP (including malaria control). During 2005-06, the budget of NRHM was Rs.6,731 crores which was increased to Rs.9,065 crores in 2006-07. In the 11th Plan period also there has been considerable increase in the fund allocation for NRHM which is evident from the fact that in 2007-08, Rs.11,010 crores was allocated which was increased to

Rs.12,050 crores in 2008-09 and a similar amount has been sustained for 2009-10. Similarly, the budget of total disease control programme has been increased from 837.63 crore in 2007-08 to 1122.25 crore in 2009-10 and for NVBDCP it has been raised from 361.08 crores to 450.00 crores.

Although health is a state subject as per the constitution of India, the central government provides assistance in the form of commodity (drugs, insecticides and larvicides) to the States/UTs. North-eastern States (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura), are provided 100 per cent central assistance for programme implementation, since December 1994. Additional resources are also being provided to selected high malaria risk areas in north-eastern states, Orissa, Jharkhand and West Bengal through external Aid from GFATM to accelerate anti malaria activities and improve service delivery in the remote and inaccessible pockets. Furthermore, in 100 districts in 8 states, namely Andhra Pradesh, Chhattisgarh, Jharkhand, Gujarat, Madhya Pradesh, Maharashtra, Orissa and Rajasthan, 1045 PHCs predominantly inhabited by tribals were also provided 100 percent support including operational expenses under the Enhanced Malaria Control Project (EMCP) with World Bank assistance, since 1997. The World Bank New Project on "Malaria Control and Kala-azar Elimination Support " for a period of 5 years w.e.f. 2008-09 (commencing from 1st September, 2008) has been approved by World Bank. The centre provides identified commodities and cash assistance for specific activities in areas other than NE States and project areas under external assistance,. The operational cost for implementation of the programme and certain commodities are met from the allocations made out of state fund. The centre also meets the requirement of states during emergent situations.

Fig. 2. Planning Process in the Health System



The development and implementation of national plans are based on a consultative process to assure ownership and participation of local health infrastructures. The planning process begins at the sub-centre level which is then compiled into the block plan which in turn is converged with the district plan and the collective district planning makes the state plan. The various stakeholders are included in these processes.

1.5 Analysis

The public health achievements in India have been made possible by progress on several fronts including the establishment of a huge rural health care infrastructure, with a workforce

consisting of over five lakh doctors working under the various systems of medicine and over seven lakh nurses and other health care workers; 25,000 PHCs and CHCs and 1.6 lakh sub-centres, complemented by 22,000 dispensaries and 2,800 hospitals delivering alternative systems of medicine. However, this infrastructure remains under-equipped, under-staffed and under-financed to cope with the challenge of providing universal access to health care and controlling the threats of communicable disease.

As the socioeconomic standards of the population improve, it is expected that more people will turn to private providers for health care. This development, which is helpful from a financing viewpoint, requires the formulation of competence and quality standards to check the trend of health care becoming a business.

During the next five to ten years, existing national programmes may eliminate polio and leprosy and possibly kala-azar and filariasis. However, tuberculosis, malaria and AIDS are likely to continue as major public health problems, with nation-wide elimination being nowhere near and with a continued need for vigilance and increasing investments to ensure consolidation of gains and progress.

Over the last few years, there has been a rapid increase in the number of ASHAs, who carry out many tasks in their role as frontline extensions of public health services. When and where the NRHM norms are met, it can be said that a basic health care infrastructure required for sustaining malaria control will have been established. However, the rapid expansion of village-based providers immediately raises the problem of ensuring qualified and trained supportive supervision from the higher levels. It is possible that the ASHAs may be overburdened by the large number of important services. A high level of competence, capacity and commitment for community health at the PHC level (covering a population of about 30,000) will be essential to make the system perform and respond to local epidemiological needs and the population demands.

Section – 2: Malaria situation and control in India

2.1 History of malaria control in India

Malaria was a major scourge in India contributing 75 million cases with about 0.8 million deaths annually, prior to the launching of the National Malaria Control Programme (NMCP) in 1953. The widespread DDT indoor residual spray (IRS) in the country under the NMCP resulted in a sharp decline in malaria cases in all areas under spray and as a result the GOI converted the NMCP into the National Malaria Eradication Programme (NMEP) in 1958. The NMEP was initially a great success with the malaria incidence dropping to a 0.1 million cases and no deaths due to malaria reported in 1965.

The resurgence of malaria in the country resulted in escalation of incidence to 6.4 million cases in 1976. The resurgence was attributed to various operational, administrative and technical reasons, including emergence of drug resistance in the parasites and insecticide resistance in the vectors. .In 1977, the Modified Plan of Operation (MPO) was implemented with the immediate objectives of preventing deaths due to malaria and reducing morbidity due to malaria. The national programme was also integrated with the primary health care delivery system. Under the MPO, IRS was recommended in areas with Annual Parasite Incidence (API) ≥ 2 in addition to early diagnosis and prompt treatment. The malaria incidence declined to 1.66 million cases in 1987. The scarce resources in many states, however, allowed spray coverage in areas with API > 5 only. By 1996, there was another malaria upsurge with 3.03 million cases and 2,803 deaths reported.

Since the focus shifted from eradication to control, the programme was renamed as National Anti-Malaria Programme (NAMP) during year 1999. It is important to note that the Directorate responsible for prevention and control of malaria at central level was also made responsible for prevention and control of filariasis, Kala-azar, Japanese Encephalitis, Dengue and Chikungunya. With the convergence of prevention and control of other vector borne diseases, the Directorate of NAMP was renamed as Directorate of National Vector Borne Disease Control Programme (NVBDCP) in 2003. The NVBDCP is presently one of the most comprehensive and multi-faceted public health programmes in the country. The NVBDCP became an integral part of the NRHM launched in 2005. The special focus of the NVBDCP is on resource challenged settings and vulnerable groups.

Table 1. Milestones of malaria control activities in India

Year	Milestone
Prior to 1953	Estimated malaria cases in India – 75 million; Deaths due to malaria – 0.8 million
1953	Launching of National Malaria Control Programme (NMCP)
1958	NMCP was changed to National Malaria Eradication Programme
1965	Cases reduced to 0.1 million
Early 1970's	Resurgence of malaria
1976	Malaria cases – 6.46 million
1977	Modified Plan of Operations implemented
1997	World Bank assisted Enhanced Malaria Control Project (EMCP) launched
1999	Renaming of programme to National Anti Malaria Programme (NAMP)
2002	Renaming of NAMP to National Vector Borne Disease Control Programme
2005	Global Fund assisted Intensified Malaria Control Project (IMCP) launched
2005	Introduction of RDT in the programme
2006	ACT introduced in areas showing chloroquine resistance in *falciparum* malaria
2008	ACT extended to high Pf predominant districts covering about 95% Pf cases

2008	World Bank supported National Malaria Control Project launched
2009	Introduction of LLINs

2.2 Malaria situation and trends

Malaria in India is particularly entrenched in low-income rural areas of eastern and north-eastern states, but important foci are also present in the central and more arid western parts of the country. The countrywide malaria surveillance data for the period from 1995 to 2008 is given in Table below.

Table 2. Countrywide malaria surveillance data (1995 – 2008)

Year	Population (in thousands)	Total Malaria Cases (in millions)	*P.falciparum* cases (in millions)	*Pf %*	API	SPR	Deaths due to malaria
1995	888,143	2.93	1.14	38.84	3.29	3.51	1,151
1996	872,906	3.04	1.18	38.86	3.48	3.32	1,010
1997	884,719	2.66	1.01	37.87	3.01	2.97	879
1998	910,884	2.22	1.03	46.35	2.44	2.49	664
1999	948,656	2.28	1.14	49.96	2.41	2.59	1,048
2000	982,413	2.03	1.04	51.05	2.07	2.34	932
2001	984,579	2.09	1.01	48.20	2.12	2.31	1,005
2002	1,025,563	1.84	0.90	48.72	1.80	2.01	973
2003	1,027,157	1.87	0.86	45.85	1.82	1.89	1,006
2004	1,040,939	1.92	0.89	46.47	1.84	1.97	949
2005	1,082,882	1.82	0.81	44.32	1.68	1.88	963
2006	1,084,067	1.79	0.84	47.08	1.65	1.67	1,707
2007	1,087,571	1.51	0.74	49.11	1.39	1.56	1,310
2008*	1,089,795	1.52	0.76	49.56	1.40	1.60	924

* Provisional

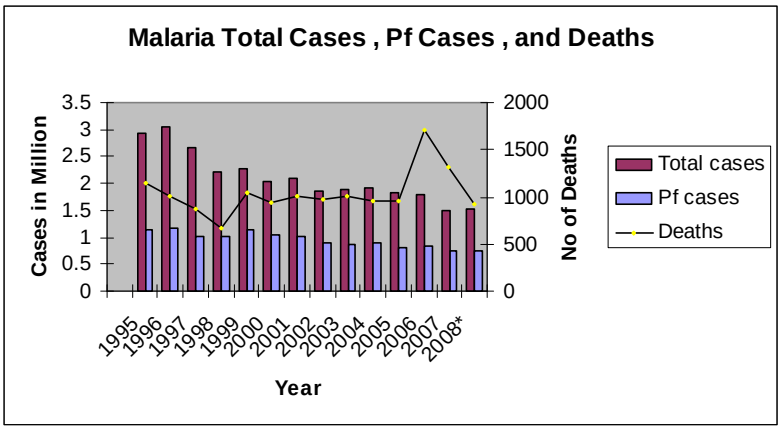
The API has been steadily declining in India from 3.29 in 1995 to 1.40 in 2008. When interpreting API, it is important to evaluate the level of surveillance activity indicated by the Annual Blood Examination Rate (ABER). At low levels of surveillance, the Slide Positivity Rate (SPR) is a better indicator. The SPR has also shown a decline in the country from 3.51 in 1995 to 1.60 in 2008. The *Pf* cases have declined from 1.14 million in 1995 to 0.76 million cases in 2008. However, *Pf* % has gradually increased from 38.8% in 1995 to nearly 50% in 2008, which may indicate increasing resistance to chloroquine.

India is predominantly characterized by unstable malaria transmission. Transmission is seasonal with increased intensity related to rains. Due to the low and unstable transmission dynamics, most of the population has no or little immunity toward malaria. As a result, the majority of Indians living in malarious areas are at risk of infection with all age groups affected. However, surveys have shown that in some foci, mainly in forested areas, transmission is so intense that the disease burden is to a large extent concentrated in children.

Screening of fever cases for malaria is done under NVBDCP covering about 10% of the population annually, of which about 1.5 to 2.0 million are positive for the malarial parasite. Though the API has come down in the country, the malaria situation continues to be a major problem in certain states and geographical pockets. The topography of these areas with hilly tracts, rivulets and forests provide ideal ecological conditions for malaria transmission. The majority of malaria cases and deaths are being reported from Orissa, the seven North Eastern states, Jharkhand, Chattisgarh, Madhya Pradesh and Rajasthan with Orissa alone

contributing more than 20 % of the cases in the country. The case load has shown a steady declining trend since 2004.

Fig 3 - Total malaria cases, *Pf* cases and deaths reported annually from 1995-2008.



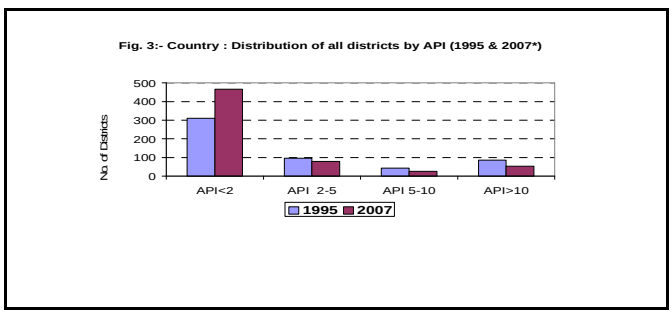
The number of deaths has levelled around thousand per year, with most of these associated with outbreaks occurring in different parts of the country.

Table 3: Reported deaths due to Malaria in High Endemic States in 2007

	Total Deaths	Deaths as percentage of total deaths in the country
Meghalaya	237	18.09
Orissa	221	16.87
Maharashtra	182	13.89
Assam	152	11.60
West Bengal	96	7.33
Mizoram	75	5.73
Gujarat	73	5.57
Tripura	51	3.89
Rajasthan	46	3.51
Madhya Pradesh	41	3.13
Arunachal Pradesh	36	2.75
Jharkhand	31	2.37
Andhra Pradesh	2	0.15
Chhattisgarh	0	0.00
Other states and UTs	**67**	**5.11**
All India	**1310**	**100.00**

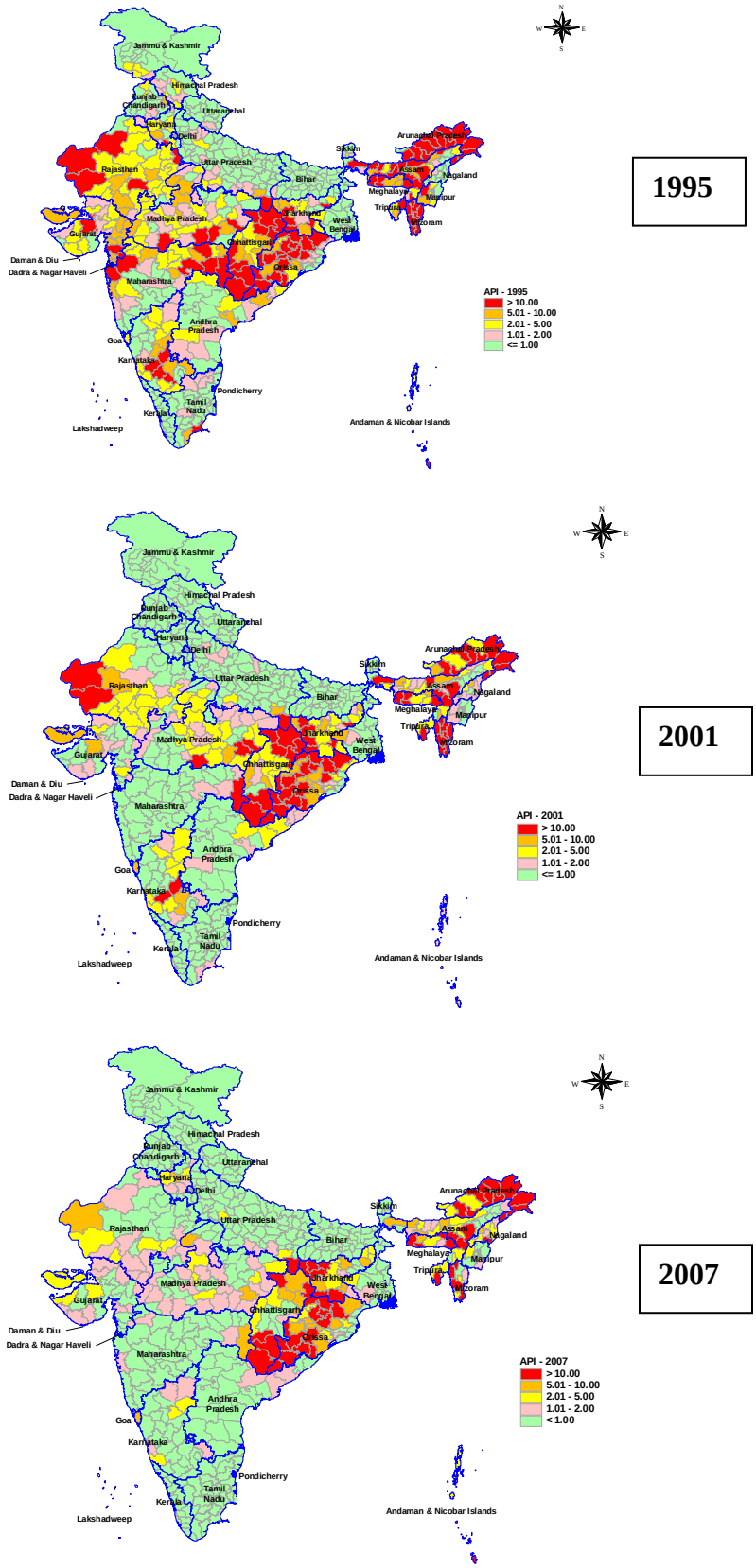
Areas with an API ≥ 2 per 1000 population per year have been classified in India as high risk areas and thereby eligible for vector control. In practice, in high burden states, where often the majority of the population live in areas with API ≥ 2, the criterion applied for high risk has been API ≥ 5 due to resource constraints.

Fig. 4: Change in Distribution of Districts by API in 1995 and 2007



The number of districts with API ≥ 2 has declined from 1995 to 2007.

Fig. 5- Malaria endemicity according to API from 1995 to 2007



2.2.1 Malaria Burden Estimations

The purpose of malaria surveillance is to find out the trends and distribution of the disease for the purposes of planning, evaluation and early detection of epidemics. However, it is important to get a true estimate of malaria related morbidity and mortality in order to plan and project the resource requirements for its control.

The WHO has estimated that malaria was responsible for 10.6 million cases and 15,000 deaths in India in 2006.[2] These estimates are based on extrapolations from surveillance data with assumptions made on underreporting.

Taking into consideration the highly focal distribution of malaria and the size of the country, the accurate estimation of the national malaria mortality and morbidity burdens is inherently very difficult. There are also very few studies on estimation of the malaria morbidity, mortality and burden of malaria in pregnancy in the country.

The NVBDCP intends to arrive at better estimates of severe malaria cases and mortality by establishment of a sentinel surveillance system in all high endemic areas. Non governmental health care providers are also increasingly involved for reporting of malaria cases and deaths. Collaboration with research institutions is also enhanced for conducting studies to assess the true malaria burden in the country.

2.3 Malaria epidemics

Malaria outbreaks occur frequently in various parts of the country. Malaria in India is mostly unstable and the outbreaks are caused mostly by infection due to *P. falciparum*. The reasons for such outbreaks have been identified as improper surveillance and inadequate residual spray activities in rural areas, and antilarval measures in urban areas. The outbreaks which have occurred in the past few years are listed in table below:

Table – 4: Malaria epidemics in India from 1996 to 2007

Year	State(s)	Remarks
1996	Rajasthan and Haryana	Large number of cases; many deaths in Rajasthan
1997	Gujarat, Goa and West Bengal	4 districts
1998	Goa and Maharashtra	2 districts
1999	Andhra Pradesh, Assam, Bihar and West Bengal	23 districts
2000	Uttar Pradesh, Madhya Pradesh and Karnataka	5 districts
2003	Rajasthan	Large epidemic affecting several districts
2004	Assam, Goa, Haryana, Gujarat, Karnataka, Manipur and Maharashtra	44 districts
2005	Assam, Goa, Haryana, Gujarat, Karanataka and Maharashtra	48 districts
2006	Karnataka and West Bengal	5 districts

[2] WHO (2008). World Malaria Report. Geneva, WHO

2.4 Malaria Vectors

The transmission of malaria is governed by local and focal factors leading to vector abundance under favourable conditions. There are six primary vectors of malaria in India: *An. culicifacies, An. stephensi, An. dirus, An. fluviatilis, An. minimus* and *An. epiroticus* (previously: *An. sundaicus*). The secondary vectors are *An. annularis*, *An. varuna*, *An. jeyporiensis* and *An. philippinensis*.

- *An. culicifacies* is the main vector of rural and peri-urban areas and is widespread in peninsular India. It is found in a variety of natural and man-made breeding sites. It is highly zoophilic and therefore a high density of cattle limits its vectorial capacity. *An. Culicifacies* is a complex of 5 sibling species designated as A, B, C, D and E. Species A has a relatively higher degree of anthropophagy as compared with species B. Species A is an established vector of *P. vivax* and *P. falciparum*, whereas species B is completely refractory to *P. vivax* and partially refractory to *P. falciparum*. It has been demonstrated that species B, however, may play a role as a vector of *P. falciparum* in areas where the cattle population is very low or absent.

- *An. stephensi* is responsible for malaria in urban and industrial areas. *An. stephensi* is a complex of 3 variants, i.e. type form, intermediate form and *mysorensis* form. The type form is found in urban areas; intermediate form in urban and semi-urban localities and *mysorensis* form is present in rural areas. Both type form and intermediate form act as vectors whereas the *mysorensis* form is not a vector. Malaria has become an important problem in some of the cities in peninsular India. It has also become a potential problem in rural areas which are undergoing a change to urbanized lifestyle with use of coolers, etc.

- *An. fluviatilis* is the main vector in hilly areas, forests and forest fringes in many states, especially in the east. *An. fluviatilis* is a complex of 4 sibling species designated as S, T, U and V, of which species S is highly anthropophagic and an efficient vector of malaria.

- *An. minimus* is the vector in the foothills of North-Eastern states.

- *An. dirus* is an important forest vector in the North-East, well known for its exophilic behaviour.

- *An. epiroticus (An. sundaicus)*, a brackish-water breeder, is now in India restricted to the Andaman and Nicobar Islands.

Resistance to DDT and malathion is common in *An. culicifacies* and *An. stephensi* in peninsular India. Insecticide resistance in other vectors is thought to be patchier, and information on this aspect is planned to be collected by a large number of studies in various parts of the country from 2009 to 2014.

In addition to monitoring insecticide resistance, there is a need for field entomology in India to update knowledge on bionomics of species and subspecies as well as their vectorial status, taking into consideration climate and environmental changes and the long-term effects of various vector control methods applied.

2.5 Malaria Paradigms/Ecotypes

The association between malaria and various ecological situations have been studied in India since the early part of the 20th century when it was found that the anti-larval measures were not effective everywhere and it was attempted to identify entomological and environmental characteristics, which could be used in decision-making. There is considerable heterogenecity in malaria transmission characteristics between and within the states of the country, and many ecotypes/paradigms of malaria have been recognised. The classifications and vector control recommendations from the below-mentioned text (Sharma et al., 1997) are presented with updates based on the experience of recent years, when ITNs have emerged as a vector control option.

Table 5: Malaria ecotypes/paradigms in India and recommended vector control measures

Ser. No	Ecotype/ paradigm	Main recommended measures
1.	Tribal areas with malaria associated with forest environment (all 7 NE states, Orissa, Jharkhand. Chhattisgarh, foci in other states)	IRS / ITNs / LLINs Limited role for larval control
	Undulating Hills/Foothills with perennial rain in NE, hilly rainforest with *An. dirus*,	
	Hilly partially deforested cultivated forest fringe (*An.dirus, minimus*)	
	Undulating, sometimes deforested with rice cultivation (*An. fluviatilis, minimus,*)	
	Peninsular deep forest or forest fringe (*An. fluviatilis,culicifacies*)	
2.	Malaria in organized sector/army/road construction/Tea Gardens	Same as above and in some situations personal protection, chemoprophylaxis
3.	Epidemic prone areas (Punjab, Haryana, Western UP and Rajasthan)	Antilarval measures, including fish in some areas One round of IRS in selected villages Space spray and IRS in case of outbreaks
	Plain tubewell irrigated areas	
	Plains with sandy soil and no waterlogging	
	Deserts (especially Rajasthan)	
4.	Economic development project areas	Mass screening of incoming labourers, antilarval measures, IRS / ITNs / LLINs
5.	Urban malaria	Chemical and biological larviciding, environmental measures, ITNs / LLINs, house screening, other personal protection measures and focal IRS in areas where this is possible (mainly single-storey buildings).

