Strategic Plan for Malaria Control in India
2012-2017
A Five-year Strategic Plan

'Scaling up malaria control interventions with a focus on high burden areas'
and
'Categorized strategic interventions for achieving pre-elimination status'

Directorate of National Vector Borne Disease Control Programme
Directorate General of Health Services
Ministry of Health & Family Welfare
Government of India

22- Shamnath Marg, Delhi- 110054

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 Insecticidal nets (LLINs). Modern concepts in monitoring and evaluation have also been incorporated into the programme which take account of the new interventions.

A "Strategic Plan for malaria control in India" has accordingly been prepared by the Directorate of NVBDCP organized around the package of these new interventions to decrease malaria transmission and increase access and improve quality of curative services over the 12th five year plan period (2012-17) 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 MOHFW plans to reduce the malaria burden over the 12th five year plan period (2012-17). 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. Considering the wide range of incidence in different districts, the strategy is different for different levels of incidence. Thus, it also considers the interventions in low endemic areas to prevent malaria upsurges. It includes estimates of the human resources, financing, infrastructure and major commodities 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 scale 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, Caritas India (PR2) 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. It advocates for inclusive partnerships between the Ministry of Health, the line ministries, civil societies, non-governmental organisations, development partners and the private sector in order to achieve the set objectives and targets.

However, in order to achieve these targets, significant resources will be required to translate the commitment into effective action in order to achieve sustainable malaria control in India and to reach pre-elimination stage before the end of 12th Five Year Plan.

Dr. A.C. Dhariwal
Director
NVBDCP

ACKNOWLEDGEMENTS

The Directorate of NVBDCP wishes to acknowledge with thanks the support and contribution from the development partners, the non-governmental organizations and individuals who have contributed in one way or another in the development of the Malaria Control strategic Plan 2012-17.

Special thanks go to the Officers and Consultants at the Malaria Division and the Consultants of The World Bank and the Global Fund Projects for providing technical assistance right from the initial stages of drafting the strategic plan. The role of Caritas India in preparing this document is appreciable and we are thankful to them for their kind cooperation in preparing this document.

On behalf of the Ministry of Health and Family Welfare, we would like also to thank WHO for their inputs and support in ensuring that all inputs from the various stakeholders in Malaria Control were included and reflected in the final Strategic Plan document.

Dr. G.S. Sonal
Additional Director &
Head of Malaria Division
NVBDCP

List of contributors

No.	Name	Designation	Organization
1.	Dr. A. C. Dhariwal	Director	NVBDCP
2.	Dr. G. S. Sonal	Additional Director	NVBDCP
3.	Dr. Avdhesh Kumar	Additional Director	NVBDCP
4.	Dr. R. S. Sharma	Ex-Additional Director	NVBDCP
5.	Dr. V. K. Raina	Ex-Joint Director	NVBDCP
6.	Dr. S.N. Sharma	Ex-Joint Director	NVBDCP
7.	Dr. K.S.Gill	Joint Director	NVBDCP
8.	Dr. P.K.Srivastava	Joint Director	NVBDCP
9.	Dr. Kalpana Baruah	Joint Director	NVBDCP
10.	Dr. Sher Singh Kashyotia	Assistant Director	NVBDCP
11.	Dr. Sumanlata Wattal	Deputy Director	NVBDCP
12.	Dr. A. Gunasekar	NPO	WHO
13.	Dr. Shampa Nag	Project Director – IMCP-II	CARITAS INDIA
14.	Dr. Naman Shah	Consultant	NIMR
15.	Dr. H.G.Thakor	M&E Consultant –TA-GF	NVBDCP
16.	Dr. Munish Joshi	Consultant (Training) –TA-GF	NVBDCP
17.	Mr. Nitin Sagar	Ex-Consultant (Finance) –TA-GF	NVBDCP
18.	Mrs. Nagalakshmi Sankar	Consultant (Finance)	NVBDCP
19.	Mr. Bahadur Yadav	Upper Division Clerk	NVBDCP
20.	Ms. Nirupa Tirkey	Data Entry Operator	NVBDCP
21.	Mr. Atul Kumar	Statistician	NVBDCP
22.	Mr. Vikram Sagar	Computer Programmer	NVBDCP

Contents

7. Intersectoral collaboration and Behaviour Change Communication

7.1 Intersectoral collaboration
7.2 Behaviour Change Communication (BCC)

8. Monitoring and Evaluation (M&E)

8.1 M&E strategy
8.2 Strengthening of HMIS
8.3 Sentinel surveillance
8.4 Lot Quality Assurance Sampling (LQAS) surveys
8.5 Population based surveys
8.6 Logistics Management Information System (LMIS)
8.7 Quality assurance of RDTs and drugs
8.8 Drug resistance
8.9 Pharmacovigilance
8.10 Insecticide resistance
8.11 Joint programme reviews

9. Programme management and other strategies

9.1 Programme management and organisational alignment
9.2 Programme planning and design
9.3 Procurement and supply chain management
9.4 Legislation
9.5 Research

10. Financial outlay

10.1 Background
10.2 12^{h} Five-Year plan outlay
10.3 Financial details of NVBDCP (1997-2011)
10.4 External support
10.5 Financial management strategies
10.6 Integration of financial management under NRHM

11. Planning for malaria control beyond 2017

11.1 Diagnosis
11.2 Case detection policy
11.3 Treatment
11.4 Vector control
11.5 Malaria in pregnancy
11.6 Prioritization of areas and populations
11.7 Urban malaria
11.8 Vaccination
11.9 Malaria elimination
11.10 Malaria situation in the North East
11.11 Staffing
11.12 Summary

References

Abbreviations and Acronyms

ABER	Annual Blood Examination Rate
ACD	Active Case Detection
ACT	Artemisinin-based combination therapy
API	Annual Parasite Incidence
BCC	Behaviour Change Communication
CHC	Community Health Centre
DBS	Domestic Budget Support
DDT	Dichloro Diphenyl Trichloroethane
DPIP	District Program Implementation Plan
EAP	Externally Assisted Projects
EMCP	Enhanced Malaria Control Programme
EMP	Environment Management Plan
FTD	Fever Treatment Depot
GOI	Government of India
GTZ	Gesellschaft fur Technische Zusammenarbeit (Germany)
ICMR	Indian Council of Medical Research
IEC	Information, Education and Communication
IDA	International Development Association
IDR	In-Depth Review
IMNCI	Integrated Management of New-born & Childhood Illnesses
IPHS	Indian Public Health Standard
IRS	Indoor Residual Spraying
ITN	Insecticide Treated (bed) Nets
JMM	Joint Monitoring Mission
LLIN	Long lasting insecticidal nets
MDGs	Millennium Development Goals
M&E	Monitoring and Evaluation
MIES	Monitoring Information and Evaluation System
MIS	Malaria Indicator Survey
MoH&FW	Ministry of Health and Family Welfare
MOU	Memorandum of Understanding
MPO	Modified Plan of Operation
MTR	Mid-term review
MRC	Malaria Research Centre
NFHS	National Family Health Survey
NGO	Non-Governmental Organization
NIHFW	National Institute of Health and Family Welfare
NIMR	National Institute of Malaria Research
NHSRC	National Health Systems Resource Centre
NMCP	National Malaria Control Programme
NMEP	National Malaria Eradication Programme
NMSP	National Malaria Strategic Plan
NPIP	National Project Implementation Plan
NRHM	National Rural Health Mission
NVBDCP	National Vector Borne Disease Control Programme
PCD	Passive Case Detection
PDO	Project Development Objectives
PBF	Performance Based Financing
P. falciparum	*Plasmodium falciparum*
PHC	Primary Health Centre

PIP	Program Implementation Plan
PPP	Public Private Partnerships
PRI	Panchayati Raj Institutions
P. vivax	*Plasmodium vivax*
RCH	Reproductive and Child Health
RDK	Rapid Diagnostic Kit
RMRC	Regional Medical Research Centre
RPRG	Regional Programme Review Group
SOP	Standard Operating Procedures
SP	Sulphadoxine-Pyrimethamine
SA	Social Assessment
SoE	Statement of Expenses
SPAR	State Procurement Assessment Report
SPIPs	State Program Implementation Plans
TA	Technical Assistance
UNICEF	United Nations Children's Fund
UMI	Upper Middle Income Countries
USAID	United States Agency for International Development
VBD	Vector-borne disease
VCP	Vulnerable Community Plan
VCRC	Vector Control Research Centre
VGHP	Vulnerable Group Health Plan
WB	World Bank
WHO	World Health Organization

Executive Summary

Introduction

Malaria is a major public health problem in some States of India including the North East region. Recognizing the burden due to malaria on the health and economic development of the population living in 'high-risk' areas, the Government of India has given special attention to malaria control in these areas. In States with very low malaria burden is the strategic interventions are different. The National Malaria Strategic Plan (NMSP) outlines a strategy for translating commitment into concerted action for *scaling up malaria control interventions with a focus on high burden areas and categorized strategic interventions for achieving pre-elimination status.* It is envisaged that effective implementation of the Strategic Plan would reduce the burden on health and economic development of millions of people affected by malaria.

Vision

The country has a document 'The Vision 2002' which emphasizes the expectations from the health care delivery system for malaria by 2025.

Mission

To reduce the morbidity and mortality due to malaria and improving the quality of life, thereby contributing to health and alleviation of poverty in the country

Goals

- Screening all fever cases suspected for malaria (60% through quality microscopy and 40% by Rapid Diagnostic Test)
- Treating all *P. falciparum* cases with full course of effective ACT and primaquine and all *P. vivax* cases with 3 days chloroquine and 14 days primaquine
- Equipping all health Institutions (PHC level and above), especially in high-risk areas, with microscopy facility and RDT for emergency use and injectable artemisinin derivatives
- Strengthening all district and sub-district hospitals in malaria endemic areas as per IPHS with facilities for management of severe malaria cases.

Objective

To achieve by the end of 2017, API < 1 per 1000 Population

Outcome Indicators

- At least 80% of those suffering from malaria get correct, affordable and appropriate and complete treatment within 24 hours of reporting to the health system, by the year 2017
- At least 80% of those at high risk of malaria get protected by effective preventive measures such as ITN/LLIN or IRS by 2017
- At least 10% of the population in high-risk areas is surveyed annually (Annual Blood Examination Rate >10%)

Impact Indicators

- To bring down annual incidence of malaria to less than 1 per 1000 population at national level by 2017.
- At least 50% reduction in mortality due to malaria by the year 2017, taking 2010 level as baseline

Strategies

India's National Malaria Strategic Plan (2012-17) is in line with the following broad strategies of the Regional Malaria Strategy of WHO/SEARO.

- Reform approaches to programme planning and management
- Improve and enhance surveillance and strengthen monitoring and evaluation
- Scale up coverage and proper use of insecticide treated bed nets
- Target interventions to risk groups
- Scale up control of *P vivax*

Reforms are an on-going process and during the current five year strategic plan, continued use of ACT, and RDTs at village level and IVM along with LLIN use is envisaged. These strategies are congruent with the WHO global recommendations and offer the possibility of dramatically improved outcomes for malaria. Reforms are also in place or underway to address governance issues to strengthen accountability.

The programme plans to implement activities to:

- Promote the implementation of evidence based strategies for malaria control through sustained technical support and partnerships;
- Facilitate access of populations at risk to effective and complete treatment of malaria;
- Support the application of effective preventive measures against malaria for the population at risk through IVM;
- Strengthen capacity building of the field staff for malaria control in the country; and
- Strengthen malaria surveillance system and the monitoring and evaluation of malaria control measures at all levels.

Rapid focussed Scale-Up For Impact (SUFI)

India is poised to make dramatic progress in reducing the health and economic burden attributable to malaria. There is a new and highly effective drug policy with the deployment of a more effective drug, the roll out of a package of interventions to reduce the burden of malaria in high-risk areas, a scale up of transmission-reduction using ITN / LLIN) and a selective and targeted application of IRS. The intensive scale up of coverage of personal protection interventions (ITN / LLIN) and focussed IRS is expected to have rapid and significant impact on malaria cases, deaths, and health care costs. It is also foreseen that coverage in the range of 80% in high risk areas would result in greater than 50% reduction in malaria illnesses and drug and health care costs.