For further details, refer “Epidemiology and control of malaria in India 1996” by RS Sharma, GK Sharma and GPS Dhillon, GOI MOHFW, NMEP Publication

2.6 Malaria parasites

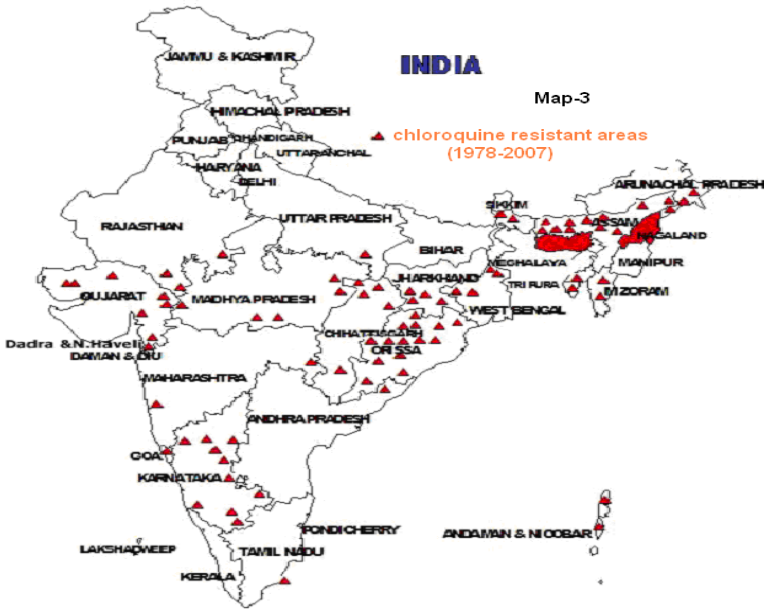
The two most important species of malarial parasites in India are *P. falciparum* and *P. vivax.* They occur together in many areas, with *P.falciparum* being particularly dominant in the North-East while *P.vivax* is predominant in certain states of north India.

Drug resistance

Chloroquine resistance status in India was earlier assessed following the WHO *in-vivo* protocol. 16,833 *P. falciparum* cases had been subjected to the protocol till 2002, out of which 77.5% were sensitive to chloroquine, 14.0% resistant at RI level, 4.8% at RII and 3.7% at RIII level.

From 2002-03 onwards, the new WHO protocol on therapeutic efficacy is being followed to assess the efficacy of antimalarial drugs. 4,287 *Pf* cases have been tested against chloroquine so far, out of which 60.9% have shown Adequate Clinical and Parasitological Response (ACPR), and 39.1% treatment failure have shown either Early Treatment Failure (ETF) or Late treatment Failure (LTF). The areas identified as chloroquine resistance areas in the country are shown in figure 6.

Fig. 6- Areas identified as Chloroquine resistant in India (1978-2007)
(Source: NVBDCP, NIMR and RMRC)



For sulfadoxine-pyrimethamine, ≥10% treatment failure has been observed in Changlang and Lohit districts of Arunachal Pradesh; Karbi-Anglong, Darrang and Lakhimpur districts of Assam; West Garo Hills of Meghalaya and Purulia, Jalpaiguri and Bankura districts of West Bengal.

2.7 National Vector Borne Disease Control Programme (NVBDCP)

The NVBDCP is an umbrella programme for prevention and control of vector borne diseases viz., malaria, filariasis, kala-azar, Japanese encephalitis, dengue and chikungunya. The Directorate of NVBDCP, under the Directorate General of Health Services (Dte. GHS), Ministry of Health and Family Welfare (MOHFW), Government of India (GOI), is the national level unit dedicated to the programme. The Directorate of NVBDCP is the nodal agency for planning for programme implementation, and oversight in coordination with the states. It is responsible for formulating policies and guidelines, monitoring, and carrying out evaluations. It is also responsible for administering GOI's financial assistance to the states in the context of the program.

The main activities of NVBDCP are:

- Formulating policies and guidelines
- Technical guidance
- Planning
- Logistics
- Monitoring and evaluation
- Co-ordination of activities through the states/union territories (UTs) and in consultation with national organizations such as National Institute of Communicable Diseases (NICD), National Institute of malaria Research (NIMR)
- Collaboration with international organizations like the WHO, World Bank, GFATM and other donor agencies
- Training
- Facilitating research through NICD, NIMR, Regional Medical Research Centres etc
- Coordinating control activities in the inter-state and inter-country border areas.

There are 19 Regional Offices for Health & Family Welfare under Directorate General of Health Services, Ministry of Health & F.W., GoI, located in 19 States which play a crucial role in monitoring the activities under NVBDCP. Out of these 19 offices, 16 are equipped with malaria trained staff whereas two offices, one at Chhatisgarh and one at Guwahati are managed by giving additional responsibility of Regional Director to the in charge of Regional Leprosy Training Centre and Regional Drug Testing Laboratory respectively. The Regional Office at Shimla does not have the malaria trained staff. The remaining offices conduct entomological studies in collaboration with the states, drug resistance studies and cross-checking of blood slides for quality control. They contribute also to capacity building at the state level, and monitoring and supervision.

The state governments are required to plan and implement the malaria control operations in their respective states. Every state has a Vector Borne Disease Control Division under its Department of Health and Family Welfare. It is headed by the State Programme Officer (SPO) who is responsible for supervision, guidance and effective implementation of the programme and for co-ordination of the activities with the neighbouring states/UTs. States are responsible for the procurement of certain insecticides for IRS, spray equipment and certain antimalarials, but the central government supplies DDT and larvicides.

Each state has established a State Vector Borne Disease Control Society, which includes civil society and sometimes private sector representation. These are now merged with similar entities for other centrally sponsored schemes into a single state-level Health and Family Welfare Society. The main role of these societies is to channelize funds from GOI to the states and onwards to districts for the financing of the programmes. They also play a role in district level planning and in monitoring of programme activities within districts.

At the divisional level, zonal officers have technical and administrative responsibilities of the programme in their areas under the overall supervision of Senior Divisional Officers (SDOs).

At the district level, the Chief Medical Officer (CMO) / District Health Officer (DHO) has the overall responsibility of the programme. At the district level, district malaria offices have been established in many places headed by the DVBDC officer to assist the CMO / DHO. This office is the key unit for the planning and monitoring of the programme. Spray operations are the direct responsibility of DMO/DVBDC officer in the entire district under overall supervision of CMO and collaborative supervision/monitoring by PHC's Medical Officer. There is one Assistant Malaria Officer (AMO) and Malaria Inspectors (MIs) to assist him. Many posts of DVBDC officer are vacant in some high-burden states such as Orissa, Chhattisgarh and Jharkhand. This is now being remedied by new recruitment; assignment of staff from other

disease control programmes such as leprosy in which the disease burden is declining and by deployment of newly recruited contractual consultants and project officers.

In many districts, District Vector Borne Disease Control Societies (now merged with District Health Societies under NRHM) have been established to assist with the management of funds and planning and monitoring of programme activities.

The laboratories have been decentralized and positioned at the PHCs. The MO-PHC has the overall responsibility for surveillance and laboratory services, and also supervises the spray. Case detection and management and community outreach services are carried out by MPWs as well as ASHAs and other community health volunteers.

In 1977, it was envisaged to implement Urban Malaria Scheme (UMS) in 181 cities and towns. However, only 131 towns and cities were included under the UMS. These cities and towns contributed about 7% of total malaria cases reported in the country in 2007.

2.7.1 Projects and partnerships

The major externally aided projects of NVBDCP are as follows:

- World Bank aided Enhanced Malaria Control Project (EMCP) (1997-2005) was implemented in the tribal areas of 100 high malaria burden districts of 8 states, viz., Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Orissa and Rajasthan.

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- GFATM Round 4 grant aided Intensified Malaria Control Project (2005-2010) has been implemented in the 7 North-Eastern states along with parts of Orissa, Jharkhand and West Bengal, covering a population of about 100 million.

- The New World Bank assisted project (2008-2013) is envisaging coverage of a population of 185 million, in 93 districts of 8 states i.e., Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Orissa and Karnataka.

Partnerships have been established as follows:

- WHO has provided regular technical assistance for malaria control since the 1950s. Currently, the country office has one national professional officer and four consultants assisting the programme, funded by GFATM grant.

- Collaboration with neighbouring countries is undertaken through arrangements made by WHO/SEARO.

- Continuing partnership exists with NIMR for conducting research on various aspects of malaria control including drug and insecticide resistance and also operational research studies.

- There is collaboration with a few NGOs in some endemic districts, as local partners for malaria control activities. A mechanism for “public-private-partnership” allows state and district level malaria control programmes to establish local partnerships with NGOs, particularly for BCC (see www.nvbdcp.gov.in). UNICEF and JSY contribute to malaria control by providing ITNs or LLINs to pregnant women in certain districts.

2.7.2 Interaction of malaria control with the other health programmes

The other main public health programmes related to malaria control are:

- **Integrated Disease Surveillance Project (IDSP).** The project, with weekly fever alerts is increasingly providing the early warning signals on malaria outbreaks.

- **Other vector borne diseases.** Dengue and malaria control activities overlap in many urban areas, malaria and kala-azar in a few districts of Jharkhand and malaria and filariasis in some areas including a few districts of Orissa.

- **Reproductive and Child health.** Ante-natal care services are utilized in distribution of LLINs to pregnant women in some areas of the country. Janani Suraksha Yojana (JSY) also makes provision for bed net distribution to pregnant women. Changes in the malaria case management norms have been included in the Integrated Management of Neonatal and Childhood Illnesses (IMNCI).

2.7.3 Strength, Weakness, Opportunity and Threat (SWOT) analysis

Table – 6. SWOT analysis of the national malaria control programme

Strengths	Weaknesses
Long experience since 1953 Political commitment at national level and in many states Malaria surveillance covering all blocks ASHAs being utilized in all endemic villages for surveillance RDTs for diagnosis of *Pf* introduced Microscopy available up to PHC level ACT for treatment of Pf introduced World's largest IRS programme LLINs introduced Research support from NIMR and other institutions India is a leading manufacturer of malaria diagnostics, drugs and insecticides	RDT coverage needs to be expanded to all endemic villages Delay in conducting microscopic examination of smears collected at community level ACT needs to be used for all Pf cases in country Need for improving effectiveness of IRS Requirement of total shift from re-impregnation of plain nets to LLINs Difficulty in distribution of ITNs in remote areas with inhibited access Deficiency of human resources at all levels from national to block level Procurement related constraints
Opportunities	**Threats**
National Rural Health Mission strengthening the health structure and malaria control in rural areas, at all levels. National Urban Health Mission expected to be launched in the 12th Five Year Plan will strengthen urban malaria control. Increasing commitment for funds from international agencies such as GFATM and the World Bank Good community organization (Panchayats, Village Health Sanitation Committee, Self-Help Groups) for promoting health, present in most districts. NGOs willing to be partners Large scale introduction of RDTs in endemic areas for use by peripheral health workers/ ASHAs. Possibility of introduction of pan-specific RDTs for both *Pf* and *Pv* soon. Large scale introduction of LLINs and ACT for *Pf* malaria.	Overloading of ASHAs with many programmes Development of insecticide resistance Development and spread of drug resistance Social and ecological constraints to effectiveness of standard interventions in some high risk populations Social unrest in some areas

Section – 3: Strategies

3.1 The Vision – A Malaria Free India

The vision of the strategic action plan is a substantial and sustained reduction in the burden of malaria in the near and mid-term, and the elimination of malaria in the long term, when new tools in combination with strengthening of health systems will make national elimination possible.

Malaria control deserves particular attention in India at present because:

- Increasing availability of new technologies and tools and international attention to malaria provide opportunities for formulating more ambitious strategies than has been possible over the last few decades.
- It had been possible in the past to reduce malaria to very low levels with intensive efforts.
- Malaria is also a cause of poverty in many areas and its control will drastically reduce the suffering as well as loss of productivity of the productive age-groups.
- Malaria is largely concentrated in tribal populations and strengthening of malaria control will be an important contribution to improving equity in the health system.

Malaria control is now incorporated into the health service delivery programmes under the umbrella of NRHM. This provides opportunities for strengthening malaria prevention and treatment services close to the community. All available methods and means are being used to deliver these interventions, at entry-level facilities (e.g. CHCs, PHCs, and sub-centres), community outreach services using community health workers and volunteers (ASHAs) at village level, NGOs, private-sector providers and district and regional health facilities and hospitals.

The priorities and practices of the National Malaria Control Programme continue to reflect a strong commitment to the following operational principles:

- Delivery of malaria control services by ASHAs and other volunteers/activists at the community and household level in high endemic areas
- Enhancing supportive supervision and monitoring by engaging DVBDC consultants at district level and Malaria Technical Supervisors (MTSs) at sub-district level.
- Under the externally aided projects supported by World Bank and the Global Fund, the SPOs are strengthened by project monitoring units
- Well streamlined Procurement and supply-chain management

3.2 Malaria Control Strategies

The strategies for prevention and control of malaria and its transmission is:

3.2.1 Surveillance and case management

- Case detection (passive and active)
- Early Diagnosis and Complete Treatment
- Sentinel surveillance

3.2.2 Integrated Vector Management (IVM)

- Indoor Residual Spray (IRS)
- Insecticide Treated bed Nets (ITNs) / Long Lasting Insecticide treated Nets (LLINs)
- Antilarval measures including source reduction

3.2.3 Epidemic preparedness and early response

3.2.4 Supportive Interventions

- Capacity building
- Behaviour Change Communication (BCC)
- Intersectoral collaboration
- Monitoring and Evaluation (M & E)
- Operational research and applied field research

3.3 The Goals for the Strategic Plan 2007-2012

The main international and national goals for malaria control are given below:

3.3.1 National Goals

- At least 50% reduction in mortality due to malaria by the year 2010, as per National Health Policy document-2002

- At least 80% of those suffering from malaria get correct, affordable and appropriate treatment within 24 hours of reporting to the health system, by the year 2012

- At least 80% of those at high risk of malaria get protected by effective preventive measures such as ITNs/LLINs or IRS by 2012.

3.3.2 International Malaria Control Goals

Roll Back Malaria (RBM) partnership goal

- To halve malaria-associated mortality by 2010 and again by 2015

Millennium Development Goals

Goal 2: Achieving universal primary education.

Malaria is a leading cause of illnesses and absenteeism in school-age children and teachers. It adversely affects education by impeding school enrolment, attendance, cognition and learning.

Goal 4: Reducing child mortality.

Malaria is a leading cause of child mortality in endemic areas.

Goal 5: Improving maternal health.

Malaria causes anaemia in pregnant women and low birth weight.

Goal 6: Combating HIV/AIDS, malaria and other diseases.

To halt and begin to reverse the incidence of malaria and other major diseases by 2015.

Goal 8: Developing a global partnership for development, including the provision of access to affordable essential drugs.

There is a lack of access to affordable essential drugs for malaria

3.3.3 Strategic Action Plan

The strategic action plan is organized around a balanced package of services addressing the stated priority of

- Rapid scale up of preventive interventions to decrease disease transmission and
- Reduce burden due to malaria by increased curative services to care for the sick by improving access and quality.

This document has been prepared to convey how the GOI plans to reduce the malaria burden over the five year period 2007-12. It focuses on the urgently needed intensified public health action in those areas where the disease remains a major cause of morbidity and mortality. It also includes estimates of the human resources, major commodities, infrastructure and financing required for malaria vector control and case management in the whole country, and describes the strategies required in the diverse ecological and epidemiological contexts encountered in India. The planning is concentrated to the period corresponding to Government of India's 11th Five Year Plan, i.e., 2007-2012. The plan also includes briefly estimates of requirements from the year 2012 to 2017 (12th Five Year Plan) which aims to also meet the requirements for scaling up interventions to meet the MDG malaria goals by 2015. Finally, it includes an outline of strategic directions for malaria control for the period from 2017-2022 (13th Five Year Plan) aimed at state/region wise elimination of malaria in the long term in the country.

The components of the Strategic Action Plan for the period 2007-2012 are discussed in detail in the following sections.

Section- 4: Surveillance and Case management

4.1 Surveillance

The primary purpose of case management is to shorten the duration of illness, prevent the development of severe disease and death, especially in falciparum malaria. Therefore, case management for malaria is based on early diagnosis followed immediately by effective treatment. Early effective treatment is also important for limiting transmission.

The malaria surveillance system in India was initially set up in the early 1960s to detect remaining foci at that time, when the country was aiming to eliminate the disease and, not to measure the burden of the disease. The system has since been adapted to the needs of control and now monitors malaria incidence trends and geographic distribution and the aim is to target control interventions to high transmission areas and assessing their impact. Surveillance also plays a key role in the early detection of outbreaks.

Active case detection (ACD) is carried out in rural areas with blood smears collected by MPWs during fortnightly house visits. Passive case detection (PCD) is done in fever cases reporting to peripheral health volunteers / ASHAs and at sub-centres by RDTs and at PHCs by examination of blood smears. In villages where no ASHA or other volunteer has been trained and deployed for providing early diagnosis and effective treatment, ACD and case management will be done by the MPWs.

The surveillance data of NVBDCP reflects malaria trends reasonably well because the ABER in the country as a whole has remained relatively constant at about 10% and the surveillance system had not undergone any major changes. The ABER is, however, low in a few states, while in most of the high endemic areas it is much above 10%. Microscopy remains the best method of diagnosis on account of its high sensitivity and specificity. It is also more economical in facilities where large numbers of slides are examined daily.

There are about 100 million blood slides collected from fever cases in India annually from which less than 2 million malaria cases are detected. The new norms for case management emphasize quality care for patients. The implementation of use of RDTs and ACT and the improvements in service delivery is expected to attract greater number of fever cases to the programme in the coming years. It is also expected that these patients will report early to the service provider and as a result case detection will be improved. The programme also plans to supply RDT kits to private providers in return for data. The current level of screening of 100 million fever cases will not be reduced as it is aimed to screen 10% of the population, even though the disease transmission is expected to reduce.

The time lag between collection of blood slides and onset of radical treatment may get delayed due to operational problems related to difficult terrain, poor public transportation and other communication facilities and shortage of trained laboratory technicians. Microscopy is also time consuming, labour intensive and the results largely depend upon the expertise and diligence of the microscopist. During 2003, the NVBDCP introduced the use of RDT in 8 states under the World Bank assisted EMCP for early diagnosis of malaria. Since then, the programme has procured and distributed RDTs to community level workers/volunteers who have been trained to use them to enable timely diagnosis in these areas. Provision of RDTs has been scaled up in the programme to the order of 12 million kits per year. In remote and inaccessible rural and tribal areas, RDTs are now the established method of choice for malaria diagnosis.

Currently, *Pf* specific RDTs are procured by the NVBDCP. These kits are deployed in *Pf* predominant areas {Test falciparum rate (TfR) ≥ 1% and *Pf* % ≥ 30} where microscopy results are not available within 24 hours. For planning purposes, the population residing in remote and hard to reach areas where microscopy facilities are not available is kept at about 30% of the country's total population. It is planned that by 2010-11, RDTs will be available for malaria case detection for the entire population living in these areas. With the ABER around 10%, there will be about 35 million RDTs performed annually. The estimate of RDT needs in the country has been worked out as follows.

Table - 7. RDT requirements of the country (all figures in millions)

Year	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Total population of the country (population projected to increase at the rate of 1.6% annually)	1148	1166	1185	1204	1223	1243	1263
Estimated population in remote and hard to reach areas where microscopy facilities are not available (assumed to be approximately 30% of the country population)	344.4	349.8	355.5	361.2	366.9	372.9	378.9
RDT requirements to achieve 10% Annual Blood Examination Rate (ABER) based on fever rates in the population in remote and hard to reach areas	34.4	35.0	35.6	36.1	36.7	37.3	37.9
25% reserve (buffer stock) of RDTs	8.6	8.7	8.9	9.0	9.2	9.3	9.5
Total RDT requirements in the country	**43.1**	**43.7**	**44.4**	**45.2**	**45.9**	**46.6**	**47.4**

RDTs for *P. vivax* have not yet been deployed in the country, mainly because they lack adequate heat stability. On the background of recent improvements in heat stability of *Pf* RDTs, it is expected that sufficiently sensitive, specific and heat-stable *Pv* RDTs and bivalent RDTs (which detect and differentiate *P.falciparum* and *P. vivax*) will be available by 2011-12.

Microscopy will be required for diagnosis of *Pv* cases occurring even in remote and hard to reach areas, till the time RDTs to detect *Pv* cases are introduced in the programme and hence, the requirement of blood slides will not decrease in this period. When bivalent RDTs will be deployed, the requirement of blood slides will decrease to about 70% of the existing levels, as 30% of total cases occurring in the country will be tested by RDTs in 30% of the population living in remote and hard to reach areas. The annual requirements for diagnostics during the strategic action plan period are given in annexure- 1. The planned procurement of RDTs from 2008-09 to 2010-11 is kept below the actual requirements as the capacity of community volunteers to conduct RDTs and distribute ACTs is being built up in this period.

There has been a steady increase in the proportion of *Pf* cases reported in India over the years and now *Pf* cases account for nearly 50% of the total reported cases of malaria. The large scale introduction of *Pf* RDTs is likely to lead to exaggerated estimates of the *Pf* proportion. The true picture of *Pv : Pf* proportion will emerge only when bivalent RDTs are introduced in the programme.

Presently, RDTs are being used for early and easy diagnosis of *Pf* cases but they can also assume special significance in highly endemic tribal areas for mass screening of

asymptomatic cases common in these areas due to development of natural immunity because of repeated exposures.

4.2 Strategies for malaria diagnosis

- Ensure functional microscopy in all existing facilities in high malaria burden areas.

- Introduce use of RDTs by the health volunteers i.e., ASHAs in villages where the microscopy result cannot be made available within 24 hours i.e. in remote and hard to reach areas and in health facilities without microscopy.

- Increase clinical diagnostic skills through capacity building at all levels.

Objective

To ensure that by 2012, at least 80 % of fever cases suspected to be malaria are diagnosed either by RDTs or microscopy within 24 hours of the first contact to health services.

Operational Design

Till now, ABER is being used to determine the surveillance activities for malaria case detection through ACD and PCD. The yield of case detection through MPWs was poor and it is now planned to shift emphasis on strengthening early case detection by involving ASHAs in high malaria endemic areas. ABER would include fever cases screened through slides as well as RDTs. For bringing objectivity and to amicably address operational issues, the minimum target of ABER of 10% (blood slide or RDT for all suspected malaria cases) will continue to be applied. In villages that do not have trained village level health worker/volunteer, ACD and case management will be carried out by the MPW.

The recruitment of health volunteers (ASHAs) is being continued by the states. One of the key strategies under NRHM is to have one ASHA for every village / a population of 1,000. Detailed guidelines have been issued by the Government on selection and training of ASHAs and as on 2007, 3.8 lakh ASHAs were in position in the country. These ASHAs are being trained in the use of RDTs and ACT in the *Pf* predominant high burden areas to make diagnostic and treatment facilities available at the village level. In addition, under NRHM the states receive inputs for hiring contractual LTs.

People living in malaria-endemic areas are informed through intensified BCC activities that any febrile disease might be malaria and that malaria can rapidly become a very dangerous disease. They will also be informed about where they can obtain quality care for malaria.

Malaria is to be suspected in all patients living in malaria-risk areas and in those who have visited an endemic area within the last month when they present with fever without symptoms and signs of any other obvious condition. Health care providers must immediately initiate a diagnostic test by microscopic examination of blood smear and/or RDT, in all such suspected cases.

Microscopy facilities will be strengthened in health facilities for malaria diagnosis. At the community (village) level, the malaria diagnosis will be based on RDT done by the ASHAs/volunteers in areas where microscopy results will not be available within 24 hours and where one of the following conditions applies:

- *Pf* % ≥ 30 and SfR ≥ 1%
- Consistently high API and deaths are reported

Anti-malarial treatment will in principle be given only on the basis of a positive diagnosis. RDT solves the problem of early diagnosis of *Pf*. If a microscopy result cannot be made available within 24 hours and RDT is negative, a complete 3 days treatment with chloroquine will be given for suspected *vivax* malaria cases.

Wherever a microscopy result can be made available within 24 hours, microscopy will be maintained as the only routine method. RDTs will be used in PHCs and other health facilities only in emergencies or when the LT is not immediately available.

Output indicators

At least 80% of fever cases in high-risk districts receive the malaria test result (either RDT or microscopy) no later than the day after first contact, by 2012.

4.3 Treatment

4.3.1 Criteria for Change in Drug Policy

According to the revised drug policy, there is no scope of presumptive treatment in malaria control. However, where microscopy is not possible within 24 hours and RDT is negative or not available, suspected malaria cases will be considered as clinical malaria cases due to *P. vivax* and treated with the full 3 day course of chloroquine (1500 mg).

The drug policy is changed in areas/block PHCs having 10% or more treatment failure (ETF+LTF) to the currently used antimalarial drug in therapeutic efficacy studies in a minimum sample of 30 patients. The current National Drug Policy recommends the use of ACT (Artesunate plus Sulfadoxine Pyrimethamine) for treatment of *P.falcipuram* cases in chloroquine resistant areas/block PHCs. ACT use is now implemented in 117 high endemic districts of Andhra Pradesh, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura and 256 block PHCs in 48 districts which have reported resistance to chloroquine. The list of these areas is given in annexure 2.

4.3.2 Calculation of requirements of antimalarial drugs

The stopping of presumptive treatment of malaria and introduction of ACT for *Pf* cases in many areas is unlikely to result in an immediate, drastic reduction in the requirement of chloroquine. In the initial few years, at least about 30% of fever cases (around 30 million suspected malaria cases) are expected to be treated with a full 3 day course of chloroquine.

It is expected that in the initial few years after introduction of ACT for treatment of Pf cases and scaling up of vector control interventions including LLINs and quality IRS, the epidemiological situation will improve. However, the number of cases detected by the public health system may remain at around the existing levels due to the public health system attracting more patients who would otherwise have gone to private providers. Therefore, estimation of quantities of antimalarials will continue to be based on the present level of 1.4 million annual cases of malaria.

It is seen that out of the total 1.4 million malaria cases diagnosed annually, there are 0.7 million each of *P. vivax* and *P. falciparum* cases, with the present *Pf* proportion of 50% in the country. The vivax cases are treated with a full course of chloroquine for 3 days and primaquine for 14 days. The norms for calculation of requirements of anti-malarial drugs to

avoid stock-outs even in circumstances like unforeseen outbreaks and procurement delays are as follows:

1. The data of positive malaria cases of the last completed year is taken as basis for calculation.
2. 25% additional quantity is taken as buffer stock requirements
3. For outbreaks which may occur during the declining trend of malaria, the figures for the maximum number of cases reported in any of the years during the decade are also considered e.g., for 2006, the number of cases reported in 1997 are taken, which is 40% more than 2006. This method gives a margin of safety to avoid low provisioning as underreporting of malaria cases in the public health system is known.

Chloroquine

The management of suspected cases awaiting microscopy results implies initiation of chloroquine treatment (6 tablets on 1st day) in up to 50% of cases from whom blood slides have been collected. Therefore, the requirement of chloroquine is worked out as follows:

$$\text{Requirement of Chloroquine tablet (in nos.)} = \frac{\text{No. of blood Slides Collected}}{2} \times 6 \text{ tablets}$$

This quantity will also be sufficient for completion of treatment with a total of 10 tablets (adults) for the cases, which have to wait for more than a day for the slide result and for confirmed *P. vivax* cases. Chloroquine will not be required in treatment of cases of fever due to *Pf* diagnosed by RDTs/microscopy in areas where ACT has been introduced for treatment of *Pf* cases.

Primaquine (2.5 mg) tablets

Primaquine (2.5 mg) tablets are used for radical treatment of *Pv* cases in children in the age group of 1 to 14 years. This age group constitutes about 30% of total *Pv* cases occurring in the country. The dose of primaquine is 0.25 mg per kg body weight per day. The average number of primaquine (2.5 mg) tablets required has been calculated to be 4 per child per day for 14 days. Therefore, the requirement of primaquine (2.5 mg) tablets is

(Total number of *Pv* cases x 30% x 4 x 14) + 25% buffer and 40% for exigencies

Primaquine (7.5 mg) tablets

Primaquine (7.5mg) tablets are used for adult patients who constitute around 70% of the total *Pv* cases occurring in the country. The dose of primaquine is 0.25mg per kg body weight per day. The average number of primaquine (7.5 mg) tablets required in an adult patient has been calculated to be 2 tablets per person per day for 14 days. Therefore, the requirement of primaquine (7.5 mg) tablets is

(Total number of *Pv* cases x 70% x 2 x 14) + 25% buffer and 40% for exigency

ACT

Pf cases in the country will be treated with ACT in areas approved for the same. These areas account for 95% of all *Pf* cases (about 665,000 cases) in the country. The remaining 5% (35,000 *Pf* cases), from areas where *Pf* is not predominant and assumed to be sensitive to chloroquine, will be treated with chloroquine. It is however planned that from 2010-11, all *P. falciparum* cases in the country will be treated with ACT. This is not expected to lead to any

increase in the national level requirements for ACT, as it is expected that by that time, the incidence of *Pf* would have declined.

At presnt, ACT-SP is available as combiblister pack only for adults in the national programme and pediatric courses are available as loose tablets only. The NVBDCP has initiated necessary action to ensure that by 2010, combiblister packs will be available for all age-groups, with four combinations for the pediatric age groups (< 1 year, 1-4 years, 5-8 years and 9-14 years) plus one for adults. Necessary action has also been initiated for stopping artemisinin monotherapy in the country by stopping sale of loose tablets of artesunate. The MOHFW has given necessary instructions to the Drug Controller General (India) to "not grant manufacturing licences or renew marketing licences for oral artemisinin monotherapies and to withdraw permissions given already for the same".

The number of Pf cases treated in the public health system is around 0.7 million cases annually in the country. The incidence is likely to start falling by about 10% every year. 25% stocks are kept extra as buffer for each of the age groups to meet the requirement in exigencies.

To avoid stock-outs at the community level, the ASHA/community health volunteer/worker is expected to keep at all times 2 combiblister packs of ACT as deployment reserve for each of these five age groups. The reserves at the level of MPW at sub-centre have also been worked similarly at a higher amount. The comblister packs will also be supplied to health facilities without laboratory technicians. The norms of deployment reserves of ACT are:

- ASHA - 2 courses for each of the 5 age groups (Total – 10 courses)
- Sub-centres- 3 courses per pediatric age group + 6 adult courses (Total – 18 courses)
- PHCs - 10 courses per pediatric age group + 25 adult courses (Total – 65 courses)
- CHCs - 15 courses per pediatric age group + 50 adult courses (Total – 110 courses).

As the shelf life of ACT is only 2 years, a certain percentage of wastage of the deployment resrves may become unavoidable in spite of best supply chain management methods. The deployment reserves after the first year are kept at 50% of the first year requirements

Deployment reserves to be kept in all Pf endemic areas, in the first year, have been worked out as below.

- 130,000 ASHAs @ 10 dosages each - 1,300,000
- 23,000 sub-centres @ 18 dosages each - 414,000
- 3300 PHCs @ 65 dosages each - 214,500
- 137 CHCs @ 110 dosages each - 15,070

Total - 1,943,570

The calculation of ACT requirements from 2010-11 is as follows.

Table - 8. ACT requirements (figures in million)

Year	2010-11	2011-12	2012-13	2013-14	2014-15
Total population of India (increasing at 1.6% annually)	1185	1204	1223	1243	1263
Number of Pf cases as per epidemiological data (cases are assumed to decline by 30% in 5 years)	0.70	0.65	0.60	0.55	0.49
Number of ACT courses required	0.70	0.65	0.60	0.55	0.49
25% buffer stocks	0.18	0.16	0.15	0.14	0.12
Deployment reserve stocks to be maintained for 4 different pediatric age groups and one adult age group at all levels to ensure that there is no stock-out of any ACT in any Pf endemic areas (in all areas and villages which have recorded Pf cases in the past 3 years)	1.94	0.97	0.97	0.97	0.97
Estimated requirements in public sector	2.82	1.78	1.72	1.66	1.58
25% to be issued for treatment of malaria cases in the non-govt facilities which will give regular reports on case management along with buffer stock and reserves	0.71	0.45	0.43	0.42	0.40
Total requirements (for public and private sector)	3.53	2.23	2.15	2.08	1.98

In summary, it has been calculated that there is a requirement of 3.52 million ACT-SP packs in the country in 2010-11 to meet the requirements of treatment of all Pf cases with adequate reserves at all levels.

The replenishment stocks will be kept at the district and state levels on the basis of total *Pf* cases expected to be treated in a year which will include blisters for all age groups. The distribution of cases is as follows:

- Adult case - 60% of total cases
- Pediatric cases - 40% of total malaria cases. Among the pediatric cases, the distribution of cases is as follows:
  - Under 1 year - 10%
  - 1 to 4 years - 22%
  - 5 to 8 years - 30%
  - 9 to 14 years - 38%

The option of switching to an alternative ACT is being kept open within the period of this plan. This may become all the more necessary if the multidrug resistance prevalent in neighbouring countries spreads to India. It is assumed that the cost of the alternative ACT will become equal to about that of the currently used combination.

Even though epidemiological studies indicate that only 3% of falciparum cases become severe malaria cases, the requirements for severe malaria have been calculated at 5% to ensure adequate quantity of drugs at all health facilities with sufficient reserves. The

calculation has been done on the basis that adult cases will be treated with artemisinin derivatives and children and pregnant women with quinine. With improved access to quality case management, the incidence of severe malaria and in-patient malaria should decline, as should malaria deaths.

4.4 Strategies for Treatment

- Extension of effective treatment with ACT to the identified PHCs / districts.

- Provision of complete course of anti-malarial treatment as per drug policy and guidelines.

- The current policy for malaria diagnosis and treatment in the public sector varies according to sensitivity pattern of parasites based on results of therapeutic efficacy studies for chloroquine. Block PHC areas where chloroquine resistance is observed to be more than 10%, along with the adjoining cluster of PHC areas are selected for treatment with ACT.

- The currently selected ACT is artesunate (3 days) + sulfadoxine-pyrimethamine (single dose on 1st day). The use of combination treatment delays the development of resistance. Artemisinin derivatives will not be used as monotherapy, as the development of resistance to these uniquely effective drugs will prove to be a major set-back for malaria case management and control. All treatment providers in the identified areas of the country, including those in the private sector, are being motivated to adhere to ACT and not artemisinin monotherapy.

- *P. vivax* cases will be treated with chloroquine for three days and primaquine for 14 days to prevent relapses.

- Private providers will provide treatment according to standard treatment guidelines.

- Supporting and strengthening of referral systems.

- Management of severe malaria cases by enhanced referral systems and treatment in tertiary institutions.

Objective

To ensure by 2012 that at least 80% of malaria cases in targeted districts receive prompt and effective treatment as per national drug policy within 24 hours of first contact with the health care provider.

Operational Design

A positive RDT result will be followed by immediate treatment for *falciparum* malaria. If an RDT has not been done, the result of microscopy will be informed to the patient no later than one day after the first contact and treatment of positive cases will start immediately.

Faster and better quality services will be ensured, partly by filling up staff vacancies like MPWs, LTs, etc. NGOs will be involved in the programme under PPP, especially to improve access to tribal populations. The workers of NGOs with the infrastructure and human resources for case management will be provided with necessary training and supplies (e.g., RDTs, ACT). Private providers will also be motivated, by involvement of the Indian Medical

Association (IMA) for correct use of antimalarial drugs as per guidelines applicable to their respective areas.

The introduction of malaria treatment at the community level will require training of community health workers like ASHAs in administering ACT. The training is intended to improve the diagnostic skills of the ASHAs, accuracy of their reporting and also to minimize the costs due to drug wastage.

Output Indicators

- Percentage of RDT positive cases among adults receiving ACT no later than the day after the fever started.
- Percent of designated providers of malaria diagnosis and treatment who have not had an ACT or RDT stock-out during the last 3 months.
- Percentage of high endemic villages with trained designated provider of malaria diagnosis and treatment services.

4.5 Management of severe malaria cases

The management of severe malaria cases at the secondary and tertiary levels focuses on strengthening the technical capacity for managing severe malaria cases and reducing deaths.

Strategies

- Provide technical support to rural and urban health centres and hospitals and ensure existence of an effective referral system.
- Identify emergencies and refer them immediately to the next level of care.
- Technical support from higher levels

Operational Design

Patients with signs of severe malaria, symptoms suggesting diseases other than malaria as well as those patients who do not improve quickly with antimalarial treatment or whose symptoms return within 14 days, will be referred to higher levels of care, where their disease can be managed with competence. Cases of severe malaria will receive in-patient care and parenteral treatment with artesunate, artemether, arte-ether or quinine.

Activities to be undertaken

- Identification/mapping of referral centres in tribal and other backward areas
- Equipping referral centres with necessary anti-malarials, supportive drugs and other supplies
- Training ASHAs / AWWs, MPWs and MOs for identification of severe malaria
- Arranging for referral of severe cases in tribal areas to referral centres
- Training and orienting staff at referral centres to manage severe malaria cases

Output indicators

- Service points providing artemisinin injections and quinine according to the policy
- Case fatality rate at sentinel sites providing treatment for severe malaria cases
- Deaths due to malaria

4.6 Malaria epidemics

One of the main aims of the NVBDCP is to prevent malaria epidemics and outbreaks, identify them in their incipient stages and prevent them from progressing into full-blown epidemics. Prevention requires a high level of preparedness and it is closely linked with the IDSP.

Malaria is known to occur in cyclical trends every 7 to 10 years in low endemic areas. India has historically been affected by extremely severe malaria epidemics, often associated with unusual rainfall, for example in the arid state of Rajasthan. However, high endemic areas are also not totally exempt from epidemics, e.g. the epidemic in Assam in 2006 was caused by operational deficiencies and poor surveillance. Smaller outbreaks occur sometimes in urban areas, associated with construction works that create breeding sites and which attract workers who bring parasites from malaria endemic areas.

4.6.1 Detection of Early Warning Signals

The early warning signals communicated to MO-PHCs will enable them to pay more attention to the weekly trends. Once a strong degree of suspicion of an outbreak is present, the following steps will be taken:

- Rapid fever survey by collection of blood slides / conducting RDT to find the SPR and RDT positivity rate to assess the magnitude of the malaria outbreak.
- Comparison of trend of month-wise malaria incidence during the year under investigation with that of the preceding year.
- Comparison of the SPR of the current month to SPR of the corresponding month of previous year.
- Collection of information on climatic conditions, vulnerability, receptivity, vector density etc. and try to determine the cause-effect relationship.

Upon collection of the above data and analysis, an epidemic/outbreak will be confirmed if the following findings are positive:

- Increase in SPR (doubling) in the current period as compared to same period of previous year or when SPR in routine surveillance is 5% or more.
- Increasing trend of malaria incidence in the months of the current year as compared to corresponding months of previous year.
- Increasing vector density and positive findings for other supportive factors.

On confirmation of an outbreak / epidemic, the CMO / DMO / DVBDC officer will ensure that all measures related to preparedness and control of outbreak / epidemic are in place in the district. The following key actions are required to be taken:

4.6.2 Preparatory aspects

The district will be prepared to respond rapidly to an outbreak / epidemic whenever the need arises, particularly in the transmission season. The prerequisites to be fulfilled will be as follows:

Rapid Response Team (RRT). The RRT will be constituted in collaboration with IDSP, with the aim of undertaking urgent epidemiological investigations and provide on the spot technical guidance and logistic support.

Logistics. The CMO / DMO / DVBDC officer and the MO-PHC will ensure availability of adequate buffer stock of reagents, slides, RDTs, drugs, insecticides and spray equipment etc., during the transmission season to take care of possible excess requirements for outbreaks / epidemics in the district and PHC respectively. A contingency plan will also be in place for mobilization of resources.

4.6.3 Control of malaria epidemics

Once an abnormal situation is confirmed, the RRT will reach the area immediately. Adequate resources, logistics and manpower will be mobilized. The following steps are to be taken for the control of outbreaks / epidemics:

Step 1: Delineation of affected area. On ascertaining that there is an epidemic situation in some of the villages of a PHC, the MO-PHC / DMO /DVBDC officer / RRT will make arrangements for delineation of the endemic area and to find out the extent and severity of the epidemic by fever surveys.

During the rapid fever survey, all fever cases and individuals with history of fever in every village in the suspected epidemic zone will have their blood examined by microscopy / RDTs. In case the affected population is relatively small, a mass survey of the entire population will be carried out in every village in the suspected epidemic zone, irrespective of the fever status.

Step 2: Estimation of population involved. This will be done by taking the village-wise population from the family register or the census population of the villages identified, whichever is readily available at the PHC.

Step 3: Measures for liquidation of foci. On ascertaining the population affected and the number of households in which measures to liquidate the epidemic is to be implemented, the anti-vector and anti-parasitic measures shall be planned.

Step 4: Follow-up Action. The following follow-up actions will be taken to assess the impact of remedial measures:

- Continue close surveillance for one month (twice the incubation period of malaria) after the outbreak has been contained, as demonstrated by epidemiological indices.
- Strengthen case detection and treatment services at all levels in the vicinity by ensuring that laboratories are fully functional, surveillance workers are deployed, community volunteers are activated and supplies and logistics at all levels are ensured.
- Investigate the cause of epidemic, so as to action to prevent epidemics in future.

Section 5: Integrated Vector Management

5.1 Introduction

The NVBDCP aims to achieve effective vector control by the appropriate biological, chemical and environmental interventions of proven efficacy, separately or in combination as appropriate to the area through the optimal use of resources. Efforts are made for collaboration with various public and private agencies and community participation for vector control. Integration of IVM is done by using identical vector control methods to control malaria and leishmaniasis in rural areas, and malaria and dengue in urban areas to achieve cost-effectiveness and synergy. The IVM includes safe use of insecticides and monitoring of insecticide resistance. The measures of vector control and protection include:

- Measures to control adult mosquitoes: Indoor Residual Spray (IRS)
- Antilarval measures: chemical, biological and environmental
- Personal protection: use of bed nets, including insecticide treated nets

The national malaria control program is currently using IRS as the primary method of vector control in rural settings, and anti-larval measures in the urban areas. Bed nets have also been introduced in the program, and the program envisages a scale up in their use as an option that also addresses environmental, operational and community acceptance considerations of IRS.

5.2 High risk areas and high risk populations

Micro-stratification has been applied in malaria control for decades, and will now be applied more rigorously, as resources are increasing, making it possible to protect maximum number of populations living in high risk areas. Using local surveillance data and vector control experience, including the knowledge, habits and attitudes of the local community, district VBDC staff will be responsible for identification and mapping of high risk areas and risk populations as a basis for planning vector control. The stratification will be flexible, but firm enough to provide the corner-stone for planning, monitoring and evaluation.

IRS was carried out at the beginning of the NMEP in 1958 in all rural areas. However, under the MPO in 1977, it was decided to cover only high risk rural areas, i.e., those areas with API ≥ 2. The Technical Advisory Committee on Malaria (2002) has further prioritized the criteria for undertaking IRS, which was at that time the only vector control method recognized for broad application. These criteria are as follows:

- To spray on priority basis with suitable insecticide all areas with ≥ 5 API where ABER is 10% or more, taking the sub-centre as a unit.
- To spray on priority basis with suitable insecticide all areas reporting ≥ 5% SPR (based on passive collection of blood slides), if the ABER is below 10%.
- Due priority be accorded for spray if *Pf* proportion is more than 50%.
- To accord priority for IRS in areas with less than API 5 / SPR 5% in case of drug resistant foci, project areas with population migration and aggregation or other vulnerable factors including peri-cantonment areas.
- To make provision for insecticidal spraying in epidemic situations.

- Other parameters including entomological, ecological parameters, etc, may also be considered while prioritizing areas for spraying.

As much as possible, the village will be the unit of intervention, but in some districts, data availability combined with knowledge of ecological conditions may make it more rational to classify whole sub-centre areas as high risk areas.

High risk areas and populations will be re-defined at least annually. Populations living temporarily in a high risk area will be included in the high risk category. Thus, through microstratification, it will be determined for each village, whether it is located in a high risk area. Such villages shall be protected by IRS or ITNs and the coverage will be more than 80%, whatever may be the intervention. Larval control is the main method of vector control in urban areas.

IVM includes a large number of measures which aim to reduce the number of bites by infected vectors of malaria. It may be possible to reduce the breeding of anopheles mosquitoes by environmental measures or by the use of larvivorous fish or chemical larvicides. These methods would be systematically promoted in areas wherever they have proven effective. However, in most high-burden areas, long-term measures targeting adult mosquitoes are generally more effective and applicable. Two such methods are now available: IRS and ITNs. Since these methods are costly and based on insecticides, they shall be targeted in high-risk areas. The choice between IRS and ITNs will be based on operational factors, community acceptance and local experience. The unit of intervention for application of IRS and ITNs will be the village.

5.3 ITNs including LLINs

A number of published studies from different parts of the country have demonstrated the effectiveness of ITNs. A field study in an area with low malaria transmission in Gujarat compared effectiveness and cost-effectiveness of ITNs and IRS. The mean cost per case averted for ITNs was statistically significantly lower (Rs. 1848, 1567–2209) than IRS (Rs. 3121, 2386–4177)[3].