Categorized strategic interventions for achieving pre-elimination status

During the 11th Five-Year Plan period (2007-12), the malaria strategy adopted was for malaria control. At present, malaria incidence in many states in India is very low. In view of the feasibility of shrinking the map of malaria and progress towards malaria elimination

(defined as no indigenous transmission-i.e., API less than one) it is proposed to change the strategies according to malaria endemicity at state and district level. This approach is expected to lead to reduction in malaria incidence in high endemic areas and sustain reduced incidence in low endemic areas to pave the way for the country to enter into the "pre-elimination stage". This requires adequate inputs in terms of technical, logistic and financial support.

The Technical Advisory Committee (TAC) for the programme has approved the following category specific broad strategies by:

Category	Definition	Strategies
Category 1	**States** with API **less than one and** all the **districts** in the state are with API **less than one**	• Active, passive and sentinel surveillance with focus on quality surveillance Screening of migrants. • Screening of migrants. • IVM with involvement of Village Health and Sanitation Committees, other PRIs and MNREGA schemes. • Supportive interventions including BCC activities.
Category 2	**States** having API **less than one** and one or more **districts** reporting API **more than one**	• Epidemiological surveillance and disease management (3 Ts—Test, Treat and Track). • Screening of migrants. • IVM by source reduction through minor engineering, environmental management and focal spray. • Supportive interventions including BCC activities with involvement of private health care providers, community involvement and NGOs.
Category 3	**States** with API **more than one**	• Epidemiological surveillance and disease management: by Early Diagnosis and Complete Treatment (EDCT). • Management of severe malaria cases by strengthening of district and sub-district hospitals and quality referral services. • IVM by IRS and LLIN distribution so as to saturate the entire high risk population. • Supportive interventions.

For areas having perennial transmission (more than 5 months in a year)

- 2 rounds of IRS with DDT/Synthetic Pyrethroids (SP) or 3 rounds with Malathion, depending on vector susceptibility and priority distribution of LLINs.

For areas having seasonal transmission (less than 5 months in a year)

- 1 round of IRS with DDT/ SP or Malathion before start of transmission season; focal spray whenever and wherever needed; and priority distribution of LLINs.

Further, for surveillance, states which are reporting an API of < 1 for three consecutive years shall initiate action for declaring malaria as a notifiable disease in the state.

Core interventions and target objectives

Reducing disease burden and mortality: Prevention

Insecticide treated mosquito nets

Objective: By March 2017, 80% of population in high-risk areas sleep under an insecticide treated bed-net

Indoor residual spraying

Objective: By March 2017, 85% of people living in households eligible for IRS have their homes sprayed annually.

Reducing disease burden and mortality: Caring for the sick

Accurate diagnosis

Objective: By March 2017, at least 80% of those suffering from malaria get correct, affordable and appropriate diagnosis within 24 hours of reporting to the health system

Prompt and effective treatment of malaria

Objective: By March 2017, at least 80% of malaria patients in high-risk areas are receiving prompt and effective treatment according to the current drug policy within 24 hours of reporting to the health system

Effective programme management

NVBDCP will be strengthened as a technical support unit with prescribed responsibilities for overall coordination of implementation of national malaria control efforts.

Empowering individuals and communities

Achieving high coverage of effective interventions requires a well-functioning "close-to-client" health system that will ensure the delivery of high quality and technically sound services. In India, efforts at information dissemination and communication strategies for behavior change show great promise. The Directorate of NVBDCP has developed the public private partnership (PPP) guidelines for involvement of NGOs/FBOs and civil society. During the Plan period efforts will be made to improve the participation of the NGOs in malaria control efforts at the district and sub-district level. The partnership developed with the civil society partners under the externally funded project will be synergistically utilized to increase the efforts on BCC activities.

Commitment to performance monitoring and impact evaluation

The basic health information systems will be strengthened and new capacity developed for collection, analysis, and timely dissemination of coverage and impact data, as well as developing new knowledge through operations research. The Lot Quality Assurance Sampling (LQAS) surveys and periodic household /health facility surveys (with the support from donor agencies and WHO) will guide the programme in continuous monitoring and periodic evaluation of the programme. Partnership with research institutes like National Institute of Malaria Research will help the programme in monitoring the drug and insecticide resistance which is vital to design the changes in the drug and insecticide strategies.

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 1.21 billion (2011 census). India is the largest democracy of the world consisting of 28 states and 7 union territories. The states of India are further divided into 640 districts.

India, one of the oldest civilizations in the world with a kaleidoscopic variety and rich cultural heritage, has achieved multifaceted socio-economic progress during the last 65 years since its independence. India has become self-sufficient in agricultural production, and is now the tenth industrialized country in the world. It covers an area of 32,87,263 sq km, extending from the snow-covered Great Himalayas in the north, stretching southwards towards the Indian Ocean between the Bay of Bengal on the east and the Arabian Sea on the west. The geography of India is diverse and can be divided into three main regions. The first is the rugged, mountainous Himalayan region in the northern part of the country, while the second is the Indo-Gangetic Plain where most of India's large-scale agriculture takes place. The third region is the plateau in the central and southern parts of the country. India also has three major river systems, the Indus, Ganges and Brahmaputra, with large deltas occupying large portions of the land.

India is at present the world's tenth largest economy and its GDP is US $ 1.085 trillion and the per capita GDP per annum is US $ 3700. The country is one of the G-20 major economies and a member of BRICS. However, the percentage of people living below the poverty line, though reduced, was still high at 30 % in 2011 as per the new international poverty line. India's nominal per capita income of US $ 1514 is ranked 139th in the world. The literacy rate is 74%. The health of the population of India has improved significantly over the past 50 years. Life expectancy has risen from 33 to 67 years. The crude birth rate has declined from 41 to 21 and the crude death rate from 25 to 7.5[1]. The infant mortality rate (IMR) has fallen from 148 to 44 per 1,000. The maternal mortality ratio per 100,000 live births has declined to 212.

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; and

[1] www.mohfw.nic.in

- 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.

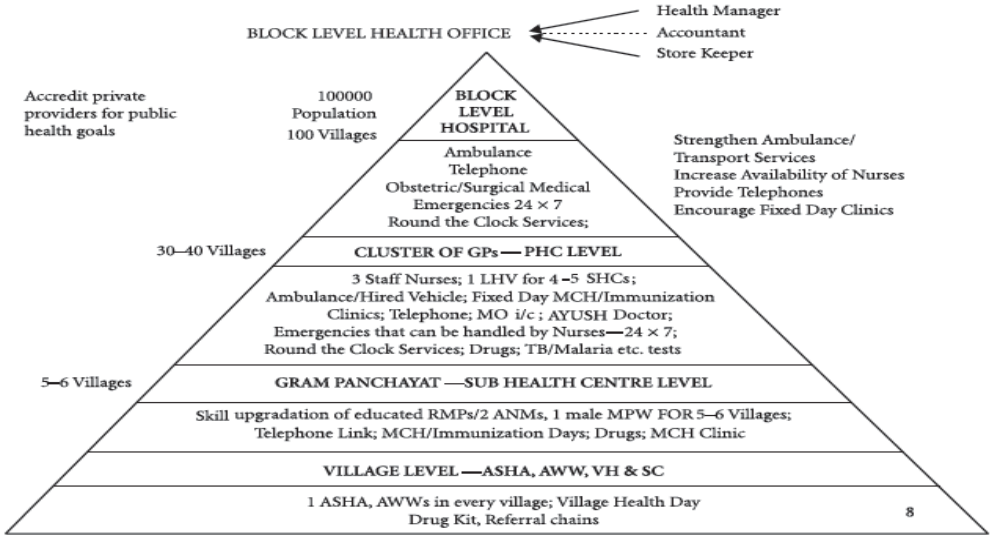
1.3 National Rural Health Mission (NRHM)

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 & Kashmir. The duration of NRHM was from 2005 to 2012 which has been further extended to 2017.

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 intersectoral 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 stakeholders 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.

Figure 1.1: Health Care provision 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; and
- To improve access of rural people, especially poor women and children to equitable, affordable and effective primary health care.

Under the NRHM, it was planned to have:

- Over 5 lakh ASHAs, one for every 1,000 population / large habitation, in 18 high focus states and in tribal pockets of all states by 2008;
- All sub-centres (about 1.75 lakh) functional with two Auxiliary Nurse Midwives (ANMs) by 2010;
- All Primary Health Centres (PHCs) (nearly 25,000) with three staff nurses to provide 24 × 7 services by 2010;
- 6,500 Community Health Centres (CHCs) strengthened/established with seven specialists and nine staff nurses in each by 2012;
- 1,800 taluka/sub-divisional hospitals and 600 district hospitals strengthened to provide quality health services by 2012;
- Mobile medical units for each district by 2009;
- Functional hospital development committees in all CHCs, sub-divisional hospitals and district hospitals by 2009; and
- Untied grants and annual maintenance grants to every CHC, PHC and SC released regularly and utilized for local health action by 2008.

The NRHM was to make the health service system (both public and private) acceptable, affordable and accountable to the poorest households. Accordingly, the thrust of the Mission has been to establish a fully functional, community owned, decentralized health delivery system conforming to public health standards laid down for all health care facilities. The broad direction of the Mission and some achievements towards addressing the constraints in brief are as under:

1) Increasing public expenditure on health care from 0.9 percent to the GDP in 2005 to 2 to 3 percent of the GDP: Currently, public resources for health are estimated to be about only 1.07 percent of GDP due to rapid GDP increase. However, in absolute terms, there has been a substantial increase in budgetary outlays both at the federal and state levels which have

succeeded in setting right several distortions related to maintenance and other routine expenditure required for the proper functioning of the health facilities.

2) Flexible funding: A main strategy of NRHM is to provide flexibility in fund utilization by providing untied funds at every level of the health system, its use being decided by the hospital boards – a true indicator of empowering people to participate. Substantial improvements in infrastructure and placement of human resources have been achieved, resulting in increased utilization by the poor.

3) Increasing participation and ownership by the community: Under this initiative all health facilities have a board consisting of representatives from civil society, women's groups, political leaders, etc. with powers to decide budget allocation and utilization. Further, it is the community selected health volunteer, the ASHA who provides the linkage between the community health needs and the facility. She is incentivized with a certain amount of money for each service she provides, for example, under the malaria programme, for performing RDT, making blood smears, treating confirmed malaria cases etc.

4) Participation by the Private sector/Civil society organizations (CSOs): The NRHM at State and district levels has representatives of NGOs/CBOs/FBOs; this would be leveraged in proposed malaria project areas. The Global Fund Round 9 supported Intensified Malaria Control Project II builds on the strong credentials of NRHM and CSO involvement, to involve communities actively in malaria control efforts. The Civil society (Caritas India consortium) which has an extensive network of primary and secondary level health care units and volunteers, across the NE states has been involved as Principal Recipient 2 under the Project. Trainings of private practitioners by Indian Medical Association are conducted at state level. Caritas India's curative and preventive services at community level to complement the government's efforts are recognized in increasing the access and utilization of services. The CSOs facilitate utilization of services by also enhancing awareness, service demand and participation.

5) Improve management capacity: At the State and district level, autonomous health societies have been constituted to manage health budgets. Professionals such as chartered accountants and public health managers including those with business management degree have been appointed. This has resulted in improving financial management and quicker flow of resources. Qualified persons are increasingly being recruited for better planning, management and M&E at State and district VBDCPs as well as at sub-district levels too..

6) Integration of all vertical programs to ensure better coordination: All health care facilities are being strengthened in accordance with public health standards laid down in terms of human resources, infrastructure facilities, funding, etc. for providing the required package of services. More than 850,000 Accredited Social Health Activists (ASHA) have been recruited at community level.

7) Monitoring and Supervision: Under NRHM, the Health Management Information System (HMIS) is a comprehensive system capturing programme data from all national health programmes. The NVBDCP also has set up the NAMMIS for strengthening programme monitoring and analysis of performance and outputs to feed into strategic planning and decision making.

The NRHM interventions give higher focus on the economically and socially lagging states where the social and health indicators are poorer. These are states with poor health infrastructure in the public and private sector, low social capital, poorly developed civil

society, inadequate human resources and weak governance. Besides, training, accreditation of facilities, regulatory mechanism etc. are a part of the substantial array of initiatives underway to address the public health delivery system in the districts. With further strengthening of health systems through NRHM, scaling up of services for malaria control is expected. Given this overall context, the NVBDCP in harmonization with the NRHM (through integrated health systems at sub-district level) is scaling up delivery of preventive and curative interventions.