The in-depth review (2007) of the programme reported a low ITN coverage rate in spite of many years of distribution of large number of nets. The task of achieving high LLIN coverage of populations living in malaria endemic areas in India faces challenges such as determination of at-risk and target populations, lack of resources required to scale up coverage in target populations, development of operational guidelines for net distribution, choosing the appropriate net delivery mechanisms and evaluation of the programme using standard survey methodologies. It is also important to evaluate long-term field performance of LLINs, especially assessment of community acceptance and coverage rate, epidemiological impact and attrition rate. To realize the full potential of the LLINs, they would be scaled up to achieve full coverage of the entire population of the villages where they are the chosen method for malaria prevention.

Of the estimated 1,148 million of the country's population (2008), about 131 million live in high risk areas with API ≥ 2. (The population is projected to increase at a growth rate of 1.6% annually, as per decadal growth rate). These high risk areas are eligible for vector control interventions as per policy. ITNs (including LLINs) and IRS are the two key methods of vector control promoted on a large scale in the country. It is planned to scale up the use of

[3] Bhatia et al. Cost-effectiveness of malaria control interventions when malaria mortality is low:insecticide-treated nets versus in-house residual spraying in India. *Social Science & Medicine* **59** (2004) 525–539

LLINs over the coming years and simultaneously reduce the reliance on use of conventional bednets treated with insecticides.

The population living in areas with API ≥ 5 (69.1 million in 2008) is at present planned to be covered with LLIN. This population is projected to increase at the rate of 1.6%. The number of LLINs required is planned @ 2 family size LLINs per household, with the assumption that an average household consists of 5 persons. The number of LLINs required to cover the target population has been calculated @ 2 LLIN for 5 persons.

Table - 9. Estimation of LLIN requirements (all figures in million)

Year	2008 - 09	2009 - 10	2010 – 11	2011 - 12	2012 - 13	2013 - 14	2014 - 15
Total population of the country (population projected to increase at the rate of 1.6% annually)	1148	1166	1185	1204	1223	1243	1263
High risk population living in areas above API > 2	131.00	133.10	135.23	137.39	139.59	141.82	144.09
Population to be covered by LLIN (the population living in areas where API > 5)	69.10	70.21	71.33	72.47	73.63	74.81	76.00
Number of LLIN required in the country	27.64	28.08	28.53	28.99	29.45	29.92	30.40

Population living in endemic areas registering API ≥ 2 is at present covered with conventional nets treated with insecticides and IRS. Conventional nets treated with insecticides will continue to be used in areas registering API 2 to 5. IRS will be carried out in high endemic areas as per the program policy. IRS is still the preferred method of vector control in areas with very hot summers and where ITNs are not acceptable to the population, e.g. in Rajasthan. Both IRS and ITNs may be used in some areas depending on epidemiological, ecological and operational requirements. The potential role of combining ITNs and IRS will be investigated in a controlled trial.

The strategy is to rapidly scale up LLIN coverage through a mass distribution campaign to achieve universal coverage in villages with API > 5 and to ensure a long-term sustainability of net delivery. The objective of the universal coverage is to ensure that at least 80% of the population in these villages sleeps regularly under LLINs. In combination with the net distribution, the program focuses on promoting utilization of LLINs through extensive BCC activities to achieve utilization rates of at least 80%. LLINs will also be deployed in all high burden areas which are operationally difficult for IRS.

LLINs will be promoted and scaled up, while impregnated plain nets will retain a small role. A total of 4.6 million plain nets have been distributed by the programme to eligible populations which get reimpregnated with insecticides regularly. The bed nets purchased by the community are also treated regularly. It is planned that from 2010-11, plain nets will not be distributed any more by the programme and only nets purchased by the community will be reimpregnated. The programme will be supplying LLINs from 2009 with external assistance to the areas covered under external assistance.

A population of about 80 million is at present being covered by IRS in the country. IRS is also used for control of any outbreaks/epidemics. Any decision on withdrawal of IRS from areas which have received universal coverage with LLINs will be taken only after taking epidemiological and ecological factors into consideration. It is also expected that IRS will

remain the main vector control measure in some areas. IRS will also be the main method for control of epidemics.

With the resources available under the country's domestic budget and the existing commitments under GFATM Round 4 Project and World Bank aided Project, a wide gap in LLINs will still need to be bridged to attain universal coverage. At the current level of committed supplies, the country is well short of its target for universal coverage. The programme envisages filling this gap by applying in subsequent rounds of the Global Fund, increasing their numbers in the World Bank project as well as procurement through the domestic budget.

5.3.1 Planning for LLINs

Universal coverage with ITNs/LLINs with focussed IRS is expected to achieve 80% utilization by people at risk resulting in a significant impact on malaria morbidity, mortality and health care costs.

Objective

To ensure that at least 80% of people sleep under effective ITNs/LLINs in target areas by 2012.

Strategies

- Rapid scale up of ITN/LLIN coverage through a mass distribution campaign. Every eligible household will be supplied with family size LLINs @ 2 nets per 5 persons.
- Re-treatment of plain nets with synthetic pyrethroids done free of cost to the community.
- BCC to ensure that there is regular use of ITNs/LLINs which were previously distributed.
- The Vulnerable Community Plan (VCP) for malaria prevention and control will develop a demand driven approach for the distribution and availability of LLINs / ITNs at the community level involving the people in planning and decision-making about whether they will be protected by IRS or LLINs.
- Social marketing of LLINs.

Operational Design

India has previously employed a mix of interventions for ITN delivery mechanisms. These have revolved around targeting various sub-populations defined by socio-economic, demographic and geographical factors such as children under five, pregnant women and the poor. It has included commercial sales, subsidized and free ITNs.

In order to rapidly scale up ITNs country-wide, NVBDCP has re-focused its strategic approach towards ensuring that the goal and objectives of increased access and utilisation are met. This will be done by using the experience gained in the past 5 years. In this regard, the minimum package for delivery of ITNs has been determined as mass distribution of ITNs / LLINs free of cost in remote and hard to reach tribal and rural areas.

Maintenance of coverage will be met through need based planning and all partners involved in implementation and distribution will be required to cost their operational activities. Mass re-treatment campaigns will be conducted twice a year to ensure efficiency and consistency with the recommended insecticides.

The success of this thrust will require effective BCC strategies for proper use and demand generation. Initially, LLINs will be distributed by the public sector free of charge (possibly through contracts with NGOs), but it is possible that in future, a progressively larger share of

nets will be distributed through PPP initiatives (social marketing), with the government providing a partial subsidy, depending on the household economy.

Outputs

- Number of ITNs / LLINs distributed to households
- Number of nets retreated
- Number of nets replenished
- Percentage of population in high-risk project areas provided with effective ITNs/ LLINs or IRS.

5.4 Indoor Residual Spray (IRS)

IRS is at present carried out in high risk areas with coverage of about 80 million population. DDT is the insecticide of choice; in areas where the vector has shown resistance to DDT, the alternatives are malathion and synthetic pyrethroids. Two rounds of spraying are done for DDT and synthetic pyrethroids to provide protection during the entire transmission season and in the case of malathion, three rounds of spraying are required.

About 60% of the high risk areas targeted under IRS are under coverage with DDT. The real coverage by IRS is however limited by the low community acceptance due to the white marks left on plastered surfaces, acrid smell associated with malathion, re-plastering of wall after completion of IRS, etc.

As the programme intends to expand the use of LLINs in high risk areas targeted for vector control, it would not expand the use of IRS further. The focus would be on improving the quality of IRS with meticulous microplanning and intensive monitoring and supervision. With quality IRS, there is every chance that disease control would be possible in these areas in the coming 2-3 years and areas previously qualifying as high risk would shift to low risk. This would bring about a decline in the requirement of insecticides for spray in the following years.

The projected requirements of insecticides and spray squads is given in Annexure- 1.

Planning for IRS

The first round of spray in an area is usually done to coincide with the time of build up of vector populations which precede the malaria transmission season.

Objective

To achieve at least 80% coverage of households in targeted high risk areas with spray of effective insecticides

Strategies

IRS is still the best method for vector control in certain parts of the north-west states of India, where vectors are highly endophilic and the summer temperatures are so high that people do not like to use bed nets.

Operational Design

During the Strategic plan period (2007-12), IRS coverage will be targeted primarily at achieving a minimum of 80% coverage of IRS eligible population living in high endemic areas. These are the areas not targeted for community-wide coverage with LLINs or conventional ITNs. It is possible that as LLINs are scaled up, the IRS eligible population will become smaller, but the rate at which this will happen cannot be determined in advance.

Surveillance on insecticide resistance will form a critical component for taking decision on the insecticide to be used. Therefore, the surveillance of resistance by NIMR and zonal entomologists will be strengthened.

DDT will continue to be used but efforts will be made to progressively scale down its use. Research for alternative insecticides will be intensified in adherence to Stockholm Convention. The state health services will be responsible for safe disposal of DDT and other insecticides.

Output indicators

- Percentage of targeted households / rooms sprayed.
- Percentage of population living in sprayed households.

5.5 Other methods for malaria vector control

The breeding of anopheles mosquitoes can be reduced by a variety of physical, chemical and biological methods of larval control. In most situations these antilarval measures have lesser impact than IRS and ITNs/LLINs which reduce the longevity of adult vectors. However, in some areas, larval control can play an important role, either alone or as an adjunct to IRS and ITNs. NVBDCP recommends use of larvivorous fish in man-made breeding sites in rural and peri-urban areas, freshwater bodies in rural areas and in unused wells. Generally, larval control plays a greater role in arid areas, where breeding sites are very few in number and well delimited. In contrast, in forested areas and other areas with dense vegetation, it may not be practically possible to identify and target adequate number of breeding sites. In India, use of larvivorous fish is the most widespread method of larval control.

The types of larvicides to be used will range from chemical formulations to microbial formulations as recommended by WHOPES. The larvicides used in the programme are Temephos and BTI.

The control of urban malaria lies primarily in the implementation of urban bye-laws to prevent mosquito breeding in domestic and peri-domestic areas, and government buildings. Larvicides are applied on a weekly basis in water bodies that are unsuitable for fish use. The Government of India supplies larvicides to municipalities under the Urban Malaria Scheme. The Urban Malaria Scheme is implemented by the state authorities, including the salary of staff employed for spraying the larvicides.

Section 6: Human resource management and capacity building

6.1 Human Resource Management

The human resource requirement of the programme is broadly of two types. Firstly, staff is required in large numbers at the service delivery points like CHCs / PHCs, sub-centres and the village / community level. The government has sanctioned staff in CHCs / PHCs and sub-centres as per approved norms for health facilities. These categories include Medical Officers (MOs), Lab Technicians (LTs), Health Supervisors (HS) (male and female) and Multipurpose Workers (MPWs) (male and female). For community level service delivery ASHAs have been sanctioned under NRHM. Vacancies however, exist across all these cadres of staff. It has been identified that in the 15 states of the country which carry the highest malaria burden, 13% posts of MOs, 18% of LTs, 28% of HS (M), 11% of HS (F), 23% of MPW (M) and 5% of MPW (F) are vacant against the sanctioned numbers. These vacancies affect various aspects of programme functioning like surveillance, case management, monitoring and supervision adversely. The programme envisages filling up of these posts in high malaria burden areas on priority. NRHM supports institutional strengthening and to some extent the human resource with the condition that states should fill the vacancies so that the contractual support does not become a recurring liability of GoI.

Objective

To achieve positioning of at least 70% of the sanctioned staff in high-risk areas.

Strategies

- Ensure that there is a well established planning and forecasting framework for projecting status of vacancies and additional needs based on norms and related costs across all cadres and levels of the health system.

- Provide planning support to districts to manage temporary staffing pools for rapid scale up of malaria control efforts e.g., District Vector Borne Disease Consultants (DVBDCs) and MTSs.

- Invest in and conduct training of all health care providers (MO, LT, DVBDC, MPW, MTS and ASHA) for delivery of better services.

Operational Design

- Utilise available resource mobilisation to contract non-governmental staff.

- Advocate for expansion of staff retention and compensation incentives to include key technical and management staff in addition to cadres of health care providers. Incentives for ASHA have been built-in for high endemic areas. These need to be expanded in case of requirement.

- Provide support to Regional Offices of Health and Family Welfare and research institutions of higher learning for capacity development for improved management and HR planning.

Output indicators

- Each district produces an annual analytical report and an annual plan with objectives and strategies

- An assessment of HR requirements is completed for rapid national scale up and maintenance of malaria control programming at all levels.

- All levels of the health system have staffing plans inclusive of malaria prevention and control related staffing requirements.

6.2 Capacity building

Human resource, adequate both in quantity and quality, is a vital need for effective functioning of any programme. The capacity of the medical and paramedical personnel and volunteers in public and private sector is regularly assessed and necessary trainings are regularly organized. Training enhances knowledge and strengthens technical skills, especially in the light of scientific and technical advances, as well as helps motivate staff for discipline, diligence and dedication in their work. The training will have inbuilt provisions to update knowledge and skills.

During the strategic plan period, training will be taken up for staff at the time of induction as well as for reorienting existing staff on new programme policies and guidelines. All staff recruited for service delivery at CHCs, PHCs, sub-centres and community level will receive induction training and refresher courses in two years. Existing staff will also be given reorientation trainings in a phased manner during the period. NVBDCP has updated its Operational Manual for Malaria Control and developed training modules MOs, MPWs, MTSs and ASHAs. .

To improve programme management and monitoring, special courses are being designed to build the capacity of related staff. A 3-month induction course for the newly appointed District Malaria Consultants/ District Vector Borne Disease Consultants is being organized. They will be trained on malaria epidemiology, entomology and programme management. Similarly a 10-day training course has been designed for MTSs who are receiving training at the nearest Regional Medical Research Centres.

Objective

To train at least 80% of the health care staff, health volunteers and ASHAs in high-risk areas in anti-malarial activities by 2012.

Strategies

- Development of a training plan, training modules and SOPs based on needs assessment

- Conducting national and sub-national job-specific training courses for new recruits

- Conducting national and sub-national refresher training courses for in-service personnel and health volunteers

Operational Design

- A training plan and operational guide will be developed for the period of this strategic plan. This will be made available in all states/districts.

- A cascading model of three tier capacity building program at primary, secondary and tertiary levels to strengthen health care delivery system for prevention and control of

malaria and other vector borne diseases already exists to ensure quality health manpower development. The training will be an ongoing program with in-built provision for updating of knowledge and skills in the light of technical advances.

- Preference will be given to technical training related to their respective job requirements in the case of ASHAs, MTSs, VBD consultants, etc. as they are new to the health care delivery system. At the end of the training, they will be able to demonstrate adequate knowledge of malaria and control interventions; express confidence in their ability to participate in planning and implementation; perform M&E and have counseling skills including IPC.

- Government training institutions will be used for organizing training to the health care staff. Services of private/NGO training institutions will also be sought, wherever sufficient capacity for conducting trainings is available, by entering into partnership.

- Training of private sector care providers will be carried out with the help of professional organizations which have the expertise and experience, by entering into partnerships with them. Appropriate training materials will also be developed for private sector care providers with the help of experts.

- Trainings will emphasize standard approaches and methods including active learning.

- Pre- and post-training assessments will be mandatory.

- A resource pool of master trainers will be created at national and sub-national levels comprising experts in various fields for conducting various training courses.

- The various training modules for different categories of staff will be reviewed and updated periodically.

- Appropriate budget will be allocated for training.

- M & E of training will be integrated into the overall M & E plan of the program.

Output indicators

- Updated training modules for all categories of staff and volunteers are in place at each level where training is conducted.

- Number of training courses conducted in a year relative to number of courses planned, disaggregated for ASHAs, health workers, volunteers, MTSs, laboratory technicians, MO-PHCs, etc. in a year.

- Number of persons trained in each category relative to planned number of persons, disaggregated for ASHAs, health workers, volunteers, MTSs, laboratory technicians, MO-PHCs, etc., in a year.

Section 7: Intersectoral collaboration and Behavior Change Communication (BCC)

7.1 Intersectoral Collaboration

Malaria is not merely a health issue, but a consequence of interplay of physical environmental and socio-economic factors. Efforts to control malaria have yet to prove very successful, since community-driven demand and action and integration with non-public sector have been inadequate. It is increasingly being recognized that the efforts of the public health authorities can be strengthened with effective intersectoral collaboration with non health ministries and departments, private sector and NGOs. This will foster uniformity in diagnosis, treatment and monitoring through a wider base for maximizing malaria control with effective treatment and appropriate and locally applicable vector control measures. This will thus complement and supplement the national program efforts in making a significant and sustained decrease in the malaria burden.

Under the NRHM, State and District Health Missions, Rogi Kalyan Samitis and Village Health and Sanitation Committee have multisectoral composition. As malaria control is part of the integrated disease management efforts under NRHM, intersectoral deliberations take place at sub-national levels. The malaria specific responsibilities of member organizations and their partners / networks will be charted out.

Objective

To establish intersectoral collaboration and partnerships with other sectors for prevention and control of malaria, in endemic areas by 2012.

Strategies

- Sustained advocacy at political and administrative levels to prioritize malaria control and inculcate keenness for partnerships within public / private / NGO sectors.

- Fostering partnership of NVBDCP through written communication and inter-personal dialogue with non health ministries and departments, private / NGO sectors at national and sub-national levels.

Operational Design

- Scheduling of NTF meeting prior to the month of June to discuss shared concerns, best practices and specific areas of cooperation by member organizations.

- Identification of nodal officials for follow-up.

- The existing NTF may be expanded to include such ministries and departments of the GOI as industries, labour and transport as well as Municipal Corporations, FICCI, ASSOCHAM; educational bodies [Federation of Public Schools (FPS), Association of Indian Universities (AIU); professional bodies [Indian Association of Physicians, Association of Gynaecologists and Obstetricians, Association of Paediatricians] and hospitals / medical institutions (All India Institute of Medical Sciences, Safdarjung Hospital, Maulana Aazad Medical College, Lady Hardinge Medical College etc.), to make it one of the most significant drivers of the NVBDCP at national level for inter-sectoral collaboration. Follow-

up meetings of the nodal officials during November-December will also be planned to review progress in action.

- Identification and mapping of private sector organizations in high endemic areas engaged in malaria control activities or those facing constraints due to the disease. Initiation of one-on-one discussions with them as well as their headquarters / parent organization to establish PPP and signing of MOUs / agreements. Subsequently, an action plan will be developed including implementation responsibilities, mechanisms and resource sharing (infrastructure, personnel, knowledge and technical expertise, etc).

- Initiation of dialogue with the non health public sector organizations with diligent follow up. For example, successful collaboration with the Department of Tribal Affairs may include representation of NVBDCP in the Integrated Tribal Development Council and other such bodies, inclusion of Department of Tribal Affairs in State and District Health Societies to represent the tribal viewpoint, use of manpower under Tribal Welfare Program and *Ashram* (residential) schools / hostels for promotion of effective preventive interventions, like LLIN through BCC, community mobilization, etc.

- Guidelines for involvement of NGOs, Faith Based Organizations (FBOs), Community Based Organizations (CBOs) and Local self-government (*Panchayat*) for malaria control already exist. The guidelines will be updated, especially with regard to the financial component and fiduciary arrangements, oversight mechanisms as well as to include the new tools being introduced/scaled up under the program. This will be followed by regional level consultation with non-health sector government departments, private sector, NGOs / FBOs, etc for dissemination and partnership building.

- Training / capacity building of personnel of non health ministries and departments, private sector, NGOs, etc, will be planned, as necessary, followed by a training needs assessment.

- Wide dissemination of program policy including national drug policy, guidelines, modules, annual reports, newsletters, etc.

- Assessment and consolidation of work place policy and programs will be done and then promoted.

- Supply of anti-malarial drugs, LLINs and other commodities by NVBDCP as per agreed plan to partners.

- Establishment of a reporting system with partner organizations and integrating it under NAMMIS. National M & E plan will include M & E of inter-sectoral collaboration.

- In the long term, continued advocacy with the appropriate authorities for legislative measures, like amendments to civic bye-laws and building bye-laws to control mosquitogenic conditions.

- Consultations with appropriate authorities will be organized for mandatory health impact assessments for all development projects to prevent adverse impact due to malaria. Adoption of healthy public policy for promoting equity-focused social responsibility for health and safeguarding people from negative health impact of development projects will be actively considered. Healthy policies are intended to create supportive environments, strengthen community action and reorient health services through intersectoral convergence between public and private sector.

Output indicators

- Updated PPP guidelines disseminated to non health ministries and departments, private sector, NGOs, etc.

- Number of organizations that have signed MOUs with NVBDCP for implementing PPP schemes.

- Number of organizations that have signed MOUs and shared action taken reports with NVBDCP.

7.2 Behavior Change Communication (BCC)

BCC is a systematic process that motivates individuals, families and communities to change their inappropriate or unhealthy behavior or to continue appropriate or healthy behavior. BCC is a key supportive strategy for the principal strategies for malaria prevention and treatment under the NVBDCP. The national program recognizes that the success in malaria control efforts would stem not only from sound health systems and trained human resources but also from effective ownership of malaria control by people. BCC has assumed importance as the Information, Education, Communication (IEC) activities to increase knowledge and awareness did not lay much emphasis on appropriate action. Although there is evidence that knowledge and awareness of care takers and providers have increased over the years, there has not been sufficient internalization of information and resultant behavior change.

In recent years, BCC is being increasingly emphasized for informed decision-making and responsive behavior, while enhancing knowledge and awareness about new malaria control interventions. BCC is directed at: early recognition of signs and symptoms, early treatment seeking from appropriate provider, adherence to treatment regimen, vulnerability of children and pregnant women and ensuring their protection; use of ITNs/LLINs; acceptance of IRS, etc. Every year, BCC activities are planned and implemented in a campaign mode (for example, during anti malaria month - June) and as a routine, throughout the year at the national and sub-national levels. Guidelines and resources (funding and occasionally, prototype creative materials) are provided to the states for local planning, and adoption and dissemination to district/sub-district levels. An operational guide for anti-malaria month campaign is already available at national, state and district levels. However, recent reviews and assessments (Social and Beneficiary Assessment, 2007, In-Depth Review report, 2007 and Joint Monitoring Mission report, 2007) have reflected inadequate knowledge, awareness, and inappropriate practices in high risk areas particularly those that are rural and tribal, having a deficient health system. The BCC strategic plan is aimed at improving the scenario.

Objective

To increase coverage of BCC for the population at risk to at least 80% by 2012 to improve knowledge, awareness and responsive behavior with regard to appropriate malaria control interventions.

Strategies

- Locale specific BCC strategic planning and implementation at sub-national level through direct, inter-personal channels of communication and community outreach supported by

appropriate BCC tools and complemented by mass media activities where there is reasonable reach and acceptance.

- Centralized campaign and routine information dissemination through mass media.

- Intensified BCC campaign for acceptance of IRS and for promotion of new tools, i.e., LLIN, RDT and ACT prior to and during high transmission season for timely adoption of interventions.

- Meaningful engagement of stakeholders in BCC planning, implementation, and M&E.

Operational design

- Problem definition for BCC and setting of behavioral goal(s) and objective(s).

- Situation analysis (formative research) drawing from existing knowledge (reviews, assessment reports, etc) and undertaken in a sample of endemic states. This will include assessment of approaches and channels, creative materials, systems and capacity in public/private sector to identify demand and supply constraints and specific societal and gender-specific barriers to access. The situation analysis will be done by an agency with suitable experience and expertise and contracted through an appropriate method. Based on the situation analysis, the goals and objectives will be re-defined. The objectives will be Specific, Measurable, Appropriate, Realistic and Time bound (SMART).

- Development and consolidation of BCC strategy and plan in consultation with state/district and other key players. The plan will include target audience segmentation and analysis.

- Designing, development, pre-testing and dissemination of BCC tools (flip books, information cards, TV/radio scripts, etc) for supporting IPC/community outreach/mass media activities. The BCC tools will be culturally and contextually adapted and translated in as many local languages/dialects as practicable before dissemination. A guideline will accompany the BCC tools on how to utilize them.

- Since the high burden areas are mostly rural/tribal and hence, least likely to have access to mass media, BCC at sub-national level will be based on direct inter-personal communication and community outreach activities supported by appropriate BCC tools. The mass media will be utilized to reinforce BCC done through IPC/community outreach, in areas where there is mass media access. At the national level, nation-wide campaigns for dissemination of information will be attempted through the mass media. The specific activities will include a) counselling/one to one direct communication between patient/family members and volunteer, ASHA, health worker, doctor in public and private sector and change agents (religious leader/community leader, educator, traditional healers, etc). {IPC will also target vulnerable groups—pregnant women in antenatal clinics}; b) peer group interactions between members of associations, youth clubs, etc; c) community/group meetings of civil society organizations, SHGs, Panchayats, Rogi Kalyan Samitis, Village Health and Sanitation Committees, etc.; d) infotainment by popular folk song and drama, skits, puppetry, etc. by local groups, animators, etc.; e) village level rally, miking, wall writing, etc and f) school activities.

- For effective and suitable mass media activities, media buying can be considered after negotiating the best price for best targeted reach by contracted BCC consultant agency. However, attempts will be made to build capacity within the national program to

understand the key media buying criteria - target clients, their behavior, type of media, and details of measuring value of TV / radio programming, etc.

- Training and capacity building of public / private sector personnel / volunteer to manage / oversee and co-ordinate BCC planning and implementation will be done. The knowledge and skill (behavior) enhancement of these care providers will be targeted through sensitization and training to ensure their commitment for delivering quality services and community mobilization.

- BCC activities will be implemented as campaigns during the pre-transmission and transmission season especially, intensifying in anti malaria month (on weekly / fortnightly basis) and as routine (monthly / once in two months, as appropriate) during low transmission season. A calendar will be prepared in the first quarter of the financial year, as the resources are disbursed.

- Timely allocation of resources – funds and generic creative brief for local adaptation and translation.

- BCC will be aligned with availability of products / services. For example, the BCC campaign on LLIN distribution will be launched, only when LLIN is already available at the distribution points.

- BCC programs are rarely monitored systematically and / or evaluated and hence, a myriad of approaches and methods are used whose effectiveness is still to be demonstrated. In order to avoid this, concurrent monitoring (process evaluation) will be emphasized. At the end of each year, an evaluation will be conducted to determine the effectiveness of the BCC activity and to strengthen the same for future. At the end of the plan period, an end-term evaluation of the program will include assessment of its BCC component. An M & E framework and tools for BCC will be developed to support the programme M & E.

Output indicators

- BCC strategy and operational guide developed and disseminated to states and districts.

- Percentage of eligible / high risk villages reached by any community outreach activity in the last six months

- Percentage of villages where at least 80% households were reached through IPC during the BCC campaign for LLIN / IRS / for adoption of suitable measures during anti malaria month

- Number of mass media activities (radio / TV) conducted during the last six months at national level relative to planned number of activities

Section 8: Monitoring and Evaluation

8.1 Monitoring and Evaluation (M & E) strategy

A comprehensive assessment of the malaria programme's performance and impact will require that the basic health information systems are strengthened and that capacity is developed for the collection, analysis, and timely dissemination of coverage and impact data.

Monitoring & Evaluation will be an on-going process in the programme. A system of recording and reporting exists in the programme which was earlier designed to capture information related to malaria case detection and IRS. Adoption of newer disease prevention and control instruments like RDTs, ACTs & LLINs and recruitment of ASHA, a new frontline worker under NRHM, made it necessary to restructure the Management Information System (MIS). The NVBDCP also has an online system of data collection and collation called the National Anti-malaria Management Information System (NAMMIS). This system was not fully functional in the country due to infrastructure related bottlenecks like internet connectivity, annual maintenance of computers and availability of staff for data entry. The programme through its concerted efforts in 2008 addressed the two issues and revised the country's M&E Framework and initiated the process of revival of NAMMIS. The MIS is implementable through the health care workers involved in service delivery of programme interventions. It is envisaged that within the timeframe of 6 months to 1 year these tools will be in operation and quality data generation, transmission and analysis will be ensured. The programme would sustain NAMMIS through continuing technical support from an IT Vendor.

Sentinel sites will be established at district hospitals, PHCs and private sector hospitals. These sites will furnish regular and detailed data on inpatients and cases of severe malaria and provide trends on them. Sentinel sites in high endemic areas will be equipped with a Lab Technician and computer for fortnightly data entry.

A successful programme requires intensive monitoring & supporting supervision of activities being performed at the implementation level to identify deviations, take timely corrective action and bring about improvement in performance. This mandates large number of monitoring and supervisory staff at all levels to keep a close watch over activities. Visits are routinely undertaken by NVBDCP and State staff to the implementation units i.e. districts but these visits are inadequate to provide day-to-day monitoring support nearer the implementation points. High endemic districts will be provided with District Malaria Consultant/ District Vector Borne Disease Control Consultants and sub-district level Malaria Technical Supervisors (MTSs). Besides, capacity will also be developed at national, regional and state levels. Key areas identified are M&E, finance, procurement, supply chain management and GIS.

Besides the MIS which forms the pillar for all M&E, specialized evidence is also required on therapeutic efficacy of chloroquine and ACT, entomological monitoring including insecticide resistance, quality assurance of diagnosis and pharmacovigilance of ACT.

Therapeutic efficacy is an inbuilt programme component of NVBDCP and is being strengthened in collaboration with National Institute of Malaria Research (NIMR). Every year, 15 therapeutic efficacy studies would be conducted by NVBDCP through its regional offices and by NIMR through its field stations. These studies would provide evidence on the efficacy of chloroquine as well as on the ACT in use.

Entomological monitoring is conducted through the zonal offices in the country.

Objectives

To ensure that 80% of districts in high-disease burden areas will collect, process, analyse, and effectively manage malaria data by 2010 and 100% of them by 2012.

Strategies

- Systems strengthened to collect, process, analyse, and manage malaria epidemiological and transmission data.
- Programme management capacity assures that all activities have been implemented in a timely manner as planned to ensure accountability and address problems that have emerged.
- M & E systems are capable of providing feedback to programme implementers, partners and relevant authorities to improve programme planning and management.
- The NVBDCP and partners document on a timely basis how the planned strategies and resource allocations have achieved expected outcomes and impacts.

Operational Design

The key functions and actions of the national malaria M & E system have been developed and strengthened within the context of general health and disease M & E systems in India. Systems will be put strengthened to assure that challenges and opportunities that exist at national, state and district levels in M & E planning and capacity are addressed promptly to support the national commitment to rapid scale up of malaria programming for impact.

It is expected that improved M & E during the strategic plan period (2007-2012) will facilitate documentation in future reports of progress made towards the achievement of country's targets and the prospects for reaching the overall RBM goals by 2012 and the targets of the United Nations MDGs by 2015.

The following activities will be adopted in the programme to strengthen the M & E system:

- Strengthening of management information system for tracking malaria incidence and operational indicators including the revival of the National Anti Malaria Management Information System (NAMMIS).

- Sentinel surveillance to collect data on severe malaria, hospitalized malaria cases and malaria deaths from selected hospitals in each district.

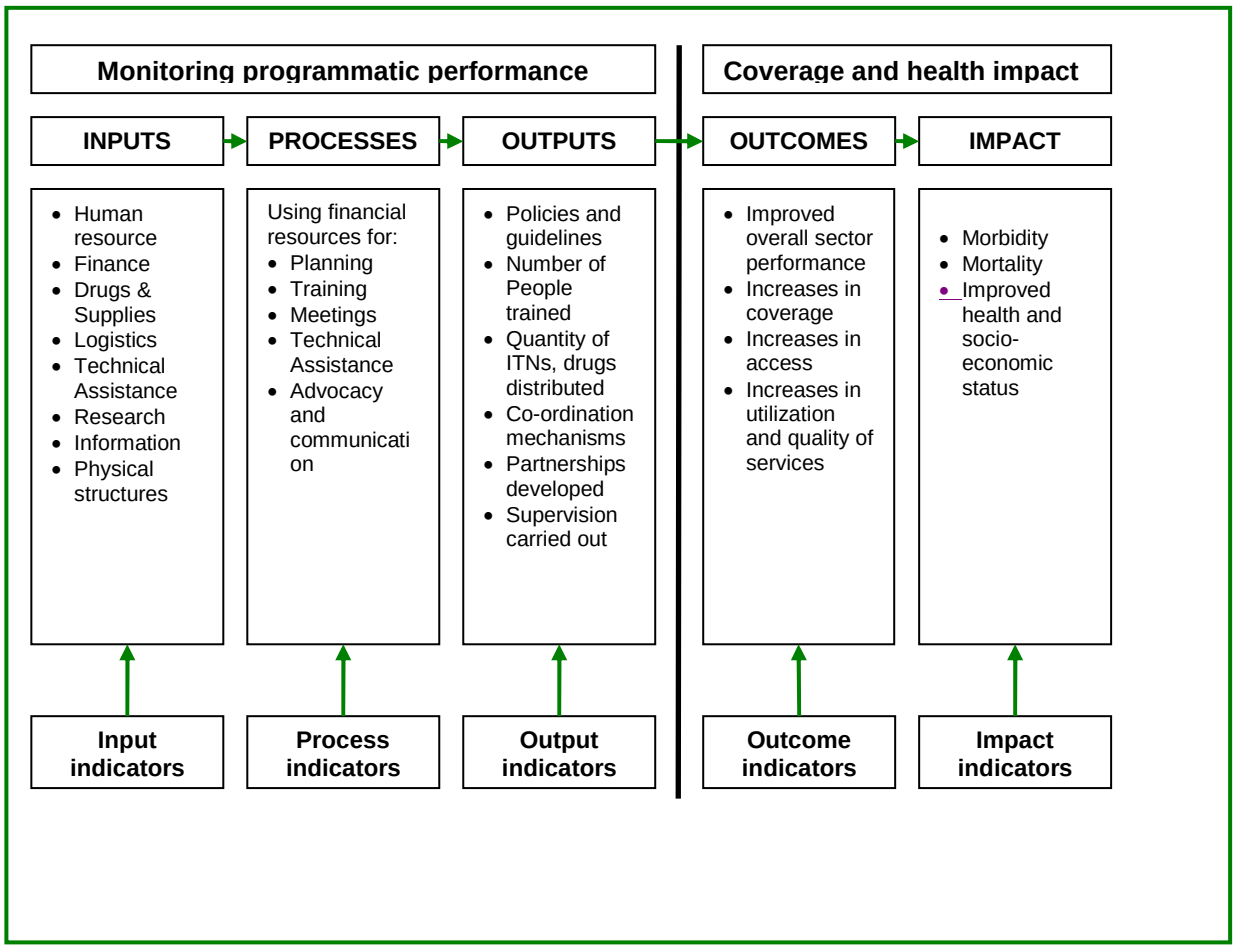
- Decentralized measurement of outcomes at district and PHC levels through Lot Quality Assurance Sampling (LQAS) to support local decision-making and provide objective monitoring to the central level.

- Large-scale population surveys every second year to assess malaria prevalence and population coverage with main interventions.

- Logistic Management Information System for supply chain management.

- System to monitor the quality of RDTs and medicines to ensure their quality upon delivery and at point of use.

Table- 10: Malaria M & E framework with the proposed inputs, outputs, processes, outcomes and impact measures:



8.2 Strengthening of HMIS

Surveillance is one of the strongest components of the national malaria control programme. Based on the examination of about 100 million blood slides per year, covering all endemic districts, it provides information on trends in malaria incidence and the geographic distribution of the disease in the country, but not the absolute size of the burden.

Disease surveillance and data management is being strengthened by the following:

- The introduction of RDTs and ACTs will by itself improve data quality by attracting more patients to public services. A protocol has been devised to dovetail the RDT data with microscopy at all levels.
- New streamlined formats, including computerized data management from the block level and upwards have been developed. These formats also allow monitoring of villages with a provider of RDTs and ACTs and the comparison of data on coverage in populations at risk with data obtained through population based surveys and LQAS.
- Revival of the web-based NAMMIS, which had poor functionality due to poor internet connectivity in the districts.
- Strengthening of GIS at present being used on a limited scale for more effective planning of the spray activities in the district.

8.3 Sentinel surveillance

One of the main weaknesses of the existing malaria surveillance system is the lack of articulation with hospitals, which means that severe malaria cases are not reported separately and that only a small fraction of malaria deaths are recorded. Therefore, sentinel surveillance is being established in high endemic districts, by selecting in each district, depending of its size, 1 to 3 sentinel sites in large hospitals for recording of all cases of malaria (outpatients and in-patients) and malaria-related deaths. These sentinel sites will also be established in the private/faith-based sector hospitals as many patients seek care in these and this data is most often not reflected in the existing reporting system. Districts which have medical colleges will also establish a site in these tertiary care centres.

The sentinel sites will be adequately staffed and medical officers and laboratory technicians (LTs) will be trained. A nodal Sentinel Site Medical Officer (SSMO) will be in charge of all activities regarding malaria in the sentinel sites. In each out-patient unit, a separate register for fever cases without any other obvious cause (suspected malaria) will be maintained. There will be a laboratory with a qualified Sentinel Site Laboratory Technician (SSLT) at each sentinel site working under the supervision of the SSMO. The SSLT will be responsible for the quality of the malaria laboratory results and for data compilation.

8.4 Lot Quality Assurance Sampling (LQAS) Surveys

LQAS surveys will be carried out in each high-risk district to track coverage and utilization of LLINs, RDTs and ACTs at the PHC level on an annual basis. It will also be used to assess IRS coverage. LQAS is a rapid survey method used by district managers to determine whether the PHCs are reaching pre-established targets for key programme indicators. The same data can be used to calculate point estimates for outcome indicators for district and state levels. Data for a decision-making component will be established to determine underlying programme problems identified with LQAS. All data will be used during annual work planning sessions to restructure and improve the programme, as well as to set targets for the subsequent years. In addition, cross-sectional household surveys to collect data plus other selected variables, especially malaria prevalence, will be carried out in 2010 and 2012 across high malaria burden districts.

8.5 Population Based Surveys

Population surveys giving representative data on the malaria situation and coverage of LLINs, conventional nets, IRS and early diagnosis and adequate treatment for fever cases will be carried out in WB supported areas in the years 2008, 2010, 2012 and 2014, and in GFATM supported areas in the intervening years.

8.6 Logistic Management Information System (LMIS)

This will be created to track LLINs, insecticides, RDTs and ACTs from their purchase or point of entry into India through the districts to the decentralized distribution points in the PHC areas. The LMIS will use a standardized form that records the quantity of each commodity at every point where an organization takes delivery or delivers these commodities. The system tracks the distribution of the products down to the lower sub-district level service delivery points. Each district will be responsible for tracking its own allotments but will be required to use a single reporting system and forward this information centrally to the NVBDCP. The LMIS will show the spatial distribution of the commodities. The LMIS will not track the distribution of commodities to patients as that is the role of the malaria MIS. MOHFW is in the process of establishing a comprehensive LMIS for the health sector.

8.7 Quality Assurance of RDTs and drugs

NVBDCP has prepared a protocol for monitoring the quality of RDTs in accordance with WHO recommendations and technical documents on the subject. This will now be translated into an action plan, which includes the training of a limited number of laboratory technicians in each state, who will sample and control the RDTs. Similarly, a protocol will be established for quality assurance of antimalarial drugs, especially ACTs, which will be sampled according to established and approved protocols.

8.8 Drug resistance

With the adoption of ACT with sulfadoxine-pyrimethamine (SP) as a component, close monitoring of resistance including molecular markers becomes essential. This work will be done by NVBDCP in collaboration with NIMR based on an established protocol. ACT therapeutic efficacy and molecular markers for ACT-SP resistance will be collected from 30 sites, where patients will be sampled and examined every second year in each site. In addition, susceptibility of *P.vivax* to chloroquine will be monitored at 3 - 4 of these sites.

8.9 Pharmacovigilance

As ACT is newly adopted in India on a large scale, it is important to monitor the adverse effects in the programme conditions. In due course, new partner drugs may be considered for ACT. The routine pharmacovigilance system is not able to effectively monitor the safety of these new drugs in endemic areas, where only a small minority of patients visit a medical practitioner. A pharmacovigilance system will therefore be established by the programme.

8.10 Insecticide resistance

Monitoring of insecticide resistance across the country has been extremely weak for many years despite the availability of trained entomologists in research centres. A protocol has been established by NIMR in collaboration with NVBDCP to assess over a 5 year period, the susceptibility of anopheline vectors to the main insecticides in use in 120 selected sites, which are representative of different malaria-ecological patterns in the country.

8.11 Joint programme reviews

The national malaria programme has a long tradition of inviting external partners led by WHO to participate in detailed programme reviews. These reviews have proven to be very useful for the programme in the past. The recent review which took place in late 2006 and early 2007 was of crucial importance for introducing new policies, which will be piloted and taken to scale through this programme. NVBDCP now plans to undertake such reviews again in 2009, 2011 and 2013 and will request WHO to set up a team to provide the external expertise. The emphasis will be on effectiveness, efficiency and quality of implementation rather than policy issues.

Section 9: Programme management

9.1 Programme Management and Organizational Alignment

Objective
Strengthen the capacity of national, regional, state and district health systems to effectively and efficiently plan, implement and manage malaria control efforts.

Strategies
NVBDCP will be strengthened as a technical support unit with the responsibility for coordination of all national malaria control efforts.

Operational Design

Priority attention will be paid to ensure that current capacity is sustained, expanded and adapted to address rapid scale up of malaria prevention and control efforts in identified high-risk areas and to sustain and augment the control achieved in other parts of the country.

Output indicators

- Effective management with consensus by NVBDCP on policy and strategy through existing advisory and partner working groups viz. expert groups (chemotherapy, insecticide use, purchase committee, etc) and other implementation partners e.g., (working group on antimalarial month).
- Efficient mobilisation and management of financial and human resources in support of national programme efforts viz. proposal development for the global fund proposals by NVBDCP.

9.2 Programme Planning and Design

Objectives
All states and districts prepare and submit Annual Action Plans as per NVBDCP - prescribed guidelines and within timeframes.

Strategy
Invest in evidence-based programme planning capacity at all levels of the health system.

Operational Design
The annual malaria control programme planning cycle will include comprehensive consultations at the district, state and national levels to ensure alignment of resources with local needs, feasibility, overall programme goals and objectives. It will also be part of the overall District Action Plan prepared under NRHM.

Output indicators

- Strategic implementation, business and annual work plans are developed based on sound scientific and programme data.
- District plans are objective-oriented, with annual targets for disease burden reduction and coverage.
- District medium-term expenditure frameworks address rapid scale up of malaria prevention and control as per the local need.
- All levels of the health system have access to performance data and rationale for best practices from which to make sound programme implementation decisions.

- Functional National Anti Malaria Management Information System (NAMMIS) to support the decision making towards development of need based actions.

9.3 Procurement and Supply Chain Management

Objective

To ensure that at least 80% of health facilities do not report stock-out situation annually.

Strategies

- To develop an efficient and effective procurement and supply management plan (PSM) for drugs and commodities under NVBDCP.
- Develop systems for efficient quantification of malaria specific commodities to avoid any mismatch between demand and supply and ensure availability at all levels and also economy of scale.
- To ensure the procurement of right quantity of quality assured drugs and supplies from the right source, at right price and in right time in close collaboration with procurement agencies, donor agencies and MOHFW.
- To strengthen the contract management and monitoring of contracts through procurement agencies (wherever applicable) and by NVBDCP.
- To strengthen the procurement capacity at the national and state level through training, capacity building and strengthening the human resource capacity on procurement.
- To strengthen supply chain management at all levels in order to ensure the uninterrupted supply of quality assured drugs and supplies thereby improving the availability and access. To support this, a professional agency will be hired to assist the directorate in monitoring and supervision, training and capacity building of states and districts on supply chain and inventory management.
- To develop guidelines on supply chain and inventory management and training and capacity building at all levels so as to ensure uninterrupted supply of antimalarials.
- To develop a system for monitoring the supply status and buffer stock quantities at the central, state, district and health facility levels.
- To develop the standardized technical design / specifications and guidelines for storage facilities (warehouses, stores, and cold rooms) and training and capacity building of staff at all levels so as to ensure best storage practices at all levels.
- To transform the current manual inventory management system into an electronic based inventory control and reporting systems for monitoring of drugs and supplies.
- To develop a quality assurance system in place for post dispatch inspection of drugs and supplies under NVBDCP

This would enable Directorate of NVBDCP to improve availability and access to right quantity of quality assured drugs and commodities from the right source, at right price and in right time.

Operational Design

Rapid national scale up of malaria prevention and control efforts will result in additional stress on the national procurement processes and capacity. The scale-up must be supported by procurement capacity that exceeds current government capacity.
The focus on prevention interventions will result in supply of large quantity of non-drug commodities that will require transport, storage, and inventory management at all levels of the health system. The ability to efficiently deliver commodities to community delivery points is crucial for effective programme implementation. NVBDCP will work to identify supply chain management constraints and, in concert with local government and public and private

partners, will develop solutions to constraints in the current system. Logistic Management Information System (LMIS) will be used to monitor the flow of the commodities and drugs. A revised reporting system will be used to monitor the stock status at all levels.

Output indicators

- National procurement and supply chain management plan is in place.
- Required drugs and commodities are available in sufficient quantities for implementation prior to each malaria season.
- Contracting mechanisms and monitoring systems are in place to support procurement through the procurement agency.
- Storage, transport, and inventory management systems are in place at all levels of the health system for malaria commodities.
- Required infrastructure and human resources are in place to deal with procurement and supply chain management.
- Standardized technical design / specifications and guidelines for supply chain and inventory management and storage facilities (warehouses, stores, and cold rooms) are in place and training and capacity building of staff at all levels are completed.
- Electronic based supply chain monitoring system is in place.
- Quality assurance system is in place to ensure quality of drugs and supplies under NVBDCP.