The NRHM has mobilized significant amount of resources for strengthening the public health infrastructure and brought to scale the accessibility of health care service delivery at the doorsteps of the community by deploying ASHAs in villages. The NVBDCP leverages such strengths towards improving surveillance, universal access and coverage of malaria control interventions. The overall budget allocation for NVBDCP too is getting enhanced over the years, yet it is not adequate to ensure responsive services in view of the large size of the country and expansive malaria endemic areas. Although the global economic situation has shrunk the donor landscape and commitment, additional resource support through GFATM as well as World Bank are considered advantageous to NVBDCP towards progressing and achieving the results. Reduction/non-receipt of such resources could impede further improvements in malaria control in the country and the gains realized so far could possibly be adversely impacted. By providing additional support to NVBDCP, the donors have an important opportunity to contribute to the desired health goals and outcomes as well as address the issue of overall development, especially because the support mostly goes to the poor and marginalized who are the most affected and at risk of malaria, thereby addressing inequities in health sector.

Further, the local self-governments, tribal councils and the civil society involvement in malaria control though still minimal yet has supported programme implementation as complementary partners/players. The NVBDCP plans to continue the existing partnerships (example with PR2 consortium in NE states) and leverage their community based presence and experience to further the activities and M&E at individual, family and community levels towards participation and ownership of malaria control by the community themselves, as part of the sustainability strategy. Although registration of NGOs, FBOs, etc. is mandated, regulation for the vast private health care service providers is almost non-existent, which has a direct bearing on the disease control programmes, including NVBDCP.

Although community ownership of malaria control is emphasized by positioning ASHAs, CHVs, and active coordination with other community systems, local self-governments, tribal council, and churches, delays in implementation of some initiatives takes place due to uncertain socio-political situation in some areas of the country. However, efforts are taken to resolve the problems locally by stakeholder discussions.

Regarding the drug regulatory system, the Drug Controller General of India (DCGI) under the Food and Drug Administration Authority has the overall responsibility for issuing licensing for manufacture, marketing, export and usage of drugs. The DCGI follows international standards for drug licensing. The DGGI has banned the production, marketing, sale, distribution and export of Artemisinin as mono-therapy as per the WHO recommendation in view of development of resistance to Artemisinin observed in Cambodia and Myanmar reflecting national and international obligations towards safe drug policy.

1.4 Health financing and planning

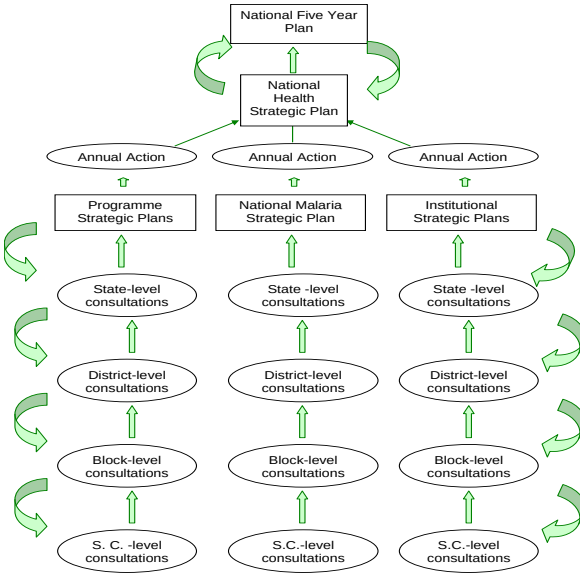
During the 10th Five-Year Plan (2002-07), Vector-Borne Diseases (VBDs) accounted for 43%

of the total budget for disease control and malaria accounted for more than half of the central government expenditure on VBDs. The state governments have budget allocations for VBD control for staff, operations and certain commodities, which are approximately equal to that of the central government.

Under the 11th Five-Year Plan (2007-12), there has been a 33% increase in budget allocations under NRHM from Rs. 90,360 million in 2006-07 to Rs. 119,760 million in 2008-09. The budget allocation for national disease control was increased by about 42% from Rs. 7,560 million in 2006-07 to Rs. 10,720 million in 2008-09.

Although health is a state subject as per the constitution of India, the central government contributes 50% of the expenditure of selected priority activities such as disease control. Furthermore, since December 1994, seven North Eastern states (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura), which are particularly disadvantaged, have been brought under 100% central assistance for selected priority activities including control of vector borne diseases.

Figure 1.2: 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 about 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 through a workforce of over five lakh doctors under the various systems of medicine and over seven lakh nurses and other health care workers. However, this infrastructure still remains under-equipped, under-staffed and under-financed to meet the challenge of providing universal access to health care and adequately controlling communicable diseases.

The last case of polio was reported in February 2011 and it is possible that in the next five to ten years, leprosy, kala-azar and filariasis are eliminated. However, tuberculosis, malaria and HIV/AIDS are likely to continue as major public health problems, requiring continued vigilance and increasing investments to ensure consolidation of gains and progress.

When and where the NRHM norms are met, it can be said that a basic health care infrastructure required for sustaining malaria control is established. However, the rapid expansion of village-based ASHAs 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.

It is important to take into account inter- and intra-country diversity as given in the following table as the country strategy plan is driven by many local factors.

General & Health Facility Profile –India

	No.	Average population	Population
Country	India		1210 million (2011 census)
States/ UTs	35	32 Million	Inter-state pop. Variation – 0.06 Million to 191 million
Districts	641	1.86 Million	Inter-district pop. variation – 9000 to 6.9 million
PHCs	23,391	47000	
Sub-centres	145,894	7000	Against norm of 5000
ASHA (Village)	0.61 million	1000 or fraction	Accredited Social Health Activist

Section – 2: Malaria Situation and Control in India

2.1 History of malaria control in India

Prior to the launching of the National Malaria Control Programme (NMCP) in 1953, malaria was a major scourge in India contributing 75 million cases with about 0.8 million deaths annually. The widespread DDT indoor residual spray (IRS) in the country under the NMCP resulted in a sharp decline in malaria cases 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 Urban Malaria Scheme (UMS) was also launched in 1971-72 covering 131 cities and towns.

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 programme was also integrated with the primary health care delivery system. Under the MPO, IRS was recommended in areas with Annual Parasite Incidence (API) $\geq$ 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 reported 3.03 million cases and 2,803 deaths. The eradication goal was officially shelved and the programme was changed to National Anti-Malaria Program (NAMP) in 1997.

The national malaria control programme became a part of NVBDCP in 2002 in consonance with the reality that the organisation was manning the National Filariasis Control Programme and Kala-azar control as well as control of other vector borne diseases namely, Japanese encephalitis, Dengue and lately Chikungunya. 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.

2.2 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 (DGHS), Ministry of Health and Family Welfare (MOHFW), Government of India (GOI), is the national level unit dedicated to the program. The Directorate of NVBDCP is the nodal agency for programme planning, 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
- Providing Technical guidance to the states
- Planning

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

The milestones of malaria control activities in India are given in table 2.1:

Table 2.1: Milestones of malaria control activities in India

Before 1940	No organized National Malaria Control Programme
Prior to 1953	Estimated number of malaria cases in India- 75 million; Estimated number of deaths due to malaria -1 million
1953	Launching of National Malaria Control Programme
1958	Launching of National Malaria Eradication Programme
1966	Cases reduced to 0.1 million
Early 1970's	Resurgence of malaria
1971	Urban Malaria Scheme launched
1976	Malaria cases - 6.46 million highest in post DDT era
1977	Modified Plan of Operations (MPO) implemented
1984-1998	Annual reported incidence of malaria within 2-3 million cases
1995	Modified Action Plan for malaria control implemented
1997	World Bank assisted Enhanced Malaria Control Project (EMCP) started
1999	Renaming of programme to National Anti-Malaria Programme
2002	Integration of malaria control progamme in to the National Vector Borne Disease Control Programme
2005	Global fund assisted Intensified Malaria Control Project (IMCP) - in 94 districts of 10 states (2005-2010); Introduction of RDTs in the programme
2006	ACT introduced in areas showing chloroquine resistance in *falciparum* malaria
2008	Revision of drug policy with ACT use extended to high risk P. falciparum districts covering about 95% of P. falciparum infections
2009	World Bank assisted National Vector Borne Diseases Control Project 185 million population 93 districts in 8 states. Introduction of LLINs
2009	Artemisinin mono-therapy banned in the country
2010	Revised National Drug Policy 2010. ACT for all *P. falciparum* cases in the country; Global Fund (Rd 9) Assisted Intensified Malaria Control Project (IMCP-II) - Oct. 2010 to Sept.2015
2012	Introduction of bivalent RDT

There are 19 Regional Offices for Health and Family Welfare (ROHFW) under the DGHS, located in 19 States which play a crucial role in monitoring the activities under NVBDCP in collaboration with the states. Out of these 19 offices, 16 are equipped with malaria trained staff and conduct entomological studies, drug resistance studies and cross-checking of blood

slides for quality control. They contribute also to capacity building, monitoring and supervision at the state level. Additional responsibility of managing VBDs is given to the officer in-charge of Regional Leprosy Training Centre and Regional Drug Testing Laboratory at Chhattisgarh and one at Guwahati respectively. The Regional Office at Shimla in the very low endemic state of Himachal Pradesh does not have any malaria programme staff.

The state governments are required to plan and implement the malaria control operations in their respective states. Every state has a VBD 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. The state has been given flexibility in deployment of staff of ROHFW with concurrence of the ROHFW. States are responsible for the procurement of certain insecticides for IRS, spray equipment and some antimalarials, but the central government supplies DDT and larvicides.

Each state has established a State VBD 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 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 DVBDC officer in the entire district under overall supervision of CMO. There is one Assistant Malaria Officer (AMO) and Malaria Inspectors (MIs) to assist him. Many posts of DVBDC officer are however yet to be filled in some high-burden states such as Orissa, Chhattisgarh and Jharkhand. This is rectified by new recruitments; assignment of staff from other disease control programmes, in areas where the disease burden is declining and by deployment of contractual consultants and project officers.

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

The laboratories have been decentralized to 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 of NGOs.

2.3 Malaria situation and trends

India is characterized predominantly by unstable malaria transmission, the seasonal transmission being related to rains. Due to the low and unstable transmission dynamic, most of the population has little or no immunity towards malaria. As a result, all age groups of population living in malarious areas are at risk of infection and get affected. However, some

surveys have shown that in some foci, mainly in forested areas, the transmission intensity is very intense with the disease burden to a large extent concentrated in children.

Malaria 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. About 95% population in the country resides in malaria endemic areas and 80% of malaria reported in the country is confined to areas where 20% of population reside in tribal, hilly, hard-to-reach or inaccessible areas.

The Urban Malaria Scheme (UMS) was approved during 1971 as 100% centrally sponsored scheme. From 1979-80 it was changed to 50:50 sharing basis between centre and state governments. The UMS scheme was scaled up in phased manner by including 23 towns in 1971-72; 5 in 1972-73; 87 in 1977-78; 38 in 1978-79; 12 in 1979-80 and 17 in 1980-81 making total towns of 182. Since states have the responsibility of providing human resources and infrastructure, the scheme could be implemented only in 131 towns for which Govt. of India is supplying anti-larval insecticides. The drugs are made available through states. At present Urban Malaria Scheme is protecting about 116 million populations from malaria and other mosquito borne diseases in 131 towns. Following the outbreaks of dengue and chikungunya, UMS was also entrusted with additional responsibility for control of other vector borne diseases in urban areas.

Passive surveillance for malaria is carried out by PHCs, malaria clinics, CHCs and other secondary and tertiary level health institutions that patients visit for treatment. Apart from that, ASHA, the village level volunteer is involved in the programme to provide diagnostic and treatment services at the community level with of the use of newer interventions like RDT and ACT for treatment of P. falciparum cases. The countrywide malaria situation as reflected in surveillance data from year 2000-2011 is given in the following table 2.2.

The data in Table 2.2 shows that the API has consistently come down from 2.12 per thousand in 2001 to 1.1 in 2011 but confirmed deaths due to malaria have been fluctuating during this period between 1707 and 753. SPR and SfR have reduced over the years 2001-2011 with ABER remaining within the range of 9.95% to 8.73%.