Output indicators

- A unified performance monitoring system in place.
- Impact evaluation system to be in place.
- Timely dissemination of information (reports) and feedback (to states, districts and community).

9.4 Legislation

Objective

To adapt and implement model bye-laws to reduce/eliminate mosquito breeding sources in domestic and peri-domestic areas. Legislative interventions like civic bye-laws are of significance in urban areas where vector breeding takes place largely in man-made sources. Efforts will be made to pass legislation to strictly control mosquitogenic conditions in such settings.

Strategies

Health impact assessment of developmental projects will be made a prerequisite for approval for all such projects. Civic bye-laws which were circulated to all towns and states will be adopted, promulgated and implemented in all the UMS towns.

Operational Design

The field staff will conduct inspection for detection of domestic and per-domestic breeding sources, every week. Every town will have a cell which will be responsible to initiate legal

proceedings against defaulters. Similarly the state will have a monitoring cell to oversee the implementation of civic bye-laws.

Output indicators

- Number of towns implementing civic bye-laws effectively
- Average number of prosecutions in the UMS towns per annum for infringement of civic bye-laws.

9.5 Research

Objective
To develop and strengthen the national capacity for developing evidence based for programming.
Strategies

- Develop a malaria-specific research agenda.
- Develop a funding stream and contracting mechanism for programme responsive research.
- Timely dissemination of research findings to stakeholders and integration of information in programming.

Operational Design

Research for operational and policy purposes will be an integral part of programme implementation in order to inform and provide an input into the evaluation process of the programmes. As various technologies and interventions are utilised and applied, the outcomes being generated may not be known nor anticipated and it is essential that there are research areas for follow up. The research aspects have been addressed in various ways by the partner institutions such as the NICD, NIMR, RMRC and other institutes and universities, as well as research institutions or organisations that carry out socio-economic research.

Operational Research and Impact Evaluation

A list of priorities for operational research under the programme has been established. The research projects will be carried out by research institutes based in India and where appropriate, in collaboration with overseas partners. The list includes:

- Use of different equipment (especially compression sprayers instead of the stirrup pumps) for IRS for vector control in malaria.
- Assessing the reliability of RDTs for vivax malaria
- Assessment of the efficacy and safety of newer ACTs, which may be considered as replacement for Artesunate + Sulfadoxine Pyremethamine
- Evaluation of different delivery models in PPP, including private providers of curative services in malaria control
- Assessment of different strategies for communication to promote the use of insecticide-treated nets, especially LLINs, in tribal populations including assessment of the influence of housing types and population mobility

Output indicators

- Research work is conducted as per the needs of the programme.
- Research findings influencing policy formulation and decision making.
- Research findings influencing programming.

The above research activities will be done in collaboration with National Institute for Malaria Research (NIMR), National Institute of Health and Family Welfare (NIHFW) and the Regional Medical Research Centres (RMRC).

Section 10: Financial Outlay

10.1 Background

During the 10th five year plan 2002-07, malaria accounted for 76% of the expenditure for VBDs as the central Directorate responsible for prevention & control of malaria was initially the Directorate of National Anti Malaria Programme and had the main budget line for malaria control. The contribution for prevention and control of other VBDs was much less (24%). It is worth noting that the allocation on malaria from GOI accounted for about 45% of the total budget for control programmes for other diseases including leprosy, tuberculosis, diarrhoeal diseases, poliomyelitis and the IDSP. In addition to allocation and expenditure by the GOI, the states also allocate the resources for VBD control (staff, operations and certain commodities).

There has been increase in fund allocation under NRHM for disease control programmes as well as for NVBDCP (including malaria control). During 2005-06, the budget of NRHM was Rs.6731 crores which was increased to Rs.9,065 crores in 2006-07. In the 11th Plan period also there has been considerable increase in the fund allocation for NRHM which is evident from the fact that in 2007-08, Rs.11,010 crore was allocated which was increased to Rs.12,050 crores in 2008-09 and the similar amount has been sustained for 2009-10. Similarly, the budget of total disease control programme has been increased from 837.63 crore in 2007-08 to 1,122.25 crore in 2009-10 and for NVBDCP it has been raised from 361.08 crores to 450.00 crores.

Although health is the state subject as per the constitution of India, the central government provides assistance in the form of commodity (drugs, insecticides and larvicides to the States/UTs. North-eastern States (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura), are provided 100 per cent central assistance for programme implementation, since December, 1994. Additional resources are also being provided to selected high malaria risk areas in north-eastern states, Orissa, Jharkhand and West Bengal through external aid from GFATM to accelerate anti-malaria activities and improve service delivery in the remote and inaccessible pockets. Furthermore, in 100 districts in 8 states namely Andhra Pradesh, Chhattisgarh, Jharkhand, Gujarat, Madhya Pradesh, Maharashtra, Orissa and Rajasthan, 1045 PHCs predominantly inhabited by tribals were also provided 100% support including operational expenses under the Enhanced Malaria Control Project (EMCP) with World Bank assistance, since 1997. The new World Bank Project on “Malaria Control and Kala-azar Elimination Support” for a period of 5 years from 2008-09 has been approved by World Bank. The GOI provides identified commodities and cash assistance for identified activities in other states. The operational cost for implementation of the programme and certain commodities are met from the allocations made out of state fund. The centre also meets the requirement of states during emergency situations.

During the 11th Five-Year Plan period, the existing strategies for prevention and control of VBDs have been continued and further strengthened with special emphasis on surveillance, human resource development, BCC, supervision and monitoring, quality assurance and quality control of diagnostics, newer drugs and operational research.

10.2 11th Five-Year plan outlay

The proposed overall budget for prevention and control of VBDs under NVBDCP is Rs 3190.27 crores including the EAC component of Rs. 1071 crores* (Rs. 231 crores from

GFATM and Rs. 840 crores from World Bank). The figure was revised as US$ 50 million for GFATM which comes to Rs. 245 crores. The World Bank agreed for US$ 200 million (which is equivalent to Rs.980 crores for 5 years) plus US$ 20 million will be GOI share making a total of US$ 220 million or Rs.1078 crores out of which during the 11th Five Year Plan, only 4 years will be covered starting from 2008-09. Hence, the World Bank assistance has been reduced from Rs.980 crores to Rs. 704 crores. The total external assistance of Rs.1071 crores has therefore, been reduced to Rs.949 crores (Rs.245 crores from GFATM + Rs.704 crores from World Bank). (* 1 US$ @ Rs. 49/-)

Table 12: Activity-wise break-up of the proposed budget under the 11th Five Year Plan (Rs. in crores)

Activities	2007-08	2008-09	2009-10	2010-11	2011-12	Total	% of total
Malaria	293.23	273.55	338.29	418.00	424.96	1748.03	54.79
Urban Malaria Scheme	10.70	20.09	20.50	20.91	21.33	93.53	2.93
ASHA-Incentives	0.00	1.41	1.41	1.41	1.41	5.64	0.18
Filariasis+Dengue +Chikungunya+JE+KA	78.16	231.57	236.62	231.91	226.40	1004.66	31.49
R&D to NIMR	1.50	3.00	3.00	3.00	3.00	13.50	0.42
Establishment	15.91	15.00	15.00	15.00	15.00	75.91	2.38
MPW Contractual salary	0.00	35.00	70.00	70.00	70.00	245.00	7.68
Monitoring & Evaluation	0.00	1.00	1.00	1.00	1.00	4.00	0.13
Total NVBDCP	**399.50**	**580.62**	**685.82**	**761.23**	**763.10**	**3190.27**	**100.00**

The item-wise and activity-wise details of proposed budget for XI Five Year Plan for each year are given in tables below.

Table- 13: Item-wise proposed Outlay of Malaria for XI Five Year Plan

Items	Total Rs. In crores
Drugs	198.39
Diagnostics	109.76
IRS	454.98
Bed net	349.23
Mobility & supervision	8.60
Training (Malaria)	28.40
BCC (Mal)	146.49
State society	259.71
Human Resource (State)	33.43
Human resource (National)	20.76
Establishment /Monitoring (National & State)	63.28
NE States (Cash)	75.00
ASHA	5.64
Research (NIMR)	13.50
Malaria	**1767.17**
Urban Malaria Scheme	93.53
Total Malaria including UMS	**1860.70**

Table- 14: Annual Item & activity-wise details of budget for each Year of XI Plan (Rs. in Crores)

Malaria	2007-08	2008-09	2009-10	2010-11	2011-12	Total
Drugs	39.00	42.00	36.99	38.20	42.20	198.39
Diagnostics	18.66	22.00	17.20	23.40	28.50	109.76
IRS	84.33	86.87	88.61	93.07	102.10	454.98
Bed net	52.15	24.44	57.98	109.05	105.61	349.23
Mobility & supervision	0.00	8.00	0.00	0.60	0.00	8.60
Training (Malaria)	4.00	7.00	7.90	6.20	3.30	28.40
BCC Mal	10.00	21.00	38.06	40.13	37.30	146.49
State society	62.51	30.70	50.20	57.70	58.60	259.71
Human Resource (State)	1.20	4.93	7.50	9.80	10.00	33.43
National Human resource	4.12	2.17	3.37	7.10	4.00	20.76
Establishment/Monitoring (National & State)	2.26	9.44	15.48	17.75	18.35	63.28
NE States (Cash)	15.00	15.00	15.00	15.00	15.00	75.00
Sub Total	**293.23**	**273.55**	**338.29**	**418.00**	**424.96**	**1748.03**
ASHA Incentives	0.00	1.30	1.30	1.30	1.30	5.20
ASHA Facilitator incentives	0.00	0.11	0.11	0.11	0.11	0.44
Sub Total (Incentives)	0.00	1.41	1.41	1.41	1.41	5.64
Research (NIMR)	1.50	3.00	3.00	3.00	3.00	13.50
Total Malaria	**294.73**	**277.96**	**342.70**	**422.41**	**429.37**	**1767.17**
UMS	**10.70**	**20.09**	**20.50**	**20.91**	**21.33**	**93.53**
Total Malaria including UMS	**305.43**	**298.05**	**363.20**	**443.32**	**450.70**	**1860.70**
Filariasis + Dengue + Chikungunya + JE + Kala-azar	78.16	231.57	236.62	231.91	226.40	1004.66
Total NVBDCP	383.59	529.62	599.82	675.23	677.10	2865.36
Establishment NVBDCP Dte.	15.91	15.00	15.00	15.00	15.00	75.91
MPW Contractual salary	**0.00**	**35.00**	**70.00**	**70.00**	**70.00**	**245.00**
Monitoring & evaluation	0.00	1.00	1.00	1.00	1.00	4.00
Grand Total	**399.50**	**580.62**	**685.82**	**761.23**	**763.10**	**3190.27**

10.3 Financial details of NVBDCP (1997 to 2008)

Expenditure on VBDCP had increased by 51% over the 8-year period from 1997-98 to 2004-05, but in the last three years alone (2005-08) the expenditure has gone up by 77%. Cumulatively 51% of total budget allocations came from the domestic budget whereas external aid contributed 49% from 1997-98 and 2007-08. Practically all the external support has been from the World Bank and GFATM. The domestic allocation and expenditure has been higher than the external until 2007. Generally the domestic budget utilization rate has been higher than the external, indicating that proportion of expenditure in external funding is less. To increase absorptive capacity, the flexibility in external support will be required.

Table- 15 : Budget Allocations and Actual Expenditure under NVBDCP (Rs. rounded off in Crore)							
	Budget Allocations			**Actual Expenditure**			**Difference between Allocation and Expenditures**
Years	**DBS**	**EAC**	**Total**	**DBS**	**EAC**	**Total**	
97-98	150	50	200	138	4	143	57
98-99	147	150	297	129	35	164	133
99-00	130	120	250	116	61	177	73
00-01	155	100	255	111	79	190	65
01-02	125	100	225	138	81	219	6
02-03	109	126	235	108	98	207	28
03-04	135	110	245	143	58	201	44
04-05	146	123	269	150	67	217	52
05-06	194	154	349	155	106	261	88
06-07	138	234	372	167	152	319	53
07-08	142	257	399	164	221	385	14
Total	**1571**	**1524**	**3096**	**1519**	**962**	**2483**	**613**
08-09*	322	150	472	220	77	297	175

Source: Budgets of Directorate of Vector Borne Disease Control Programme, World Bank Project Appraisal Document.
DBS = Domestic Budget Support, EAC = for Externally Aided Component.
*Expenditure figure is provisional.

10.4 External support

The major external support projects are:

Intensified Malaria Control Project (GFATM)

NE States along with parts of Orissa, Jharkhand and West Bengal, a population of 100 million, are receiving special inputs under the Global Fund Round 4.

Enhanced Malaria Control Project (World Bank) was implemented from September 1997 to December 2005, in high burden tribal areas in 100 districts of eight states namely Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Orissa and Rajasthan.

- The *New World Bank assisted project* envisages to cover a population of 185 million, in 93 districts of 8 states i.e. Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Orissa and Karnataka from September 2008.

10.5 Financial Management Strategies

Strategies

The programme is funded from the domestic budget (central and the state sources). The central component is used for drugs, insecticides and larvicides. Additional programme

specific support in high disease-burden areas is provided in the form of 100 % cash assistance to North East states and grants from Global fund and Loan from World Bank.

Objectives

- Provide financial planning support to states and districts to develop implementation plans within the context of available resource envelope and given disease burden.

- Ensure that there is a well established planning and forecasting framework for projecting financial resource and for tracking expenditures across all levels.

- Provide financial planning and management training capacity for improved management of financial resources and adherence with internationally accepted accounting principles and reporting procedures.

- To ensure financial support for timely, accurate and efficient disbursement system from the centre to the states.

Operational Design

The financial management system will be synchronised with the financial, administrative and management information subsystems that link the central, state and district levels.

Systemic weaknesses in decentralized procurement were also identified by others, based on which the GOI will limit financing of expenditures at the decentralized level to contractual staff costs and operating expenditures. These are a subset of a larger number of activities and expenditures to be incurred at the states/ districts under the programme.

It is anticipated that local contractors will operate within the framework of the Financial, Administrative and Management System (FAMS) of NRHM for purposes of standardization, accountability, timely reporting and transparency.

10.6 Integration of financial management under NRHM

Several measures are suggested for improving financial management in the NVBDCP. The MOHFW has decided 'in principle' to integrate various disease control programmes including the financial management arrangements with the NRHM. This will include funds flow, administrative and financial delegations / rules, accounting and internal control, finance staffing, financial reporting and audit assurance mechanisms. The MOHFW has developed a common financial management manual by Financial Management Group (FMG) applicable for all programmes funded by MOHFW, while retaining the needs, especially financial reporting requirements of individual programmes.

In addition, the FMG is developing procedures to enhance the audit assurance by strengthening the process of selection of auditors. As a part of the integration of the disease control programme with NRHM, project finance staff operating under the overall umbrella of NRHM at the state as well as district levels will be responsible for funds flow, accounting and reporting the expenditure for all disease control programmes including NVBDCP. The books of accounts at the states and districts will be maintained as per the NRHM financial guidelines. Standard books of accounts will be maintained on a double entry basis in the state and district societies which will include cash and bank book, journal, fixed assets register and advances ledger. Expenses will be recorded on a cash basis and will follow, broadly, the project activities.

The Directorate of NVBDCP will follow the normal process of releasing funds as cash grants to states against approved Annual Action Plans (AAPs). The AAP for each state is approved based on the actual pace of implementation and incorporates the district plans. The states in turn will transfer funds to districts for implementation of project specific activities. The annual budget allocated to each state is released in two instalments during the first and third quarters of each fiscal year through the electronic transfer of funds. The state unit will transfer funds for activities to be implemented by the districts. The funds will be transferred to the designated bank account in the state as well as districts, which will be maintained as a sub-account for NRHM bank account, as per the NRHM guidelines. The districts and states will maintain programme specific books of account including activity-wise ledger accounts as specified in the NRHM financial management manual and submit quarterly financial reports to the FMG in MOHFW and the Directorate of NVBDCP. The annual audit report of all programmes under NRHM (consolidated for the state and districts) will be carried out as per the TOR specified in NRHM manual / guidelines and will be submitted to MOHFW within 6 months of the close of the financial year.

Output Indicators

- An assessment will be completed of current and required financial flows for rapid national scale up and maintenance of malaria control programming for all levels of the health system.

- A financial forecasting and costing framework will be in place that provides timely data for planning and budgeting purposes given programme priorities.

- All levels of the health system have financial planning and management plans inclusive of malaria prevention and control related requirements.

- A timely accurate and reliable reporting system that contributes to the improved quality of the programme implementation is in place.

- Performance indicators are linked with the financial indicators.

Section 11: Planning for Malaria Control beyond 2012

In a country with exceptionally diverse malaria problems and a well established malaria control programme, which has learnt to contain the problem over half a century, strategic planning of malaria control cannot be reduced to scaling up of standard interventions. Different malaria foci have different characteristics and the malaria foci interact with health systems, developments in other sectors and each other in a highly complex system.

To explain the choices which have been made in this plan, it is necessary first to present the options, which would merit consideration.

11.1 Diagnosis

The experience of the programme with RDTs has been mainly positive, but storage problems exist due to lack of stability of RDTs. Nonetheless, it can confidently be said that the introduction of RDTs has provided a quantum leap in terms of improving access in the periphery. There are quality issues with RDTs but these can be addressed.

Activities to be undertaken

- Heat stable RDTs sensitive to both *Pf* and *Pv* will be in use and scaled up rapidly in high malaria burden areas.
- Microscopy will continue as the preferred method of diagnosis in all hospitals and CHCs and as much as possible in PHCs also.
- Countrywide quality assurance of RDT diagnosis and malaria microscopy will continue.
- The private sector will continue to be offered support for diagnosis by RDT in return for submission of data.

11.2 Case detection policy

PCD and case management with village level community health volunteers and workers will continue.

Activities to be undertaken

- The situation of ASHAs will be monitored, in collaboration with other health programmes to promote technical integration and collaboration with local health services and NRHM to make sure that this vulnerable resource of the national health system is well maintained.
- Efforts will be taken to differentiate between imported and indigenous cases in low risk areas by modification of the case record form. .
- The private health sector will be encouraged to participate in malaria surveillance.

11.3 Treatment

It is anticipated that in a few years, the countrywide norm for treatment of *Pf* cases will be with ACT. New ACT combinations and co-formulated ACTs may be introduced due to easy availability. Necessary action to eliminate artemisinin monotherapy in collaboration with pharmaceutical industry and private providers has already been taken. Nonetheless, the possible emergence of artemisinin resistance is an enormous threat and makes it essential to be alert. Pharmacovigilance will have to be maintained at a high level to identify fake drugs entering into use. It is now well recognized that this parasite can become resistant to chloroquine and in some settings it has proven to be as virulent as *Pf.*

Activities to be undertaken

- Therapeutic efficacy of ACT and other drugs in use will be closely monitored.
- The pharmaceutical industry and research institutions will be strongly encouraged to develop novel alternatives to ACTs.
- Research to identify a better regimen for prevention of relapses than the present 14 day regimen of primaquine will be prioritized.

11.4 Vector Control

There will be widespread use of LLINs by people living in high risk areas. The reimpregnation of plain bed nets with synthetic pyrethroids may no longer be required. Careful monitoring of gradual substitution of IRS by LLINs village by village will reveal which of these two interventions is most effective in the given situation(s). With increasing resources available for malaria control activities, new alternative chemicals may be available for IRS. This would be useful in case of the vectors developing resistance to pyrethroids. Larval control will continue to have a primary role in malaria control in urban areas. It may be increasingly used in rural areas, especially near developmental projects and in rice fields.

Activities to be undertaken

- Effectiveness of combination of IRS and LLINs, LLINs alone and IRS alone will be investigated in a rigorous controlled design.
- Effectiveness of LLINs in mobile populations of the North-East will be investigated given that effectiveness may be influenced by many local factors.
- Alternative methods will be explored for outdoor use, for example, repellents and hammock-nets.
- The role of larval control methods in rural areas may be reviewed. .
- Novel vector control methods will be tested as soon as they become available.
- Pilot trials on alternatives to new chemicals for IRS will be conducted.
- Operational research will be conducted to assess reasons for non-cooperation of spray and non-utilization of bed nets.

11.5 Malaria in Pregnancy

There are indications that the burden of malaria in pregnancy may be significant in a few areas of the country. There is scope for introduction of chemoprophylaxis in pregnancy in these areas.

Activities to be undertaken

- The use of LLINs by pregnant women in high risk areas will be promoted. Till the time NVBDCP is able to spread LLIN coverage to entire populations in all villages in high endemic areas, antenatal care programmes and their partners will be strongly encouraged to give free LLINs to pregnant women in high risk areas.
- Use of ACT in 2nd and 3rd trimester of pregnancy will be initiated after recommendations of the Technical Advisory Committee. Regarding use in 1st trimester, the policy will be reviewed as soon as the new guidelines from WHO become available.
- A controlled trial of for assessing utility of intermittent preventive treatment in pregnancy (IPTp) will be carried out in collaboration with other partners for taking decision on adoption of IPTp in some areas.
- Research on *Pv* in pregnancy will be stimulated.

11.6 Prioritization of areas and populations

Presently, malaria burden in the country is highly concentrated in a few forest-tribal states and areas. In most of these states, vector control interventions are limited to villages with API ≥ 5 or other high risk criteria due to resource constraints. The expectation is that the increased implementation of malaria control interventions, in consultation with the communities concerned and accompanied by effective BCC, will reduce the disease burden to such an extent that available resources can be made available to all villages with API is ≥ 2. Furthermore, with better data management and use of GIS, it will be possible to stratify villages as per API and as a result focus interventions to villages in which they are needed most. The North-East has specific difficulties in implementation and monitoring due to various reasons including difficulty of terrain and exophily of vector *An. dirus.* It is also possible that reductions in malaria burden in high burden areas will translate to a reduction of malaria risk in low burden areas in the country in spite of continued population movements.

Activities to be undertaken

- Initial priority for IVM interventions will be for villages with API ≥ 5.
- Subsequently, villages with API between 2 and 5 will be covered.
- Existing vector control interventions including larval control will be continued in areas with lower risk where the surveillance will be strengthened towards better control with the aim of proceeding towards pre-elimination and ultimately elimination.

11.7 Urban Malaria

The malaria burden in some cities and towns appears to have diminished, as a result of well defined control strategies. In many of these, the control of malaria is well integrated with the control of dengue and chikungunya. In other cities and towns, the progress is hampered by various factors, which are mainly related to difficulties in engaging other sectors and the community.

Activities to be undertaken

- Systems research will be done to assess which strategies are likely to become most effective for intersectoral collaboration at national and local level (regulation, advocacy, incentives, etc).
- Control of vector borne diseases will be one of the cardinal points with high visibility in the National Urban Health Mission expected to be launched in 2012.

11.8 Vaccination

It is expected that RTS-S, a pre-erythrocytic malaria vaccine, is likely to be available in a few years from now. Such a vaccine, when available, will be introduced in India after carrying out the vaccine trials. This is by far the most advanced vaccine candidate.