The annual case load, though steady around 2 million cases in the late nineties, has shown a declining trend since 2002. When interpreting API at low level of surveillance as indicated by the ABER, the Slide Positivity Rate (SPR) could be a better indicator. The SPR has showed decline in India from 3.32 in 1995 to 1.20 in 2011 and. *P. falciparum* cases decreased from 1.14 million 1995 to 0.67 million in the same period. However, *P. falciparum proportion* among all malaria cases increased gradually from 39% in 1995 to 50.7 % in 2011, which could indicate increasing resistance of *P. falciparum* to chloroquine. The reported number of deaths due to malaria has levelled to around thousand per year, albeit a peak in 2006 due to severe malaria epidemics in Assam possibly related to population movements and inadequate treatment in the private sector. However, the annual actual numbers of deaths due to malaria could be much more as a large number of patients visit private health providers who do not report the cases and deaths to the programme. .

There are various ways of classifying areas at risk for malaria transmission. Since the 1970s, areas with an API above 2 cases per 1000 population per year have been classified as *high risk areas* in India, and thereby eligible for vector control. In principle, the stratification of risk levels based on epidemiological data is based on village level data. However, not all endemic districts are able to break down their data by village, and the national data

management system works with district-level data. It is estimated that currently, 80.5% of India's population of lives in areas at risk of malaria.

Table 2.2: Malaria epidemiological situation and indicators in India from 2000 to 2011

Year	Population in Crores	Blood Smears Examined	Positive cases	P. falciparum Cases	P. falciparum %	ABER	API	SPR	SFR	Deaths
2000	97.02	8,67,90,375	20,31,790	10,47,218	51.54	8.94	2.09	2.34	1.21	932
2001	98.45.	9,03,89,019	20,85,484	10,05,236	48.20	9.18	2.12	2.31	1.11	1005
2002	101.39	9,16,17,725	18,41,229	8,97,446	48.74	9.04	1.82	2.01	0.98	973
2003	102.71	9,91,36,143	18,69,403	8,57,101	45.85	9.65	1.82	1.89	0.86	1006
2004	104.09	9,71,11,526	19,15,363	8,90,152	46.47	9.33	1.84	1.97	0.92	949
2005	108.28	10,41,43,806	18,16,569	8,05,077	44.32	9.62	1.68	1.74	0.77	963
2006	108.28	10,67,25,851	17,85,129	8,40,360	47.08	9.95	1.66	1.67	0.79	1707
2007	108.75	9,49,28,090	15,08,927	7,41,076	49.11	8.73	1.39	1.59	0.78	1311
2008	111.96	9,73,16,158	15,26,210	7,75,523	50.81	8.69	1.36	1.57	0.80	1055
2009	115.01	10,33,96,076	15,63,574	8,39,877	53.72	8.99	1.36	1.51	0.81	1144
2010	116.73	10,86,79,429	15,99,986	8,34,364	52.15	9.31	1.37	1.47	0.77	1018
2011	119.49	10,89,69,660	13,10,656	6,65,004	50.74	9.12	1.10	1.20	0.61	753

ABER: Annual Blood Smear Examination Rate
API: Annual Parasite Incidence
SPR: Slide Parasite Rate
SfR: Slide falciparum Rate

Fig. 2.1: Trends of Total Malaria cases, P. falciparum cases and deaths from year 1996 to 2011

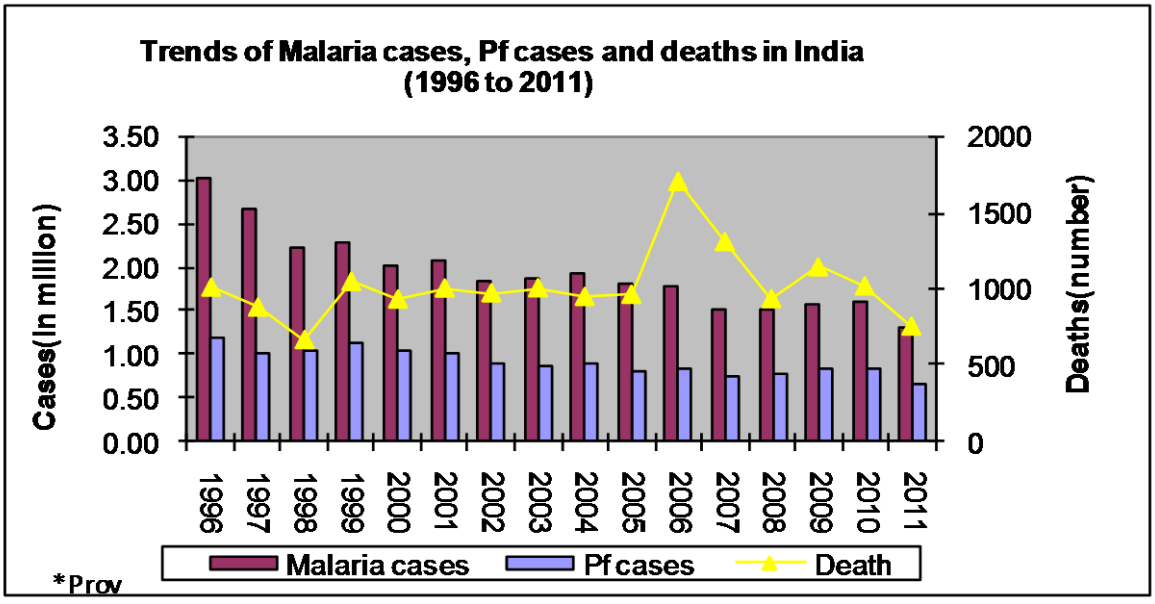
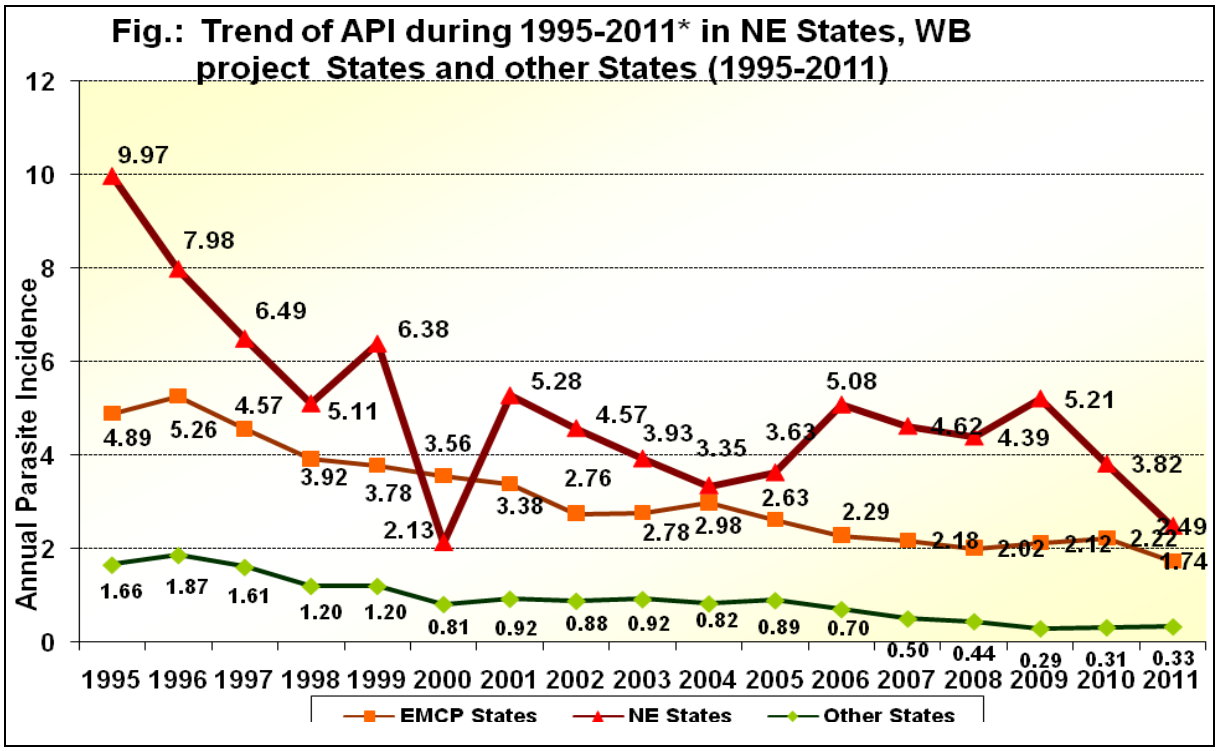


Fig 2.1 shows that the cases have consistently declined from 2.08 million to 1.31 million during 2001 to 2011. Similarly P. falciparum cases have declined from 1.0 to 0.67 million cases during the same period. This indicates declining overall endemicity of malaria in the country. The trend of API during 1995 to 2011 in North Eastern States, World Bank supported project states and remaining states is shown in the following figure. It shows sharp decline in the cases in both the project areas, being more in the GF supported IMCP-II supported North Eastern states. The remaining states had API less than 1 from 2000 onwards.



The API wise distribution of the states/UTs in 2011 is given in the following table:

Table 2.3: API wise distribution of States/UTs in 2011

S. No.	API	No. of States /UTs	Name of States /UTs
1.	>10	2	Dadra and Nagar Haveli and Arunachal Pradesh
2.	5-10	4	Mizoram, Meghalaya, Orissa and Chhattisgarh
3	2-5	3	Jharkhand, Tripura and Andaman & Nicobar islands
4	1-2	6	Assam, Gujarat, Haryana, Madhya Pradesh, Nagaland and Daman and Diu
5	<1	15	Andhra Pradesh, Jammu & Kashmir, Karnataka, Maharashtra, Goa, Manipur, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal, Chandigarh, Lakshadweep and Puducherry
6	<0.1	5	Bihar, Himachal Pradesh, Kerala, Punjab and Delhi

The API wise distribution of districts in 2000, 2010 and 2011 is given in the Table 2.4. It shows that the number of districts with API>2 have continuously decreased from 2000 to 2010 and further in 2011. The number of districts with API >10 has decreased from 59 in 2000 to 54 in 2010 and further to 40 in 2011. The number of districts with API <1 has increased from 370 in 2000 to 447 in 2010 and further to 458 in 2011. This has implications for need for vector control coverage, with the rule of thumb being that a given area should

have had an API below the threshold level (2 or 5 defined by State) for at least three years before withdrawal of vector control intervention could be considered.

Table 2.4: API wise distribution of districts in 2000, 2010 and 2011

Name of the State	2000					2010					2011					
	Number of Districts with API					Number of Districts with API					Number of Districts with API					
	>10	5 - 10	2-5	1-2	<1	>10	5-10	2-5	1 - 2	<1	>10	5-10	2-5	1 - 2	<1	total
Andhra Pradesh	0	1	4	1	16	0	0	1	2	20	0	0	2	3	18	23
Arunachal Pradesh	10	1	1	2	0	9	3	1	1	1	6	4	3	1	1	15
Assam	3	2	7	4	7	4	1	3	2	17	3	1	2	3	18	27
Bihar	0	0	0	3	34	0	0	0	0	38	0	0	0	0	38	38
Chhattisgarh	10	2	4	0	0	8	2	3	0	5	8	2	2	1	5	18
Goa	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	2
Gujarat	0	0	2	4	14	0	0	2	13	18	0	0	10	9	15	34
Haryana	0	0	0	0	19	0	0	2	2	17	0	1	3	4	13	21
Himachal Pradesh	0	0	0	0	10	0	0	0	0	10	0	0	0	0	10	10
Jharkhand	4	0	9	4	1	5	10	4	1	4	3	8	7	2	4	24
Jammu & Kashmir	0	0	1	1	5	0	0	0	0	12	0	0	0	0	12	12
Karnataka	2	3	9	4	13	2	0	4	3	25	0	0	3	2	29	34
Kerala	0	0	0	0	14	0	0	0	0	14	0	0	0	0	14	14
Madhya Pradesh	4	2	11	18	10	0	2	7	17	22	0	1	7	16	24	48
Maharashtra	1	0	1	7	27	0	2	0	5	29	1	0	1	6	28	36
Manipur	0	0	0	1	7	0	0	2	0	10	0	0	1	0	11	12
Meghalaya	1	1	1	0	0	3	1	2	0	1	3	2	0	1	1	7
Mizoram	3	0	1	0	0	5	0	1	2	1	3	2	0	1	3	9
Nagaland	0	1	2	4	2	0	2	3	4	3	0	0	4	2	6	12
Orissa	18	4	3	1	4	12	5	3	4	6	10	3	6	4	7	30
Punjab	0	0	0	0	17	0	0	0	0	20	0	0	0	0	20	20
Rajasthan	0	0	4	6	22	1	0	2	2	28	0	0	3	3	27	33
Sikkim	0	0	0	0	4	0	0	0	0	4	0	0	0	0	4	4
Tamil Nadu	0	1	0	3	39	0	0	2	0	40	0	0	2	0	40	42
Tripura	1	0	2	0	1	2	0	1	1	0	1	1	0	1	1	4
Uttarakhand	0	0	0	0	13	0	0	0	0	13	0	0	2	3	66	71
Uttar Pradesh	1	1	3	6	56	0	1	1	4	65	0	0	0	0	13	13
West Bengal	1	2	0	2	29	3	0	0	1	15	0	1	0	0	19	20
A & N Islands	0	1	0	0	0	1	0	2	0	0	1	0	0	1	1	3
Chandigarh	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
D & N Haveli	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1
Daman & Diu	0	0	0	1	1	0	0	0	1	1	0	0	0	1	1	2
Delhi	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
Lakshadweep	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	1
Puducherry	0	0	0	0	4	0	0	0	0	4	0	0	0	0	4	4
All India	**59**	**22**	**65**	**72**	**370**	**54**	**29**	**46**	**69**	**447**	**40**	**26**	**58**	**64**	**458**	**633**