Activity to be undertaken

Once the RTS-S vaccine becomes available, a phase IV field trial will be carried out.

11.9 Malaria elimination

Elimination means that a particular area is malaria-free and there are no locally acquired cases. Eradication means elimination of malaria from the world; the disease no longer occurs anywhere. As control activities are intensified in high endemic states, low endemic states will be encouraged and supported to proceed towards malaria elimination. The state of Goa has already taken the initiation of declaring its intent towards elimination and has launched its elimination drive.

Activities to be undertaken

- Elimination of malaria at the country level is unlikely with the available tools in India in the near future. There is a need for a major strengthening of health systems in most of the high endemic areas. .
- Action will be taken towards achieving elimination in some states and union territories which have strong health systems with low malaria receptivity and vulnerability. Studies on vulnerability and susceptibility will be carried out in these areas before contemplating elimination.
- The decision to declare a time bound elimination objective will be mainly that of the particular state. The state concerned must raise the necessary funds and manpower for the action.
- Whenever required, the national government will set up a certification system for malaria elimination in states in accordance with the WHO procedures.

11.10 Malaria situation in the North-East

Malaria situation in the North-East presents a convergence of following factors:

- Highly exophilic and exophagic vectors
- Mobile populations
- Insurgency in a few areas
- Borders with neighbouring countries where multi-drug resistance is widespread
- Possibility of important role of FBOs and NGOs, plantations and the military in some areas.

There is a need for strengthening of human resources and operational research programme in these states for sustainable malaria control. The three regional teams of MOHFW serving six of these states are located in Guwahati, Shillong and Imphal. The seventh state, Tripura is covered by ROH & FW, Kolkata.

Activities to be undertaken

It is necessary for NVBDCP to establish a regional centre for malaria control in the North-East, based in Guwahati, linked to MOHFW's regional office with responsibility for leading malaria control in the region by strengthening the human resource base in states and districts, intersectoral action, M & E and operational research. This team will constitute a minimal critical mass, having to start with, six professional staff members, including scientists.

11.11 Staffing

The foreseen expansion of malaria diagnosis with RDTs implies that it will not be necessary to expand the existing work force of LTs. Likewise, the foreseen shift from IRS to LLINs means that the current problem of shortage of field personnel for IRS operations will become less. However, the personnel will be maintained in place, as IRS will still be needed, though at a reduced level. All states need a team, which is able to supervise and guide districts, plan and

manage supplies, support BCC activities and carry out research in collaboration with the NIMR regional units. At central level, the current team of about 10 professionals at NVBDCP is constrained in dealing with administrative issues and partner coordination.

There are a few states in the North-East which are still not in a position to conceive and manage a malaria programme on their own, in spite of the 100% central assistance. It is therefore essential that malaria control in India has a stronger central capability with additional human resources:

- to give all needed technical support to some states
- to coordinate training programmes and develop training material
- manage nationwide M & E
- prepare reports synthesizing and analyzing the situation nationwide
- carry out field research and take the lead in defining the research and development agenda for malaria control
- engage other health programmes, other public health partners, profit oriented private sector and the industry
- lead the policy setting for malaria control in the country in a way that is objective and cognizant of local problems and health systems

Activities to be undertaken

There is a need to strengthen the NVBDCP at the central level with the following staff:

- three epidemiologists
- three entomologists
- three procurement specialists
- two finance officers
- one information technology expert (level of software engineer)
- one data manager
- one human resource and training specialist
- four M & E specialists
- one health economist
- one BCC specialist
- one Public information/advocacy specialist
- two data entry clerks

Some of these posts are currently filled by WHO national officers and consultants but this cannot be a permanent solution for the country's needs.

At the state level, in endemic states, the team would include:

- one public health manager
- one epidemiologist
- one entomologist
- one procurement expert
- one financial expert
- one database manager
- one senior laboratory technician
- Insect collectors
- Support staff

11.12 Summary

With the availability of new interventions for malaria control and the intensive implementation of the programme, the future looks optimistic for malaria control in India. The scaling up of these simple interventions in the east and north-east is likely to lead to the massive reductions in malaria burden.

In urban areas, strategies for urban vector control are gradually crystallizing and it is intended to maintain this momentum. In urban areas as well as rural areas with low malaria transmission, found mainly in the rest of the country, targeted application of locally suitable interventions would be able to achieve better larval, and therefore vector borne disease control.

Table 16 presents an overview of actions with tentative targets for burden reduction in different areas of the country for the period up to 2025.

Table- 16: Overview of National Malaria Control Strategy up to 2022

	7 states of North-East	**Orissa Chhattisgarh Jharkhand W.Bengal M.Pradesh**	**Urban malaria scheme**	**Rural malaria (not forest related)**	**National level**
		11th Five Year Plan period (2007-2012)			
ITN coverage	Up to 80%	Up to 80%	Expanded coverage with current intervention mix. Scheme becomes explicitly integrated	Continue IRS coverage about 80%.	By 2011, Bivalent RDTs introduced country-wide
IRS coverage	Down to 40%	Down to 40%			
RDT + ACT	Up to 60%	Up to 70%			
R & D	Treatment-seeking, risk factors, adapted vector control, personal protection	Combination LLIN-IRS cost-effectiveness; IPTproject trial; Phase IV trial of RTS-S vaccine	Systems research on intersectoral collaboration ; New anti-larval methods	Better definition of role of other anti-adult and anti-larval methods	
2012 cases as percentage of cases in 2002	<50%	< 40%	< 70%	< 70%	< 50%
		12th Five Year Plan period (2012-2017)			
ITN coverage	Up to 90% (mainly LLINs)	Up to 90% (mainly LLINs)	Strong inter-sectoral collaboration for greater, more effective coverage Operations gradually transferred to municipality responsibility	Differentiated vector control coverage towards 90%. Down-classification of 50% of populations to low risk, not needing vector control.	
IRS coverage	Down to 20%	Down to 20%			
RDT + ACT	Up to 80% Innovative vector control and case management delivery	Up to 90% Defined high-risk areas: Annual/ biannual mass vaccination with RTS-S			
R & D	Vector bionomics, resistance	Vector bionomics, resistance	Impact & coverage assessments operational	Continued operational research with	New treatments against *P.v.* liver

	7 states of North-East	Orissa Chhattisgarh Jharkhand W.Bengal M.Pradesh	Urban malaria scheme	Rural malaria (not forest related)	National level
			research to enhance efficiency	increasing focus on larval control	stage
2017 Cases as percentage of cases in 2002	< 30 %	< 25 %	< 20 %	< 30 %	< 30 %
	13th Plan period (2017-2022)				
	Locally appropriate combinations of vector control Including LLINs Selected high-risk areas: Annual/biannual mass vaccination with RTS-S	Maintenance of vector control and case management coverage. Re-classification of about 50% of population from high to low risk	Urban anti-mosquito scheme highly visible in National Urban Health Mission, eliminating vector-borne diseases city by city.	Case-based surveillance distinguishing imported, indigenous cases. Elimination planned in 5-10 states	Case management and detection increasingly in private sector, reporting data to NVBDCP
2025 Cases as percentage of cases in 2002	< 20 %	< 20 %	< 5 % 5-10 cities certified free of mosquito-borne diseases	< 20 % 5-10 states certified malaria-free by MOHFW	

Annexure 2

Table showing Districts/Areas identified for use of ACT Combination (AS+SP) for Treatment of Pf Malaria

S. No.	State/UT	Districts covered entirely	Districts covered partially (choroquine resistant PHC/ surrounding cluster of Block PHCs)
1	**Andhra Pradesh (5 districts)**	Vizianagaram,Vishakapatnam, Srikakulam, East Godavri, Khammam	
2	**A&N Islands (20 PHCs of 2 districts)**		Great Nicobar & Little Andaman (20 PHCs)
3	**Assam (24 districts)**	Dhubri, Kokrajhar, Goalpara, Bongaigaon, Barpeta, Nalbari, Kamrup, Kamrup, Darrang, Sonitpur, Lakhimpur, Dhemaji, Golaghat, Nagaon, Jorhat, Morigaon, Karbi-Anglong, N.C.Hills, Cachar (Silchar), Haila Kandi,	

S. No.	State/UT	Districts covered entirely	Districts covered partially (choroquine resistant PHC/ surrounding cluster of Block PHCs)
		Karimganj, Tinsukhia, Sibsagar, Dibrugarh	
4	**Arunachal Pradesh (6 districts)**	Changlang, Lohit, East Siang, Papum Pare, East Kameng, West Kameng	
5	**Chhattisgarh (11 districts)**	Jagdalpur, Korba, Ambikarpur, Raigarh, Jashpurnagar, Raipur, Dhamteri, Dantewada, Kanker, Bilaspur, Korea	
6	**Dadra & Nagar Haveli (6 PHCs)**		Dadra & Nagar Haveli (6 PHCs)
7	**Goa (28 districts of 2 districts)**		North Goa and South Goa (28 PHCs)
8	**Gujarat (27 PHCs of 7 district)**		Panchmahal district (4 PHCs)
			Kutch Bhuj –(6 PHCs)
			Anand (2 PHCs)
			Dahod (3 PHCs)
			Patan (5 PHCs)
			Surat (4 PHCs)
			Kheda (3 PHCs)
9	**Jharkhand (12 districts)**	Gumla, Ranchi, Simdega, East Lohardaga, Singhbhum, West Singhbhum, Saraikela, Sahibganj, Godda, Dumka, Latehar, Pakur	
10	**Karnataka (53 PHCs of 12 districts)**		Kolar (7 PHCs)
			Raichur, (20 PHCs)
			Bellary (2 PHCs)
			Mandya (1 PHC)
			Bagalkot (4 PHCs)
			D.Kannada (1 PHC)
			Chemarajanagar (1 PHC)
			Gadag (1 PHC)
			Chitradurga (6 PHCs)
			Belgaum (1 PHC)
			Gulbarga (8 PHCs)
			Bijapur (1 PHC)
11	**Madhya Pradesh (9 districts)**	Jhabua, Dindori, Shahdol, Chhindwara, Siddhi, Mandla,Seoni,Hoshangabad, Guna	
12	**Maharashtra (32 PHCs of 2 districts)**		Raigarh (1 PHC)
			Ghadchiroli(31 PHC)
13	**Manipur (11 districts)**	All 11 districts of the state	
14	**Meghalaya (7 districts)**	All 7 districts of the state	
15	**Mizoram (3 districts)**	Lunglei, Kolasib, Mamit	
16	**Nagaland (12 districts)**	All 12 districts of the state	
17	**Orissa (13 districts and 37 PHCs and two Urban Wards of 11 other districts))**	Keonjhar, Kandhamal, Sundergarh, Mayurbhanj, Kalahandi, Nuapada, Koraput, Sambalpur, Gajapati, Rayagada, Jharasguda, Malkangiri, Nawarangpura,	Angul (7 PHCs)
			Dhenkanal (3 PHCs)
			Deogarh (3 PHCs)
			Bolangir (6 PHCs)
			Boudh (3 PHCs)
			Balasore (3 PHCs)
			Baragarh (2 PHCs)
			Cuttack (2 PHCs)
			Ganjam (4 PHCs)

S. No.	State/UT	Districts covered entirely	Districts covered partially (choroquine resistant PHC/ surrounding cluster of Block PHCs)
			Nayagarh (2 PHCs)
			Sonepur (4 PHCs)
18	**Rajasthan (11 PHCs of 4 districts)**		Dungarpur (4 PHCs)
			Banswara (4 PHCs)
			Baran (2 PHCs)
			Udaipur (1PHC)
19	**Tamilnadu (1 area of 1 district)**		Rameshwaram Island
20	**Tripura (4 districts)**	All 4 districts of the state	
21	**Uttar Pradesh (1 area of 1 district)**		Mirzapur (1 project area)
22	**West Bengal (39 PHCs of 5 districts)**		Purulia (11 PHCs)
			Jalpaiguri (13 PHCs)
			Bankura (5 PHCs)
			Darjeeling (8 PHCs)
			Kolkata Municipal Corporation (2 wards)
	Total	**117 districts**	**256 PHCs in 48 districts**

	NEEDS ASSESSMENT - STRATEGIC PLAN (2009 - 2017)																		Assumptions
	Strategy Components	Numbers/Quantities Required each year								UNIT COST (in Rs.)	Financial Budget								
		2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17		2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	
	Estimated population of India	**1166**	**1185**	**1204**	**1223**	**1243**	**1263**	**1283**	**1303**										
1	**EARLY DIAGNOSIS & COMPLETE TREATMENT**																		
	1. RDT																		> The total of RDTs and microsocpy will be maintained to achieve an ABER of 10%
	Pf specific RDTs	14,000,000	18,000,000	0	0	0	0	0	0	20.00	280,000,000	360,000,000	0	0	0	0	0	0	Pf RDT till - 2010 - 2011
	Pan specific (Pf and Pv) RDTs	0	0	45,200,000	45,900,000	46,600,000	47,400,000	40,000,000	40,000,000	30.00	0	0	1,356,000,000	1,377,000,000	1,398,000,000	1,422,000,000	1,200,000,000	1,200,000,000	>Pan RDT will be used from 2010-2011 > Pan RDT requirement have been calculated on the basis about 40% of fever cases tested in the country will be through RDTs and the remaining by microsicopy
1	**Total of RDTs**	**14,000,000**	**18,000,000**	**45,200,000**	**45,900,000**	**46,600,000**	**47,400,000**	**40,000,000**	**40,000,000**		**280,000,000**	**360,000,000**	**1,356,000,000**	**1,377,000,000**	**1,398,000,000**	0	**1,200,000,000**	**1,200,000,000**	
	Pf cases in country	700000	700000	650000	600000	550000	490000	450000	410000										
	Pv cases in country	700000	700000	650000	600000	550000	490000	450000	410000										
2	**Anti-malarials**															0			
	Chloroquine															0			
	Pv cases and suspected malaria cases	349,800,000	355,500,000	252,840,000	256,830,000	261,030,000	265,230,000	269,430,000	273,630,000	0.35	122,430,000	124,425,000	88,494,000	89,890,500	91,360,500	92,830,500	94,300,500	95,770,500	Blood slides collected x 6 and divided by 2 (Refer details in text). From 2011-12, there will be a reduction of requirements by 30% as bivalent RDT introduction will result in 30% slide testing
	Pf cases	280,000	0	0	0	0	0	0	0	0.35	98,000	0	0	0	0	0	0	0	>No chloroquine from 2011-2012 > ACT shall be rolled out for all Pf cases > No of Pf cases Adult Children
	Buffer 25%	87,520,000	88,875,000	63,210,000	64,207,500	65,257,500	66,307,500	67,357,500	68,407,500	0.35	30,632,000	31,106,250	22,123,500	22,472,625	22,840,125	23,207,625	23,575,125	23,942,625	
	Total Chloroquine tablets	**437,600,000**	**444,375,000**	**316,050,000**	**321,037,500**	**326,287,500**	**331,537,500**	**336,787,500**	**342,037,500**	**0.35**	**153,160,000**	**155,531,250**	**110,617,500**	**112,363,125**	**114,200,625**	**116,038,125**	**117,875,625**	**119,713,125**	
	Primaquine																		
	Adults - 7.5 mg tablets																		

	Pv Cases	13,720,000	13,720,000	12,740,000	11,760,000	10,780,000	9,604,000	8,820,000	8,036,000	0.17	2,332,400	2,332,400	2,165,800	1,999,200	1,832,600	1,632,680	1,499,400	1,366,120	
	Pf Cases	4,200,000	4,200,000	3,900,000	3,600,000	3,300,000	2,940,000	2,700,000	2,460,000	0.17	714,000	714,000	663,000	612,000	561,000	499,800	459,000	418,200	
	Total	17,920,000	17,920,000	16,640,000	15,360,000	14,080,000	12,544,000	11,520,000	10,496,000	0.17	3,046,400	3,046,400	2,828,800	2,611,200	2,393,600	2,132,480	1,958,400	1,784,320	
	Buffer 25%	4,480,000	4,480,000	4,160,000	3,840,000	3,520,000	3,136,000	2,880,000	2,624,000	0.17	761,600	761,600	707,200	652,800	598,400	533,120	489,600	446,080	
	Exigencies 40%	7,168,000	7,168,000	6,656,000	6,144,000	5,632,000	5,017,600	4,608,000	4,198,400	0.17	1,218,560	1,218,560	1,131,520	1,044,480	957,440	852,992	783,360	713,728	
	Total Primaquine(7.5 mg) tablets	29,568,000	29,568,000	27,456,000	25,344,000	23,232,000	20,697,600	19,008,000	17,318,400		3,808,000	3,808,000	3,536,000	3,264,000	2,992,000	2,665,600	2,448,000	2,230,400	
	Children - 2.5 mg tablets																		
	Pv Cases	11,760,000	11,760,000	10,920,000	10,080,000	9,240,000	8,232,000	7,560,000	6,888,000	0.10	1,176,000	1,176,000	1,092,000	1,008,000	924,000	823,200	756,000	688,800	
	Pf Cases	2,520,000	2,520,000	2,340,000	2,160,000	1,980,000	1,764,000	1,620,000	1,476,000	0.10	252,000	252,000	234,000	216,000	198,000	176,400	162,000	147,600	
	Total	14,280,000	14,280,000	13,260,000	12,240,000	11,220,000	9,996,000	9,180,000	8,364,000	0.10	1,428,000	1,428,000	1,326,000	1,224,000	1,122,000	999,600	918,000	836,400	
	Buffer 25%	3,570,000	3,570,000	3,315,000	3,060,000	2,805,000	2,499,000	2,295,000	2,091,000	0.10	357,000	357,000	331,500	306,000	280,500	249,900	229,500	209,100	
	Exigencies 40%	5,712,000	5,712,000	5,304,000	4,896,000	4,488,000	3,998,400	3,672,000	3,345,600	0.10	571,200	571,200	530,400	489,600	448,800	399,840	367,200	334,560	
	Total Primaquine(2.5 mg) tablets	23,562,000	23,562,000	21,879,000	20,196,000	18,513,000	16,493,400	15,147,000	13,800,600		3,784,200	3,784,200	3,513,900	3,243,600	2,973,300	2,648,940	2,432,700	2,216,460	
	Total of Primaquine										**7,592,200**	**7,592,200**	**7,049,900**	**6,507,600**	**5,965,300**	**5,314,540**	**4,880,700**	**4,446,860**	
	ACT for Pf Cases in adults																		Total Pf Cases (6650000)
	Adults (60% of total Pf cases)	420,000	420,000	390,000	360,000	330,000	294,000	270,000	246,000	72.00	30,240,000	30,240,000	28,080,000	25,920,000	23,760,000	21,168,000	19,440,000	17,712,000	
	25% buffer stocks, deployment reserves and 25% of total for use in non-Govt sector	1,498,000	1,698,000	948,000	930,000	918,000	894,000	870,000	834,000	72.00	107,856,000	122,256,000	68,256,000	66,960,000	66,096,000	64,368,000	62,640,000	60,048,000	
	Total ACT for adults	1,918,000	2,118,000	1,338,000	1,290,000	1,248,000	1,188,000	1,140,000	1,080,000	72.00	138,096,000	152,496,000	96,336,000	92,880,000	89,856,000	85,536,000	82,080,000	77,760,000	
	ACT for Pf Cases in children																		
	0-1 year (10% if pediatric cases)	0	70,000	65,000	60,000	55,000	49,000	45,000	41,000	60.00	0	4,200,000	3,900,000	3,600,000	3,300,000	2,940,000	2,700,000	2,460,000	> buffer and deployment >including deployment reserve
	1-4 year	0	154,000	143,000	132,000	121,000	107,800	99,000	90,200	60.00	0	9,240,000	8,580,000	7,920,000	7,260,000	6,468,000	5,940,000	5,412,000	
	5-8 years	0	210,000	195,000	180,000	165,000	147,000	135,000	123,000	60.00	0	12,600,000	11,700,000	10,800,000	9,900,000	8,820,000	8,100,000	7,380,000	
	9-14 years	0	266,000	247,000	228,000	209,000	186,200	171,000	155,800	60.00	0	15,960,000	14,820,000	13,680,000	12,540,000	11,172,000	10,260,000	9,348,000	
	Total	0	700,000	650,000	600,000	550,000	490,000	450,000	410,000	60.00	0	42,000,000	39,000,000	36,000,000	33,000,000	29,400,000	27,000,000	24,600,000	
	25% buffer stocks, deployment reserves and 25% of total for use in non-Govt sector	0	712,000	242,000	260,000	282,000	302,000	310,000	310,000	60.00	0	42,720,000	14,520,000	15,600,000	16,920,000	18,120,000	18,600,000	18,600,000	