The change in distribution of districts according to API in 2011 as compared to 1995 is shown in figure 2.3 below:

Figure 2.3: Change in distribution of districts by API from 1995 to 2011

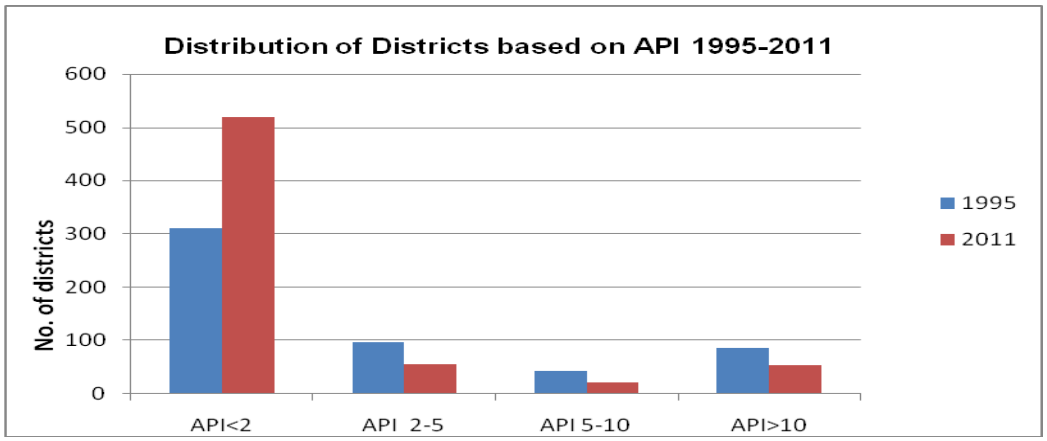
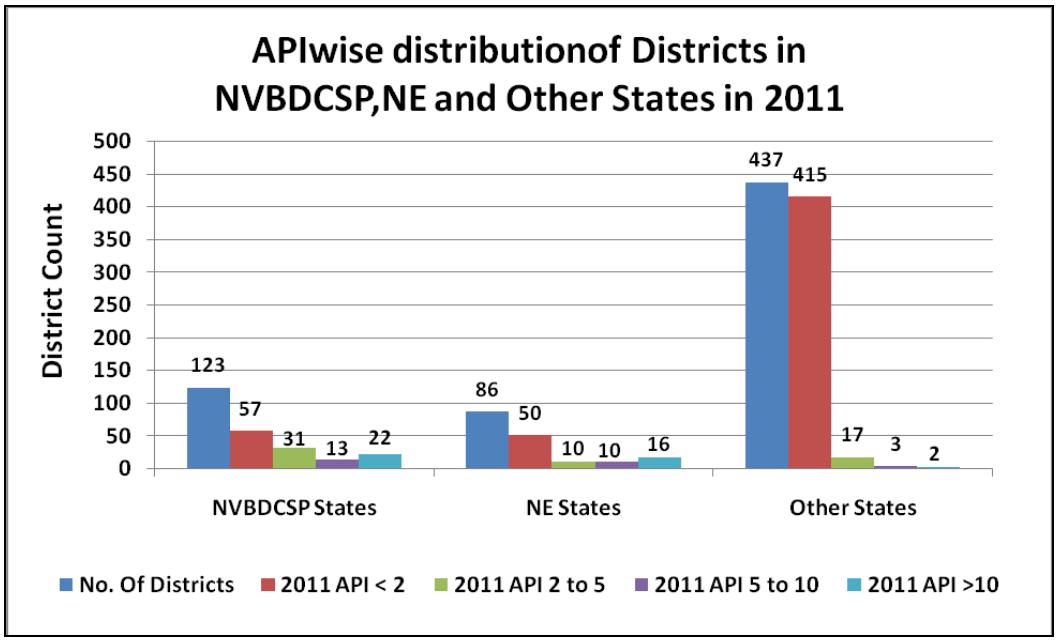


Figure 2.4: API-wise distribution of different groups of States in 2011



The API wise distribution of the districts in World Bank and Global Fund supported project states and remaining states shows that majority of the districts in remaining states are having API <2.

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 provides ideal ecological conditions for malaria transmission. The majority of malaria cases and deaths are being reported from Orissa, the seven North Eastern states, Jharkhand, Chhattisgarh, Madhya Pradesh and Rajasthan with Orissa alone contributing more than 20 % of cases in the country. In practice, in high burden states, where

the majority of population lives in areas with API ≥ 2, the criterion applied for high risk has been API ≥ 5 due to resource constraints.

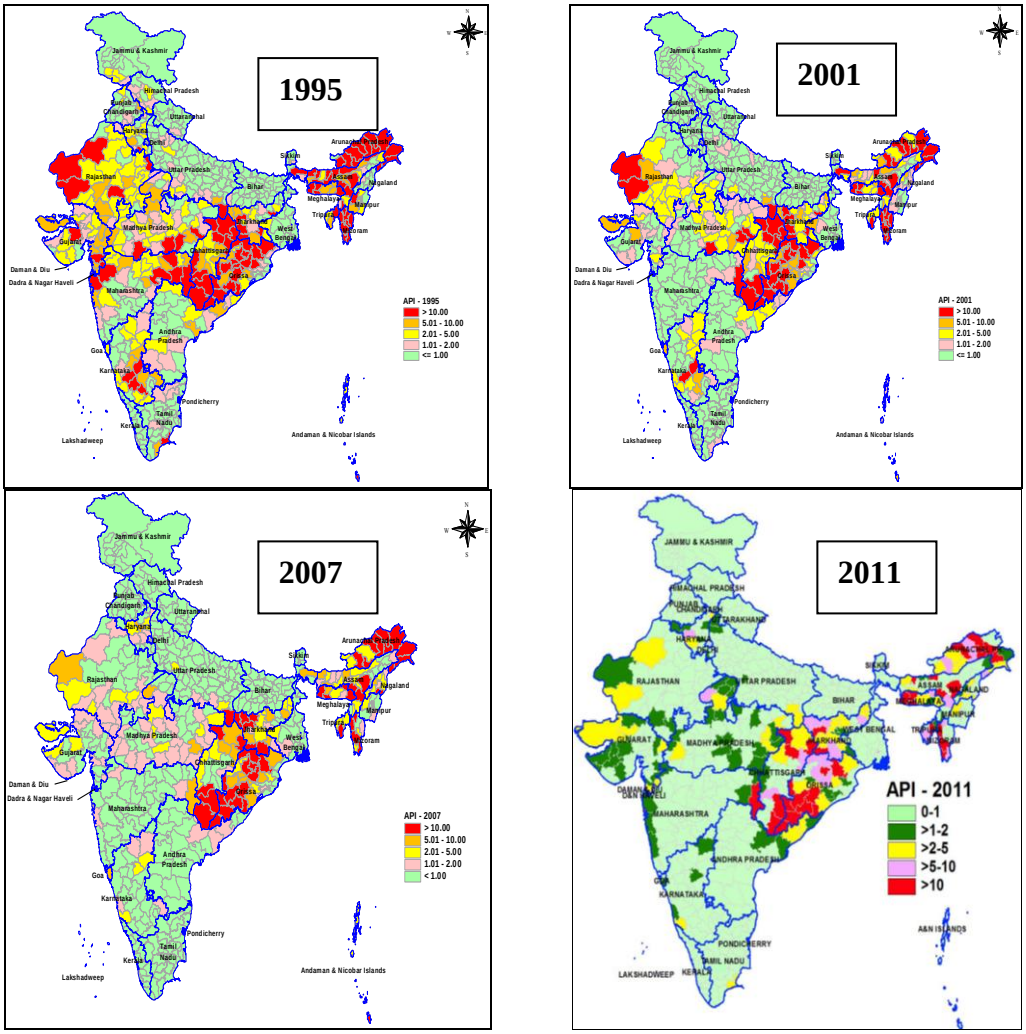
Table 2.5: State wise status of epidemiological indicators in 2011

State	Population (000)	BSE	P. VIVAX	Mixed	P. FALCIPARUM	Total	P. FALCIPARUM %	ABER	API	SPR	AFI	SFR	Deaths
Dadra Nagar Haveli	354	58949	3068	0	2082	5150	40.43	16.65	14.55	8.74	5.88	3.53	0
Arunachal Pradesh	1288	197626	9094	0	4856	13950	34.81	15.34	10.83	7.06	3.77	2.46	17
Mizoram	1033	213149	488	0	8373	8861	94.49	20.63	8.58	4.16	8.11	3.93	30
Meghalaya	3057	391397	1125	0	24018	25143	95.53	12.80	8.22	6.42	7.86	6.14	53
Odisha	42276	4650799	27391	0	281577	308968	91.13	11.00	7.31	6.64	6.66	6.05	99
Chhattisgarh	25386	3444641	29427	0	107472	136899	78.50	13.57	5.39	3.97	4.23	3.12	42
Jharkhand	32928	3441614	90351	0	70302	160653	43.76	10.45	4.88	4.67	2.14	2.04	17
Tripura	3671	288076	605	279	13812	14417	95.80	7.85	3.93	5.00	3.76	4.79	12
A& N islands	491	97946	1155	76	607	1762	34.45	19.95	3.59	1.80	1.24	0.62	0
Nagaland	1981	205520	2413	34	950	3363	28.25	10.37	1.70	1.64	0.48	0.46	4
Gujarat	59359	10967041	73652	19	16112	89764	17.95	18.48	1.51	0.82	0.27	0.15	127
Assam	32031	4130216	12690	0	34707	47397	73.23	12.89	1.48	1.15	1.08	0.84	45
Haryana	25186	2907380	32268	210	1133	33401	3.39	11.54	1.33	1.15	0.04	0.04	0
Madhya Pradesh	74786	9900131	59911	173	31940	91851	34.77	13.24	1.23	0.93	0.43	0.32	109
Daman & Diu	234	31856	207	0	55	262	20.99	13.61	1.12	0.82	0.24	0.17	0
Maharashtra	114440	15979759	75187	784	21395	96582	22.15	13.96	0.84	0.60	0.19	0.13	118
Goa	1483	418722	1052	3	135	1187	11.37	28.23	0.80	0.28	0.09	0.03	3
Rajasthan	68621	8591970	51321	152	2973	54294	5.48	12.52	0.79	0.63	0.04	0.03	45
West Bengal	98922	5044278	55510	170	10858	66368	16.36	5.10	0.67	1.32	0.11	0.22	19
Chandigarh	1060	75368	573	0	9	582	1.55	7.11	0.55	0.77	0.01	0.01	0
Andhra Pradesh	77608	9368740	10860	25	24089	34949	68.93	12.07	0.45	0.37	0.31	0.26	5
Karnataka	55863	9205620	21589	89	2648	24237	10.93	16.48	0.43	0.26	0.05	0.03	0
Tamil Nadu	72525	7841899	21246	85	925	22171	4.17	10.81	0.31	0.28	0.01	0.01	0
Uttar Pradesh	194373	4110871	55111	0	1857	56968	3.26	2.11	0.29	1.39	0.01	0.05	0
Sikkim	189	6969	37	0	14	51	27.45	3.69	0.27	0.73	0.07	0.20	0
Manipur	2723	120615	400	0	314	714	43.98	4.43	0.26	0.59	0.12	0.26	1
Lakshadweep	64	1569	15	0	0	15	0.00	2.45	0.23	0.96	0.00	0.00	0
Jammu & Kashmir	5407	484704	1046	0	45	1091	4.12	8.96	0.20	0.23	0.01	0.01	0
Puducherry	1120	241778	190	0	6	196	3.06	21.59	0.18	0.08	0.01	0.00	1
Uttarakhand	9665.74	246641	1154	0	123	1277	9.63	2.55	0.13	0.52	0.01	0.05	1
Punjab	28341	3120544	2629	0	64	2693	2.38	11.01	0.10	0.09	0.00	0.00	3
Kerala	32870	2153277	1722	157	271	1993	13.60	6.55	0.06	0.09	0.01	0.01	2
Himachal Pradesh	5328	367499	245	0	2	247	0.81	6.90	0.05	0.07	0.00	0.00	0
Bihar	103483	167561	1370	0	1273	2643	48.16	0.16	0.03	1.58	0.01	0.76	0
Delhi	16753	377122	197	0	71	268	26.49	2.25	0.02	0.07	0.00	0.02	0

State wise epidemiological indicators for the year 2011 shows that only four states/UTs (Arunachal Pradesh, Odisha, Meghalaya and Dadra Nagar Haveli are having SPR >5 with ABER of >10. Rest of the states are having SPR < 5 and majority of them are having ABER around or more than 10. Thus, as per WHO guidelines, the national programme can now plan

for reorientation for pre-elimination strategy as most states and the country are having SPR <5 for a number of years, with focussed intervention in areas still having SPR>5.