	ACT for Pf cases in children	0	1,412,000	892,000	860,000	832,000	792,000	760,000	720,000	60.00	0	84,720,000	53,520,000	51,600,000	49,920,000	47,520,000	45,600,000	43,200,000	
	Total ACT for adults and children	1,918,000	3,530,000	2,230,000	2,150,000	2,080,000	1,980,000	1,900,000	1,800,000		0	237,216,000	149,856,000	144,480,000	139,776,000	133,056,000	127,680,000	120,960,000	
	Loose ACT tablets for children																		
	Artesunate tablets till blisters available	2,520,000	0	0	0	0	0	0	0	1.50	3,780,000	0	0	0	0	0	0	0	
	SP (2 tablets for 40% of expected no. of paediatric cases) till blisters available	560,000	0	0	0	0	0	0	0	1.00	560,000	0	0	0	0	0	0	0	
	Operational Cost to ASHAs for diagnosis and treatment										8,000,000	8,000,000	8,000,000	16,000,000	32,000,000	64,000,000	64,000,000	64,000,000	> 61 districts > 2400 per annum per ASHA > for blood slide collection + RDT / ACT use
	Total cost of ACT										**150,436,000**	**397,712,000**	**254,192,000**	**253,360,000**	**261,632,000**	**282,592,000**	**273,760,000**	**262,720,000**	
	D. Severe Malaria																		
	Arteether Injections	245,700	245,700	228,150	210,600	193,050	171,990	157,950	143,910	71.00	17,444,700	17,444,700	16,198,650	14,952,600	13,706,550	12,211,290	11,214,450	10,217,610	
	Quinine injections	273,000	273,000	253,500	234,000	214,500	191,100	175,500	159,900	5.10	1,392,300	1,392,300	1,292,850	1,193,400	1,093,950	974,610	895,050	815,490	
	Quinine Sulphate tablets	819,000	819,000	760,500	702,000	643,500	573,300	526,500	479,700	1.10	900,900	900,900	836,550	772,200	707,850	630,630	579,150	527,670	
	Total cost of antimalarials for severe malaria										**19,737,900**	**19,737,900**	**18,328,050**	**16,918,200**	**15,508,350**	**13,816,530**	**12,688,650**	**11,560,770**	
2	**Total cost of antimalarials**										**330,926,100**	**580,573,350**	**390,187,450**	**389,148,925**	**397,306,275**	**417,761,195**	**409,204,975**	**398,440,755**	
3	**INTEGRATED VECTOR MANAGEMENT**																		
	LLINs for for areas with API ≥ 5																		
	LLINs from GFATM Round IV	1,000,000	2,570,000	0	0	0	0	0	0	238.00	238,000,000	611,660,000	0	0	0	0	0	0	
	LLINs from World Bank	0	1,580,000	2,260,000	2,260,000	1,260,000	0	0	0	238.00	0	376,040,000	537,880,000	537,880,000	299,880,000	0	0	0	
	LLINs from other/domestic sources	0	0	0	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	238.00	0	0	0	1,190,000,000	1,190,000,000	1,190,000,000	1,190,000,000	1,190,000,000	
	Total cost of LLINs										**238,000,000**	**987,700,000**	**537,880,000**	**1,727,880,000**	**1,489,880,000**	**1,190,000,000**	**1,190,000,000**	**1,190,000,000**	
	Community owned & Programme supplied bednets which require treatment with	6,760,000	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000	10.00	67,600,000	80,000,000	80,000,000	80,000,000	80,000,000	80,000,000	80,000,000	80,000,000	>It is assumed that about 8 million plain nets will continue to be treated till the cost of LLINs become affordable in 2017 for purchase by the

	synthetic pyrethroids																	community members
	Insecticide (SP liquid) for bednet treatment twice a year for programme supplied nets & community owned bednets* @ 20ml per net (in Lts)	270,400	320,000	320,000	320,000	320,000	320,000	320,000	320,000	154.00	41,641,600	49,280,000	49,280,000	49,280,000	49,280,000	49,280,000	49,280,000	49,280,000	
	Total cost of treatment of plain bednets	**8,030,400**	**12,470,000**	**10,580,000**	**15,580,000**	**14,580,000**	**13,320,000**	**13,320,000**	**13,320,000**	**878.00**	**585,241,600**	**2,104,680,000**	**1,205,040,000**	**3,585,040,000**	**3,109,040,000**	**2,509,280,000**	**2,509,280,000**	**2,509,280,000**	
	2. IRS (eligible pop is 80 million)																	
	DDT in MT (48 Million eligible population)	7,200	7,200	7,200	6,000	4,800	3,600	2,400	2,400	120000.00	864,000,000	864,000,000	864,000,000	720,000,000	576,000,000	432,000,000	288,000,000	288,000,000	
	Malathion in MT (12 Million eligible population)	10,800	10,800	10,800	0	0	0	0	0	80000.00	864,000,000	864,000,000	864,000,000	0	0	0	0	0	
	Synthetic pyrethroid - alpha cypermethrine for IRS in MT (20 Million eligible population)	750	750	750	750	750	900	1,125	900	154000.00	115,500,000	115,500,000	115,500,000	115,500,000	115,500,000	138,600,000	173,250,000	138,600,000	
	Operational Cost (Wages , training etc.)	80	80	80	60	56	48	46	40	3,610,000.00	288,800,000	288,800,000	288,800,000	216,600,000	202,160,000	173,280,000	166,060,000	144,400,000	
	Total cost of IRS										**2,132,300,000**	**2,132,300,000**	**2,132,300,000**	**1,052,100,000**	**893,660,000**	**743,880,000**	**627,310,000**	**571,000,000**	
	Cost of Anti larval mesures										15,000,000	15,000,000	15,000,000	15,000,000	15,000,000	15,000,000	15,000,000	15,000,000	
	Urban Malaria Scheme										20,000,000	20,000,000	20,000,000	20,000,000	20,000,000	20,000,000	20,000,000	20,000,000	**includes larvicides etc.**
3	**Total cost for IVM**										**2,990,541,600**	**5,259,680,000**	**3,910,220,000**	**6,400,020,000**	**5,527,580,000**	**4,478,160,000**	**4,361,590,000**	**4,305,280,000**	
4	**1. Human resources**																		
	National Level																		
	Establishment for National Malaria control staff (Govt) including travel										48,000,000	48,000,000	48,000,000	48,000,000	48,000,000	48,000,000	48,000,000	48,000,000	> Incudes the salary of govt emplyees with all the other expense
	National Professional Officer	1	1	1	1	1	1	1	1	1500000.00	1,500,000	1,575,000	1,653,750	1,736,438	1,823,259	1,914,422	1,914,422	2,010,143	
	Technical Consultants	18	18	18	18	18	18	18	18	960000.00	17,280,000	18,144,000	19,051,200	20,003,760	21,003,948	17,280,000	22,054,145	23,156,853	> Consultant to be hired for technical support such as M&E, Procurement , Public Health Finance , Training , NGO, PPP, Sco Mob , BCC ,

																		IT/GIS, Enviormental Specialist Research Officer (medial & Entomology) > Hiring of consultant @ 80000 per month
	Section Coordinator (one each - M&E, Finance, Procurement and administration)	4	4	4	4	4	4	4	4	300000.00	1,200,000	1,260,000	1,323,000	1,389,150	1,458,608	1,200,000	1,531,538	1,608,115	
	Support Staff (Technical)	6	6	6	6	6	6	6	6	240000.00	1,440,000	1,512,000	1,587,600	1,666,980	1,750,329	1,440,000	1,837,845	1,929,738	Research Assistant(1) , Compuer programmes (3)and statistican(2)
	Accountant	2	2	2	2	2	2	2	2	180000.00	360,000	378,000	396,900	416,745	437,582	360,000	459,461	482,434	
	Support Staff (others)	30	30	30	30	30	30	30	30	120000.00	3,600,000	3,780,000	3,969,000	4,167,450	4,375,823	3,600,000	4,594,614	4,824,344	Health Assistant (2) , Secretarial Assitant (18) , Data operator (6) , Field Assistant (2)
	Sub Total (A.1)										73,380,000	74,649,000	75,981,450	77,380,523	78,849,549	73,794,422	80,392,026	82,011,627	
	Travel Cost of Human Resource A.1(10%)+A.2 (2%)										3,345,600	3,464,880	3,590,124	3,721,630	3,859,712	3,395,331	4,004,697	4,156,932	
	Office operational and Maintenance Cost										60,000,000	60,000,000	60,000,000	60,000,000	60,000,000	60,000,000	60,000,000	60,000,000	
	Total of HR at national level										**136,725,600**	**138,113,880**	**139,571,574**	**141,102,153**	**142,709,260**	**137,189,753**	**144,396,723**	**146,168,560**	
	B. Regional Level																		
	Consultant Public Health*	3	3	3	3	3	3	3	3	960000.00	2,880,000	3,024,000	3,175,200	3,333,960	3,500,658	2,880,000	3,675,691	3,859,475	
	Consultants Programme Management	8	8	8	8	8	8	8	8	600000.00	4,800,000	5,040,000	5,292,000	5,556,600	5,834,430	4,800,000	6,126,152	6,432,459	Consultant training BCC,PPP, M&E , MIS/GIS in project areas
	Administrative Officer	5	5	5	5	5	5	5	5	300000.00	1,500,000	1,575,000	1,653,750	1,736,438	1,823,259	1,500,000	1,914,422	2,010,143	Section coordinators , section incharge ,Accounts and finance
	Data Manager	3	3	3	3	3	3	3	3	240000.00	720,000	756,000	793,800	833,490	875,165	720,000	918,923	964,869	Data manager for project areas GIS etc
	Support Staff	10	10	10	10	10	10	10	10	120000.00	1,200,000	1,260,000	1,323,000	1,389,150	1,458,608	1,200,000	1,531,538	1,608,115	Secretatary Assistance , Data Entry Opretor
	Sub Total										11,100,000	11,655,000	12,237,750	12,849,638	13,492,119	11,100,000	14,166,725	14,875,062	
	Travel Cost of Human Resource B (10%)										1,110,000	1,165,500	1,223,775	1,284,964	1,349,212	1,110,000	1,416,673	1,487,506	
	Total of HR at regional level										**12,210,000**	**12,820,500**	**13,461,525**	**14,134,601**	**14,841,331**	**12,210,000**	**15,583,398**	**16,362,568**	
	C. State Level																		
	C.1 Human Resource																		
	Consultant Public Health	15	15	28	28	28	28	28	28	480000.00	7,200,000	7,560,000	7,938,000	8,334,900	8,751,645	13,440,000	9,189,227	9,648,689	> 1 per each state

	Consultant Programme Management	75	75	75	75	75	75	75	75	360000.00	27,000,000	28,350,000	29,767,500	31,255,875	32,818,669	27,000,000	34,459,602	36,182,582	>Finance, procurement ,BCC,PPP,Training, > in 15 High endemic states
	Programme support Officer	30	30	30	30	30	30	30	30	300000.00	9,000,000	9,450,000	9,922,500	10,418,625	10,939,556	9,000,000	11,486,534	12,060,861	>Administrative Coordinator and Finance and accounts officer
	Support Staff (Technical)	30	30	30	30	30	30	30	30	180000.00	5,400,000	5,670,000	5,953,500	6,251,175	6,563,734	5,400,000	6,891,920	7,236,516	> Statician , PPP/MIS/ Training assistance
	Support Staff (non technical)	45	45	45	45	45	45	45	45	120000.00	5,400,000	5,670,000	5,953,500	6,251,175	6,563,734	5,400,000	6,891,920	7,236,516	> Secretarial Assistance and Data Entry Operator other assistance
	Sub Total (C.1)										43,200,000	45,360,000	47,628,000	50,009,400	52,509,870	49,440,000	55,135,364	57,892,132	
	Travel Cost & Misc Cost of Human Resource C.1(10%)+C.2 (2%)										3,816,000	4,006,800	4,207,140	4,417,497	4,638,372	4,440,000	4,870,290	5,113,805	
	Total of HR at state level										**47,016,000**	**49,366,800**	**51,835,140**	**54,426,897**	**57,148,242**	**53,880,000**	**60,005,654**	**63,005,937**	
	D. District																		
	Consultant (Malaria)	201	201	201	201	201	201	201	201	360000.00	72,360,000	75,978,000	79,776,900	83,765,745	87,954,032	72,360,000	92,351,734	96,969,321	
	Malaria Technical Supervisors (average 6 per districts) @ 1 per 1.5-2.5 lakh pop.	603	1,206	1,206	1,206	1,206	1,206	1,206	1,206	180000.00	108,540,000	113,967,000	119,665,350	125,648,618	131,931,048	217,080,000	138,527,601	145,453,981	> 1500 MTS @ 1
	Support Staff (non technical) for each district	402	402	402	402	402	402	402	402	120000.00	48,240,000	50,652,000	53,184,600	55,843,830	58,636,022	48,240,000	61,567,823	64,646,214	> 1 SA and 1 Account assistance
	Data Entry Operators (M&E) @ one for each district	402	402	402	402	402	402	402	402	72000.00	28,944,000	30,391,200	31,910,760	33,506,298	35,181,613	28,944,000	36,940,694	38,787,728	> Data entry 1 for NAMMSI and 1 for M&E
	MOs against vacancies in high burden areas	1,927	1,927	1,927	1,927	1,927	1,927	1,927	1,927	240000.00	462,480,000	485,604,000	509,884,200	535,378,410	562,147,331	462,480,000	590,254,697	619,767,432	
	LTs against vacancies in high burden areas	1,609	1,609	1,609	1,609	1,609	1,609	1,609	1,609	60000.00	96,540,000	101,367,000	106,435,350	111,757,118	117,344,973	96,540,000	123,212,222	129,372,833	
	HA(M) against vacancies in high burden areas	3,946	3,946	3,946	3,946	3,946	3,946	3,946	3,946	60000.00	236,760,000	248,598,000	261,027,900	274,079,295	287,783,260	236,760,000	302,172,423	317,281,044	Health Assistant Male
	HA(F) against vacancies in high burden areas	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310	60000.00	78,600,000	82,530,000	86,656,500	90,989,325	95,538,791	78,600,000	100,315,731	105,331,517	Health Assistant Female
	MPW(M) against vacancies in high burden areas	12,100	12,100	12,100	12,100	12,100	12,100	12,100	12,100	60000.00	726,000,000	762,300,000	800,415,000	840,435,750	882,457,538	726,000,000	926,580,414	972,909,435	
	MPW(F) against vacancies in	4,717	4,717	4,717	4,717	4,717	4,717	4,717	4,717	60000.00	283,020,000	297,171,000	312,029,550	327,631,028	344,012,579	283,020,000	361,213,208	379,273,868	

	high burden areas																		
	Sub Total										2,141,484,000	2,248,558,200	2,360,986,110	2,479,035,416	2,602,987,186	2,250,024,000	2,733,136,546	2,869,793,373	
	Travel Cost & Misc Cost for Human Resource (2%)										42,829,680	44,971,164	47,219,722	49,580,708	52,059,744	45,000,480	54,662,731	57,395,867	
	Total of HR at district level										2,184,313,680	2,293,529,364	2,408,205,832	2,528,616,124	2,655,046,930	2,295,024,480	2,787,799,277	2,927,189,240	
4	**Total cost of HR at all levels**										**2,380,265,280**	**2,493,830,544**	**2,613,074,071**	**2,738,279,775**	**2,869,745,763**	**2,498,304,233**	**3,007,785,052**	**3,152,726,304**	
5	**Training**																		
	A. National Level																		
	Induction & refresher training for the programme management unit , M&E and planning staff and the programme managers for the project										8,000,000	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000	>Indcution and refresher training for the programme management personnel which shall join the programme and if appointed in the project to provide an over view >Study tours , international fellowship > specialised training for PPP,BCC QA sentinel survillance national staff
	Indcution and refresher training to Medical officer										8,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	> Training for malaria dignosis > Severe case management treatment training of state entomologist and other medical doctors in vetor bionomics etc Trainees from govt as well as other organizations such as IMA etc
	Induction and refresher Training of DVBDC consultants (@ 25 participants per batch)	2	8	8	2	2	2	2	2	6,000,000.00	12,000,000	48,000,000	48,000,000	12,000,000	12,000,000	12,000,000	12,000,000	12,000,000	> Induction shall be of 3 months and refesher shall be 15 days
	Total of training at National level										**28,000,000**	**66,000,000**	**66,000,000**	**30,000,000**	**30,000,000**	**30,000,000**	**30,000,000**	**30,000,000**	
	B. Regional and / or State Level																		
	Indution and refresher training of Medical officer from the district and the state	10	10	10	10	10	10	10	10	500000.00	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	> Training conduction for treatment of malaria > Severe case management treatment .> other specialized and technical training
	Induction and refresher training of para medical staff	25	25	25	25	25	25	25	25	200000.00	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	

	govt and non govt																	
	Inductions and refersher training for regional ,state, District VBDCP teamsand (1-2 participant per district - Consultant & DMOs)	10	10	10	10	10	10	10	10	300,000.00	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	> training of district teams for malaria on the programme or the project >
	Induction and refresher training of Lab technicans	10	10	10	10	10	10	10	10	500,000.00	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	> Induction training for 24 days > Referesher training for 10 days
	Induction and refersher Training of MTS	12	12	12	12	12	12	12	12	375,000.00	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000	
	Total of training at Regional / state level										**12,500,000**	**22,500,000**	**22,500,000**	**22,500,000**	**22,500,000**	**22,500,000**	**22,500,000**	**22,500,000**	
	C. District Level																		
	Training for Medical Officers (programme management)	200	200	200	200	200	200	200	200	150000.00	30,000,000	30,000,000	30,000,000	30,000,000	30,000,000	30,000,000	30,000,000	30,000,000	> training at the district level for the CHC / Block PHC / PHC medical officer > Severe case management treatment > Training for sentinel sites
	Refresher Training for Lab. Technicians	10	10	10	10	10	10	10	10	50000.00	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	
	Training in severe case management to hospital staff (Malaria)	50	50	100	50	20	20	20	20	50000.00	2,500,000	2,500,000	5,000,000	2,500,000	1,000,000	1,000,000	1,000,000	1,000,000	
	Training of Health Supervisors & Health workers	100	100	100	100	100	100	100	100	50000.00	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	
	Training of Community Volunteers (including ASHAs) in use of RDT, drug distribution and bednet treatment detail larvivorous fish	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	25000.00	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	
	Total of training at district level										**63,000,000**	**63,000,000**	**65,500,000**	**63,000,000**	**61,500,000**	**61,500,000**	**61,500,000**	**61,500,000**	
5	**Total of training at all levels**										**103,500,000**	**151,500,000**	**154,000,000**	**115,500,000**	**114,000,000**	**114,000,000**	**114,000,000**	**114,000,000**	
6	**MONITORING & EVALUATION**																		

	A. Center																	
	Half yearly review meeting of the states by Centre	2	2	2	2	2	**2**	**2**	**2**	**30,000,000.00**	60,000,000	60,000,000	60,000,000	60,000,000	60,000,000	60,000,000	60,000,000	60,000,000	
	Project Review Quaterly a year by NVBDCP	4	4	4	4	4	4	4	4	1,500,000.00	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	
	Impact Evaluation	1		1		1		1		95,000,000.00	95,000,000	0	95,000,000	0	95,000,000	0	95,000,000	0	> Evaluation by internal or expternal agency > to be done alternate year
	Central Evaluation of selected high endemic districts coinciding with two Rounds of IRS	65	65	65	65	65	65	65	65	100000.00	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	
	Field Visits by NVBDCP Staff during Transmission season & outbreaks	30	30	30	30	30	30	30	30	50000.00	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	
	Joint Monitoring Mission		1		1		1		1	95,000,000.00	0	95,000,000	0	95,000,000	0	95,000,000	0	95,000,000	>Joint view mission to be done every alternate year
	Hiring Agency for Supply Chain Management	1	1	1	1	1	1	1	1	2500000.00	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	
	LQAS	**5**	5	5	5	5	**5**	**5**	**5**	**3,600,000.00**	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	> to be done in identified area
	Large Scale Population and house hold survey	10	10	10	10	10	10	10	10	1,000,000.00	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	> survey to be done in identified area of the state > 1 million INR for 1 state
	Therapeutic efficacy Studies	15	15	15	15	15	15	15	15	250,000.00	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	
	Total M&E at central level										**203,250,000**	**203,250,000**	**203,250,000**	**203,250,000**	**203,250,000**	**203,250,000**	**203,250,000**	**203,250,000**	
	B. Regional & Zonal Offices																		
	Regional Offices (already established)	19	19	19	19	19	19	19	19	500000.00	9,500,000	9,500,000	9,500,000	9,500,000	9,500,000	9,500,000	9,500,000	9,500,000	
	Field Visits by Regional Offices	342	342	342	342	342	342	342	342	500000.00	171,000,000	171,000,000	171,000,000	171,000,000	171,000,000	171,000,000	171,000,000	171,000,000	
	Total M&E at regional and zonal levels										**180,500,000**	**180,500,000**	**180,500,000**	**180,500,000**	**180,500,000**	**180,500,000**	**180,500,000**	**180,500,000**	
	C. State Level																		
	Field visits to districts by State staff (4 per month)	60	60	60	60	60	60	60	60	25000.00	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	to be done by the state authorities in the district
	Review meeting of Districts by individual states @ 1 per	60	60	60	60	60	60	60	60	100000.00	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	Review meeting by the state with District teams

	Quarter																		
	Total M&E at state level										**7,500,000**	**7,500,000**	**7,500,000**	**7,500,000**	**7,500,000**	**7,500,000**	**7,500,000**	**7,500,000**	
	D. District Level																		
E	Establish Sentinel sites @ 2 per district	402	402	402	402	402	402			150000.00	60,300,000	60,300,000	60,300,000	60,300,000	60,300,000	60,300,000	0	0	
	Hiring of District drug Store @ Rs.10000 per month	201	201	201	201	201	201			120000.00	24,120,000	24,120,000	24,120,000	24,120,000	24,120,000	24,120,000	0	0	
	Vehicle purchase for MTS (one time non recurring)	503	603	0	0	0	0	0	0	50000.00	25,150,000	30,150,000	0	0	0	0	0	0	
	Field Visits by MTS (10 per month per MTS)	72,360	72,360	72,360	72,360	72,360	72,360	72,360	72,360	500.00	36,180,000	36,180,000	36,180,000	36,180,000	36,180,000	36,180,000	36,180,000	36,180,000	
	Monthly review by District collector or CMHO	2,412	2,412	2,412	2,412	2,412	2,412	2,412	2,412	2500.00	6,030,000	6,030,000	6,030,000	6,030,000	6,030,000	6,030,000	6,030,000	6,030,000	
	Total M&E at district level										**151,780,000**	**156,780,000**	**126,630,000**	**126,630,000**	**126,630,000**	**126,630,000**	**42,210,000**	**42,210,000**	
6	**Total M & E at all levels**										**543,030,000**	**548,030,000**	**517,880,000**	**517,880,000**	**517,880,000**	**517,880,000**	**433,460,000**	**433,460,000**	
7	**E. Printing of M&E Formats**										**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	
8	**F. MIS - NAMMIS**																		
	Formations of the MIS software			**1**						20,000,000.00	0	0	20,000,000	0	0	0	0	0	
	Annual Maintainance Contract	1	1	1	1	1	1	1	1	7500000.00	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000	
	TOT for States @ National Level	5	5	2	5	5	5	1	1	1000000.00	5,000,000	5,000,000	2,000,000	5,000,000	5,000,000	5,000,000	1,000,000	1,000,000	
	Training of DEO of Districts on NAMMIS @ State Level	15	15		15	15	15	10	10	100000.00	1,500,000	1,500,000	0	1,500,000	1,500,000	1,500,000	1,000,000	1,000,000	
8	**Total of MIS**										**14,000,000**	**14,000,000**	**29,500,000**	**14,000,000**	**14,000,000**	**14,000,000**	**9,500,000**	**9,500,000**	
9	**G. Operational studies**																		
	Pharmacovigilance	4	4	4	4	4	4	4	4	1,000,000.00	4,000,000	16,000,000	64,000,000	256,000,000	1,024,000,000	4,000,000	4,000,000	4,000,000	
	Quaity Assurance	2	2	2	2	2	2	2	2	1,000,000.00	2,000,000	4,000,000	8,000,000	16,000,000	32,000,000	2,000,000	2,000,000	2,000,000	
9	**Total of operational studies**										**6,000,000**	**20,000,000**	**72,000,000**	**272,000,000**	**1,056,000,000**	**6,000,000**	**6,000,000**	**6,000,000**	
10	**BCC Malaria**										150,000,000	150,000,000	150,000,000	20,000,000	20,000,000	20,000,000	20,000,000	20,000,000	
11	**Public Private Partnership (PPP)**										**10,000,000**	**10,000,000**	**10,000,000**	**10,000,000**	**10,000,000**	**10,000,000**	**10,000,000**	**10,000,000**	
	Grand Total										**6,809,262,980**	**9,588,613,894**	**9,203,861,521**	**11,854,828,700**	**11,925,512,038**	**8,077,105,428**	**9,572,540,027**	**9,650,407,059**	