Figure 2.5: Malaria endemicity according to API from 1995 to 2011



2.4 Estimation of malaria burden

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.[1] These estimates are based on extrapolations from surveillance data with assumptions made on underreporting. According to the World Malaria Report 2011, India contributed to 4.6 per cent of *P. vivax* cases, 1.1 per cent of *P. falciparum* cases and 1.7 per cent of world's malaria burden in 2010.

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

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

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.

2.5 Malaria epidemics

Malaria in India is mostly unstable and outbreaks occur frequently in various parts of the country, caused mostly by *P. falciparum* infections. The reasons for malaria epidemics and outbreaks are identified as inadequacy of e surveillance and residual spray in rural areas, and anti-larval measures in urban areas. The epidemics which occurred from 1996 to 2011 are listed in table below:

Table 2.6: Malaria epidemics in India from 1996 to 2011

Year	State(s)	Remarks
1996	Rajasthan and Haryana	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, Karnataka and Maharashtra	48 districts
2006	Karnataka and West Bengal	5 districts
2007	Karnataka and West Bengal	5 districts
2008	Bihar, Karnataka, Madhya Pradesh, Maharashtra, Mizoram, Orissa, Rajasthan, Rajasthan and Uttar Pradesh	47 districts: Nawada, Chitradurga, Gulbarga, Koppal, Bagalkot, Bijapur, Shivpuri, Sheopur, Ahmednagar, Akola, Aurangabd, Beed, Bhandara, Chandrapur, Dhule, Gondia, Gadchiroli, Greater Mumbai, Jalgaon, Kolhapur, Latur, Nanded, Nagpur, Nandurbar, Nashik, Osmanabad, Pune, Raigad, Ratnagiri, Sangli, Sindhudurg, Solapur, Thane, Yavatmal, Mammit, Ganjam, Rayagada, Ajmer, Alwar, Bikaner, Jaipur, Kota, Karoli, South Madhopur, Udaipur, Namakkal, Kanpur Dehat (Rama Bai Nagar)
2009	Andaman & Nicobar, Bihar, Chhattisgarh, Karnataka, Maharashtra, Manipur, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal	36 districts: Nicobar, Munger, Bhagalpur, Sarguja, Gulbarga, Koppal, Bagalkot, Bijapur, Greater Mumbai, Dhule, Chandrapur, Kolhapur, Jalgaon, Solapur, Thane, Nashik, Ahmadnagar, Satara, Raigad. Ratnagiri, Kohlapur, Bhandara, Aurangabad, Sangli, Gondia, Latur, Nandurbar, Imphal West, Ganjam, Baran, Bikaner, Hanumangarh, Krishnagiri, Namakkal, Mathura, Malda

Year	State(s)	Remarks
2010	Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu and Uttar Pradesh	54 districts: Vishakapatnam, Vijayawada, Munger, Bilaspur, Rajnandgaon, Korba, Valsad, Dahod, Narmada, Chitradurga, Gulbarga, Koppal, Bagalkot, Bijapur, Tumkur, Udupi, Bellary, Thiruvananthapuram, Kozhikkode, Dhule, Malappuram, Balaghat, Greater Mumbai, Satara, Kolhapur, Jalgaon, Solapur, Thane, Nashik, Ahmednagar, Raigad, Ratnagiri, Gadchiroli, Beed, Latur, Chandrapur, Pune, Ratnagiri, Gondia, Nandurbar, Sindhudurg, Nagpur, Nanded, Amaravati, Ganjam, Dhenkanal, Khurda, Mayurbhanj, Nuapada, Bikaner, Jaisalmer, Paramakudi, Salem, Kanpur Dehat (Rama Bai Nagar)
2011	Andhra Pradesh, Bihar, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa and Uttar Pradesh,	39 districts: West Godavari, Prakasam, Srikakulam, Munger, Chatra, Kodarma, Palamu, Koppal, Udupi, Gadag, Thiruvananthapuram, Kozhikkode, Chindwara, Sidhi, Mandsaur, Singroli, Balaghat, Pune, Greater Mumbai, Dhule, Solapur, Jalgaon, Ahmednagar, Solapur, Thane, Nashik, Satara, Raigad, Ratnagiri, Gadchiroli, Beed, Gondia, Chandrapur, Wardha, Akola, Ganjam, Namakkal, Kanpur Dehat (Rama Bai Nagar), Saharanpur

In the project areas, the additional manpower in terms of trained consultants has helped in early detection of likely epidemics using the WHO model of 'epidemic threshold chart' and taking timely action to avert epidemics.

2.6 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 in rural areas. Both type form and intermediate form act as vectors whereas the *mysorensis* form is not a vector.

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, a brackish-water breeder, in India is now 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.

2.7 Malaria paradigms/ecotypes

The association between malaria and various ecological situations has been studied in India since the early part of the 20th century, when it was found that 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 heterogeneity in malaria transmission characteristics between and within the states of the country, and many ecotypes/paradigms of malaria have been recognised. The malaria paradigms/ecotypes with the 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 2.7: Malaria ecotypes/paradigms in India and recommended vector control measures

S. No	Ecotype/ paradigm	Recommended vector control measures
1.	Tribal areas with malaria associated with forest environment (all 7 NE states, Orissa, Jharkhand, Chhattisgarh, some foci in other states)	IRS / ITNs / LLINs; Limited role for larval control
	Undulating hills/foothills with perennial rain in North East, hilly rainforest with *An. dirus*	
	Hilly partially deforested cultivated forest fringe (*An. dirus*, *An. minimus*)	
	Undulating, sometimes deforested with rice cultivation (*An. fluviatilis, An. minimus*,)	
	Peninsular deep forest or forest fringe (*An. fluviatilis, An. 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)	Anti-larval measures, including larvivorous fish in some areas;

	Plain tube-well irrigated areas	One round of IRS in selected villages; and Space spray and IRS in case of outbreaks
	Plains with sandy soil and no water-logging	
	Deserts (especially Rajasthan)	
4.	Economic development project areas	Mass screening of incoming labourers, anti-larval 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-story buildings).

2.8 Malaria parasites

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

2.8.1 Drug resistance status – past and current

The National Programme has monitored antimalarial drug resistance over many decades with the help of NIMR. Although chloroquine-resistant *P. falciparum* was first reported near the India–Myanmar border in 1973, chloroquine-resistant *P. vivax* was unknown in India until 1995, when two cases of infection with resistance were detected in Mumbai. For many years, the Malaria Research Centre (now the NIMR) and other organizations supported a wide range of monitoring efforts in addition to the routine work of the regional teams. Between 1978 and 2007, at least 380 *in vivo* trials of chloroquine and/or sulfadoxine-pyrimethamine for the treatment of *P. falciparum* malaria were conducted in India, with involvement of almost 19,000 patients. Worryingly, the median percentage of cases failing to show an adequate response to sulfadoxine-pyrimethamine within 28 days of treatment increased from 7.7% in 1984–1996 to 25.9% in 1997–2007. Indian isolates of *P. falciparum* were also frequently found to carry mutations in the genes that code for the targets of sulfadoxine and pyrimethamine: dihydropteroate synthase (dhps) and dihydrofolate reductase (dhfr) respectively. In 2005, the combination of artesunate with sulfadoxine-pyrimethamine (AS+SP) replaced sulfadoxine-pyrimethamine as the nationally recommended first-line treatment for *P. falciparum* malaria in India. While the efficacy of AS+SP, again measured after 28 days of follow-up, was found to be high (96–100%) in nine studies conducted in India between 2005 and 2007, the numbers of cases investigated were quite small given the large size of the country. A major concern is that, since the efficacy and lifespan of ACTs depend largely on the partner drug, any pre-existing resistance to sulfadoxine-pyrimethamine could endanger the new combination.

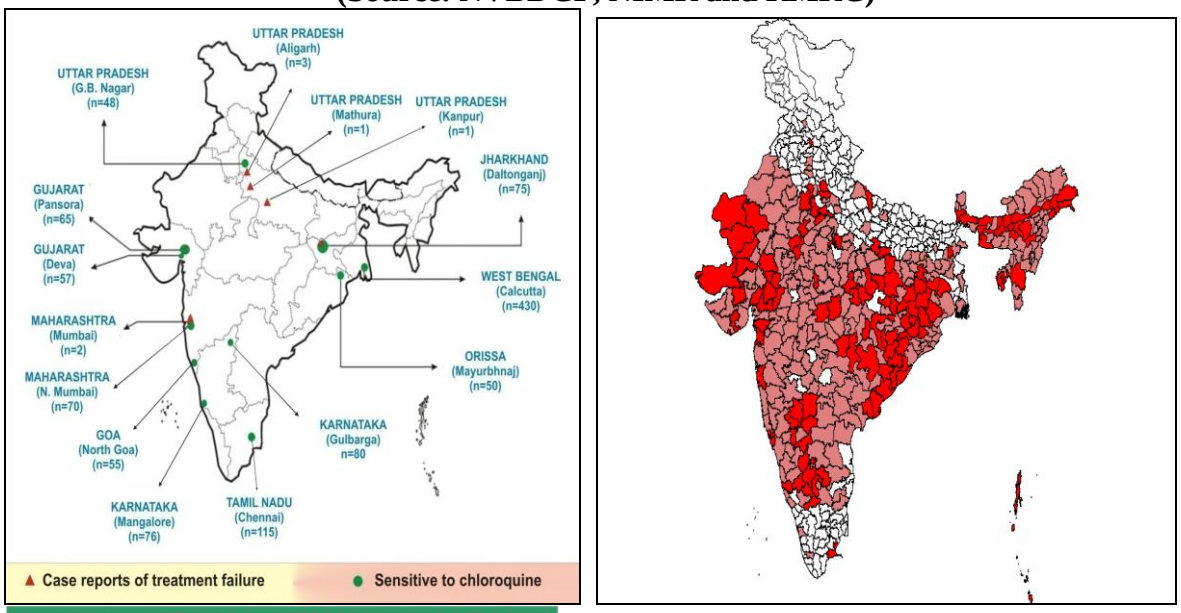
For sulfadoxine-pyrimethamine, ≥10% treatment failure has been observed in Changlang and Lohit districts of Arunachal Pradesh; Karbi-Anglang, Darrang and Lakhimpur districts of Assam; West Garo Hills of Meghalaya and Purulia, Jalpaiguri and Bankura districts of West Bengal.

To address the continued problem of antimalarial drug resistance in India, a joint NVBDCP–NIMR surveillance system – the National Antimalarial Drug Resistance Monitoring System – was set up in 2008. This system has several innovations:

- Only about 50% of the sites are monitored each year (so that each site is monitored every 2 years, and widespread coverage and information on long-term trends can be collected);
- *P. vivax* studies are routinely conducted to track the emergence of chloroquine resistance in this species;
- Blood smear examinations and data analysis undergo central quality control;
- Routine genotyping is performed to separate post-treatment reinfections from any recrudescent infections resulting from treatment failures;
- Molecular markers of drug resistance are genotyped simultaneously; and
- *In vivo* trials of drug efficacy are integrated with supplementary studies, such as the evaluation of plasma drug concentrations and other pharmacokinetic parameters.

The focus of the present study was on the data collected, nationwide, during the first 2 years of the new surveillance system's operation. These data were used to evaluate the efficacies of AS+SP against *P. falciparum* and of chloroquine against *P. vivax*, to determine the prevalence of several molecular markers of sulfadoxine-pyrimethamine resistance in *P. falciparum* (and so assess, independently, the probable efficacy of the "partner drug" in the ACT) and to determine the clinical, demographic and/or parasite-related risk factors for treatment failure.

Fig 2.6- Areas identified as Chloroquine resistant in India (1978-2008)
(Source: NVBDCP, NIMR and RMRC)



Districts with CQ treatment failure ≥10% (red) in any trial between 1978 and 2007 and P. falciparum endemic areas (Pink)

India's National Antimalarial Drug Resistance Monitoring System completed therapeutic efficacy trials in 25 sites across India during its first 2 years. The results indicate that the first-line therapies for *P. falciparum* malaria and *P. vivax* malaria recommended by the national antimalarial drug policy (i.e. AS+SP and chloroquine, respectively) remain efficacious. The 28-day efficacy of AS+SP for treatment of *P. falciparum* infection was noted to be more than 98%. Although AS+SP treatment failures and parasitaemias showing prolonged clearance intervals after AS+SP treatment were rare, those identified were clustered in just a few

sentinel sites. This clustering validates the design of the new monitoring system, which uses wide geographical coverage to increase the chances of detecting hotspots for resistance (as well as longitudinal studies to track emerging trends). There was no evidence of resistance to AS+SP in the sentinel sites in north-eastern India, though this is the region of the country where the highest frequencies of sulfadoxine-pyrimethamine treatment failure have been reported. The observation that four of the six patients who showed parasite clearance intervals of > 72 hours were confirmed to be treatment failures indicates the potential usefulness of measuring clearance intervals as a predictor of AS+SP treatment failure.

While the frequency of reinfection recorded is likely to be correlated with the length of the follow-up period, it also depends on the intensity of transmission in the study sites. The intensity of malarial transmission in India is generally lower than in many other parts of the world. Most (87.1%) of the isolates of *P. falciparum* that were successfully typed showed genotypic evidence of partial resistance to pyrimethamine, with either single (S108N) or double mutations (S108N/C59R) in the relevant *dhfr* codons. Such mutations have been found to increase the median inhibitory concentration (IC50) of pyrimethamine 10-fold. While seven isolates possessed the I164L mutation that has been associated with high-level resistance, the prevalence of triple or quadruple mutants among the genotyped isolates was low (3.2%). The prevalence of single or double *dhps* mutations among the isolates that were successfully genotyped was low (2.3%), although the possibility that *dhps* mutations caused non-amplification cannot be excluded. By monitoring trends in the prevalence of resistance-related mutations in *dhfr and dhps*, the threat to treatment with the AS+SP combination posed by resistance to sulfadoxine-pyrimethamine in *P. falciparum* could be evaluated, independent of any observations of the clinical response. Treatment failure reflects a combination of drug resistance, host immunity and pharmacokinetics.

In the same study, younger age, fever at enrolment and a low level of parasitaemia at enrolment – all potential markers of relatively low immunity to parasite antigens – were associated with recrudescence following AS+SP treatment. Another association observed, the negative correlation between the dose of artesunate (in mg per kg body weight) and the probability of treatment failure, was not surprising. Although the recommended daily dose of artesunate is 4 mg per kg, 8.8% of the subjects of the present study who were given AS+SP received 3.0 to 3.5 mg of artesunate per kg, and 1.9% received < 3.0 mg per kg. The routine use of age, rather than body weight, as a guide for determining the dose of antimalarial drug needed by a patient is probably a cause of suboptimal dosing worldwide. The relationship between the administered dose and pharmacodynamic response is complex, however, and therapeutic levels may still be achieved when the dose is lower than recommended in standard guidelines.

In spite of sporadic case reports of chloroquine-resistant *P. vivax* in India, all of the *P. vivax*-infected patients investigated in the study appeared to be cured by chloroquine treatment. Although many of the patients in sentinel sites in southern and western India who were given were migrant workers from elsewhere in India, more trials to investigate the therapeutic efficacy of chloroquine against *P. vivax* infections are needed in the north and east of India. Primaquine treatment to prevent relapses forms a critical component in the effective treatment of *P. vivax* infections. Unfortunately, no standard protocols for evaluating the therapeutic efficacy of primaquine, alone or in combination with chloroquine, exist. Another remaining challenge is the treatment of mixed infections. No data on the efficacy of AS+SP against *P. vivax* malaria are available, although, according to India's national drug policy, AS+SP is the recommended treatment for a patient found to be co-infected with *P. falciparum and P. vivax.* Recent reports across south-eastern Asia have described a high

incidence of *P. vivax* malaria following the treatment of *P. falciparum* infection, presumably the result of the reactivation of the liver stages of *P. vivax*.

2.9 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. To sustain the gains and to have further intensified efforts a new project named National Vector Borne Disease Control Support Project has been implemented since 2008 for a period of five years in phase wise manner with the support of the World Bank covering a population of 185 million. In the first phase of two years, 50 high malaria endemic districts of five states namely Andhra Pradesh, Chhattisgarh, Jharkhand, Orissa and Madhya Pradesh were covered along with 46 Kala-azar affected districts of Bihar, Jharkhand and West Bengal. In Phase II, 43 districts of Gujarat, Maharashtra and Karnataka along with 31 additional districts which were covered under the erstwhile Global fund supported Intensified Malaria Control Project (2005-2010) are covered by the World Bank project from 2011. The project will end in 2013.
.
GFATM Round 4 Grant aided Intensified Malaria Control Project (2005-2010) was implemented in the 7 North-Eastern states along with parts of Orissa, Jharkhand and West Bengal, covering a population of about 100 million. To sustain the gain of IMCP, the project has been extended in seven North-Eastern states covering 42.5 million population of 86 districts as Intensified Malaria Control Project-II from October 2010 for a period of five years (2010-2015).

Partnerships are established as follows:

- WHO provides regular technical assistance for malaria control since the 1950s. The country office had one national professional officer and four consultants assisting the programme, funded by GFATM grant in IMCP and in IMCP-II till February 2012.
- Collaboration with neighbouring countries is undertaken through arrangements of WHO / SEARO.
- Continuing partnership exists with NIMR for conducting research on various aspects of malaria control including drug resistance 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 activities (see www.nvbdcp.gov.in). The UNICEF and Janani Suraksha Yojana (JSY) of GoI contribute to malaria control by providing ITNs or LLINs to pregnant women in certain districts.
- In IMCP-II Project the Caritas India – a NGO Consortium is partner as Principal Recipient-2 (PR2) with the aid from GF round 9. The project is implemented in seven North Eastern states from 2010 to 2015.

2.9.1 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 early warning signals on malaria outbreaks.

- **Other VBDs.** Dengue and malaria control activities overlap in many urban areas; malaria and kala-azar control in a few districts of Jharkhand; and malaria and filariasis control 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. The 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).

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

Since independence, India has built up a vast health infrastructure and health personnel at primary, secondary, and tertiary care levels in public, voluntary, and private sectors. While the strengths of India's extensive health care system, as identified in an assessment done by the World Bank[1] are a well-developed administrative system, good technical skills in multiple fields and an extensive network of public health institutions for research, training and diagnostics which provides free health to people, several weaknesses in the system have also been highlighted. The 11th Five-Year Plan document has also noted weaknesses in the public health care system, particularly in rural areas, in many states and regions, including extreme inequalities and disparities both in terms of access to health care as well as health outcomes that places the burden on the poor, women, scheduled castes, and tribes.

The major weaknesses in the Indian health systems include:

Inadequate resources–human and financial: India's health system is welfare oriented and provides for a comprehensive package of basic health care services. But due to a rapidly growing population, and near-static levels of public health expenditure, the public health system is under a great stress to meet the demands for even minimal levels of health care. Inadequate resources also lead to lack of clientele satisfaction and non-availability of essential medicines. Public health expenditures in India need to increase further in order to reduce the burden of out-of-pocket health expenditures. A main challenge facing the country's health sector is also the shortage of human resources. Shortage of doctors, nurses etc. is a major constraint for scaling up any public health interventions calling for multi-tasking / multi skilling at one level and need for improved pay scales and work environment at another level which could offset the shortages and mitigate the push pull factors of a burgeoning private sector too. In the malaria control domain, lack of service providers, especially health workers and laboratory technicians, compounded by shortage of health assistant/supervisors (Male), malaria inspectors and assistant malaria officers is a main factor affecting surveillance and service delivery, particularly in remote areas. There is also a virtual absence of Rapid Response Teams for epidemic/outbreak response in many districts. There is still a large gap in allocation for scaling up specific interventions like provision of RDTs, ACT and LLINs, and for positioning health care delivery and management staff at district and state levels to achieve universal coverage and impact. The financial gap for the national malaria control program is estimated to be more than 50%.

Inadequacies in public health infrastructure, including training facilities: In several parts of the country, the health infrastructure is poorly developed and inadequately equipped to provide even basic health care services. Likewise, there is not only the non-availability of trained manpower but also the substantial mismatch between system requirements and the

[1] Peters, David H., Abdo S. Yazbeck, Rashmi R. Sharma, G.N.V. Ramana, Lant H. Pritchett and Adam Wagstaff. 2002. *Better Health Systems for India's Poor: Findings, Analysis, and Options*. Washington, DC: The World Bank

availability of required skills and competencies. Shortages prevail among important cadres of personnel such as health managers, epidemiologists, health economists and specialists in various fields required for malaria control. Although the national program has a training plan, many personnel within the public health care system require training, especially on newer tools and technologies as well as meaningful engagement of community. Also, most of the private sector care providers are yet to be trained by the program, although almost half of the fever cases could be seeking care/treatment from them. Further, the procurement and supply chain weaknesses include shortcomings in storage arrangements in absence of standardized technical guidelines; challenges for handling new products with varying storage specifications; inadequacies in distribution system especially in remote, hard-to-reach areas; manual inventory management that is non-responsive to dynamic changes in requirements; absence of linkage of implementation guidelines, manuals and other documents; weak communication among districts and states; inadequate implementation of M&E plan for PSCM.

Inadequate regulatory frameworks: Although the public health system functions within well-defined frameworks and clear external regulatory requirements, the ability of the system to regulate itself and ensure quality and efficiency is constrained by the lack of manpower, time and in some cases, poor supervisory practices. The absence of public health laws to regulate the private sector is also one reason for the inability of the public health system to optimally utilize the private sector service for achieving public health goals. It is estimated that 50% or more cases of fever/malaria are attended to by the private sector; including qualified as well as the unqualified private health care service providers. Weak engagement of the private sector care providers has led to variations in treatment protocols adopted by them, disparities in quality, lack of accountability in reporting cases and epidemic/outbreaks, reluctance to participate in capacity building, lack of public health approach etc.

Inadequate planning, monitoring and evaluation at secondary, primary care levels: The Joint Monitoring Mission in 2007 observed that the strategic planning with clear objectives, targets, monitoring indicators, and their means of verification and required inputs to achieve the targets at the district and PHC levels was weak. The capacity to analyse, interpret and use data for decision making at the district and state level is also noted to be inadequate.

Mechanisms for collaboration between health programs and non-health programs: Most public health programs to control, eradicate or eliminate diseases like TB, malaria, vaccine preventable diseases etc. continue to remain vertically driven making inter programmatic coordination for service delivery difficult. This factor is important from the perspective of the malaria program, as close collaborative approach with national health programs as well as non-health programs and multisectoral partners is extremely desirable to manage/prevent mosquitogenic conditions and transmission.

Minimal involvement of and ownership by civil society: Civil society organizations, local self-governments and communities currently have a limited role in malaria control efforts and engagement with the health systems (excepting in case of illness), especially in planning, monitoring and advocacy leading to persistence of a provider-driven malaria program rather than a community-driven program. Thus, utilization of services is varied and community ownership of malaria control efforts is lacking.

Strategy-specific weaknesses in malaria control

A. Case management

- Inadequate manpower (numbers and quality) at district, health facility and community levels to handle the case load especially in epidemic situations;
- Inadequate drug supplies leading to many front-line health units lacking second-line and pre-referral drugs causing delays in starting of appropriate treatment;
- Inadequate supply of other supplies e.g. diagnostic aids;
- Inadequate malaria knowledge at community and household level; and
- Underutilized referral system

B. Preventive measures

- Shortage of spray accessories (spray pumps, spares, etc.) and trained technicians;
- Shortage of affordable mosquito nets in communities;
- Misconceptions about insecticide treated bed nets;
- Non availability of LLINs in the country as the country has to procure them from international market; and
- Delays in procurement of LLINs leading to delayed supply and distribution

C. Community based activities

- Insufficient educational materials especially in local languages;
- Inadequate community mobilization; and
- Inadequate appreciation of malaria as a serious disease with related consequences e.g. poverty.

D. Surveillance capacity

- Majority of ASHAs in high risk areas involved but ASHAs in many areas need to be trained in anti-malaria activities;
- Inadequate or inappropriate data collection, analysis and utilization at district and lower levels;
- Epidemic preparedness in epidemic prone districts is inadequate leading to late response; and
- Delay in establishment of Surveillance in Sentinel Sites.

Table 2.8: 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 endemic blocks • ASHAs being made available in all villages • RDTs for diagnosis of *P. falciparum* introduced • Microscopy established up to PHC level • ACT for treatment of P. falciparum introduced • World's largest IRS program • LLINs introduced and being scaled up • Research support from NIMR and other institutions • India is a leading manufacturer of malaria diagnostics, drugs and insecticides	• RDT coverage yet to be expanded to all villages • Delay in conducting microscopic examination of smears collected at community level • Need for improving quality and effectiveness of IRS • Difficulty in distribution of LLINs in remote areas with inhibited access in disturbed areas • Deficiency of human resources at all levels from national to block level • Procurement related constraints • Poor communication of information
Opportunities	**Threats**
• National Rural Health Mission strengthening the health structure and malaria control in rural areas, at all levels. • National Urban Health Mission is expected to be launched as part of National Health Mission in the 12th Five Year Plan could strengthen urban malaria control. • Increasing commitment for funds from international agencies such as GFATM and the World Bank • Good community organization (Panchayats, Self-Help Groups) present in most districts for promoting health. • NGOs willing to be partners • Large scale introduction of RDTs in endemic areas for use by peripheral health workers/ ASHAs. • Pan-specific RDTs for both *P. falciparum* and *P. vivax* soon. • Large scale up-scaling of LLINs for prevention and ACT for *P. falciparum* malaria.	• Overloading of ASHAs with many programmes • Development of insecticide resistance • Development and spread of drug resistance • Spread of fake drugs, insecticides and LLINs in the market • Social and ecological constraints to effectiveness of standard interventions in some high risk population • Social unrest in some areas • Delayed supply and distribution of drugs and diagnostics may lead to stock out • High turnover /attrition of human resources

Section – 3: Strategies

3.1 The vision – a malaria free India

The vision of the strategic plan is a substantial and sustained reduction in the burden of malaria in the near- and mid-term, and elimination of malaria in the long term, when new tools in combination with health system strengthening will make it 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; and
- 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 District VBD 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 State Programme Offices are strengthened by project monitoring units; and
- Well streamlined Procurement and supply-chain management

Criteria for a more equitable and effective health care system

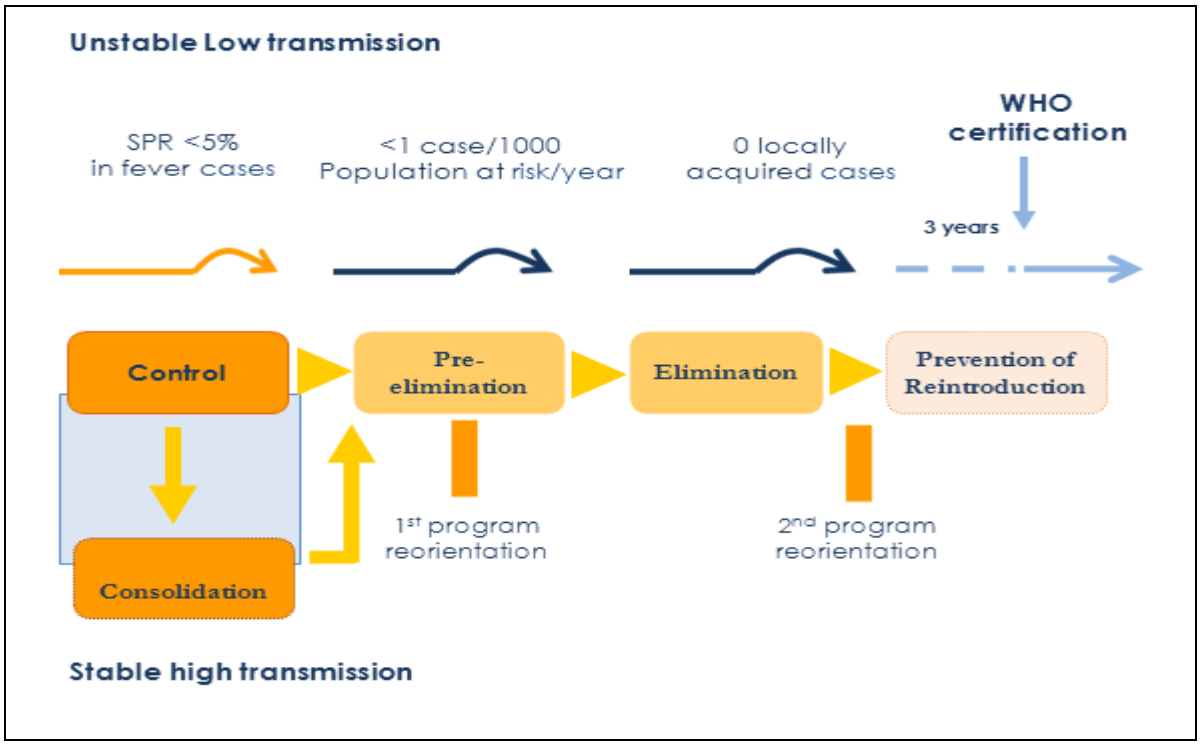
- Universal and adequate level of access to health care without financial burden;
- Fair distribution of financial costs for access;
- Fair distribution of burden in rational care and capacity;
- Ensuring that providers have the competence, empathy and accountability;
- Quality care and effective use of relevant research; and
- Special care to vulnerable groups (i.e. women, children, the disabled and the aged).

The Mission

The mission of the Programme is integrated and accelerated action towards reducing mortality on account of malaria by 2017. The vision and mission of NVBDCP are in tandem with the National Health Policy (NHP) goals for VBDs. To consolidate the efforts for realizing the NHP goals, the GoI has launched NRHM in 2005. The Strategic Plan aims at improving the availability of and access to health care to people, especially for those residing in rural areas, the poor, women and children by positioning a village based ASHA, fostering public-private partnership, intersectoral convergence, augmentation of community empowerment and participation and promotion of healthy lifestyles. The NRHM is basically a strategy for integrating on-going vertical health programmes and sharing collateral benefits for collective improvement. These are analogous to the Millennium Development Goal 6 of combating HIV/AIDS, malaria and other diseases; and target 6 of halting and beginning to reverse the incidence of malaria and other major diseases.

3.2 Malaria control and elimination strategies

Figure 3.1: Progress towards malaria elimination



SPR: slide or rapid diagnostic test positivity rate
Adopted from –Malaria Elimination – A field manual for low and moderate endemic countries- by WHO

As recommended by WHO expert meetings and the GMAP, countries need to accelerate the scaling up of key interventions to all populations at risk of malaria to achieve impact and then consolidate/sustain control over time before moving to pre-elimination and then elimination (Figure 1). As the consolidated and sustained control efforts in high focus areas are showing results in terms of decline in morbidity and mortality and as the SPR is ranging below less than five in most of the states in the country, the programme reorientation towards pre-elimination programme from control programme is planned during the current five year plan. The profile by programme type and the intervention in each programme types suggested by WHO are given in the following tables:

Table 3.1: Profile by programme type

Item	Control programme	Pre-elimination programme	Elimination programme
Main Programme goal	• Reduce morbidity and mortality	• Halt local transmission nationwide	• Halt local transmission nationwide
Epidemiological objective	• Reduce burden of malaria	• Reduce number of active foci to zero • Reduce number of locally acquired cases to zero	• Reduce number of active foci to zero • Reduce number of locally acquired cases to zero
Transmission objective	• Reduce transmission intensity	• Reduce onward transmission from existing cases	• Reduce onward transmission from existing cases
Unit of intervention	• Country- or area-wide	• Foci	• Foci, Individual cases • (locally acquired and imported)
Milestone for transition to next programme type*	• SPR <5% in suspected malaria cases	• <1 case per 1000 population at risk per year	• Zero locally acquired cases
Data source for measuring progress towards reaching milestones	• Proxy data: health facility data • Confirmatory data: population-based surveys	• Proxy data: health facility data, notification reports • Confirmatory data: population-based surveys	• Notification reports, individual case investigations, • genotyping

SPR: slide or rapid diagnostic test positivity rate.

* These milestones are indicative only: in practice, the transitions will depend on the malaria burden that a programme can realistically handle

Adopted from –Malaria Elimination – A field manual for low and moderate endemic countries- by WHO

Table 3.2: Interventions by programme type

Intervention	Control programme	Pre-elimination programme	Elimination programme
Case management	• Update drug policy, use of ACT; • QA/QC of laboratory diagnosis (microscopy/ RDT); • Clinical diagnosis sometimes acceptable; • Monitoring anti-malarial drug resistance	• Drug policy change to – radical treatment for *P. vivax* – ACT and gametocyte treatment for *P. falciparum* • 100% case confirmation by microscopy; • Microscopy QA/QC; • Monitoring anti-malarial drug resistance	• Implementation of new drug policy; • Routine QA/QC expert microscopy; • Active case detection; • Monitoring anti-malarial drug resistance
Vector control and malaria prevention	• Transmission reduction through high population coverage of ITN/LLIN and IRS;	• Geographical reconnaissance; • Total IRS coverage in foci; • IVM and ITN/LLIN	• Geographical reconnaissance; • Vector control to reduce transmission in residual active and new

	• Entomological surveillance; • Epidemic preparedness and response; • IPTp in hyperendemic areas	as complementary measures in specific situations; • Epidemic preparedness and response; • Entomological surveillance	active foci; • Vector control to reduce receptivity in recent foci; • Outbreak preparedness and response; • Entomological surveillance; • Prevention of malaria in travellers
Monitoring and evaluation	• Improve surveillance and national coverage • Country profiles • Malaria indicator surveys (MIS, MICS, DHS)	• GIS-based database on cases and vectors • Elimination database • Central records bank • Genotyping, isolate bank • Malaria surveys • Immediate notification of cases	• Case investigation and classification • Foci investigation and classification • Routine genotyping • Malaria surveys • Immediate notification of cases • Meteorological monitoring
Health systems issues	• Access to treatment • Access to diagnostics • Health system strengthening (coverage, private and public sectors, QA)	• Engaging private sector • Control of OTC sale of antimalarial medicines • Availability of qualified staff	• Full cooperation of private sector • No OTC sale of antimalarial medicines • Free-of-charge diagnosis and treatment for all malaria cases
Programmatic issues	• Procurement, supply management • Resource mobilization • Regional initiative • Pharmacovigilance • Adherence to the "Three Ones" principles Integration with other health programmes for delivery of interventions, e.g. ITN/LLIN, IPTp • Domestic/external funding	• Elimination programme development • Legislation • Regional initiative • Mobilization of domestic funding • Establish malaria elimination committee • Reorientation of health facility staff	• Implementation of elimination programme • Implementation of updated drug policy, vector control, active detection of cases • Malaria elimination committee: • -manage malaria • elimination - database – repository of information – periodic review – oversight • Reorientation of health facility staff

Interventions throughout all programmes

- Case management
- IVM, including monitoring of insecticide resistance
- Geographical information collection
- Human resources development
- Health education, public relations, advocacy
- Operational research

- Technical and operational coordination, including intra- and intersectoral collaboration, both within the country and with neighbouring countries
- Monitoring and evaluation
- Independent assessment of reaching milestones
- Resource mobilization
- Health systems strengthening

(Adopted from –Malaria Elimination – A field manual for low and moderate endemic countries)

Based on the broad strategic guidelines given by WHO as above, the country strategic plan is structured around a balanced package of services addressing the stated priority of

- Rapid scale up of preventive interventions to have aggressive control in the malaria heartland, to achieve low transmission and mortality in those states currently experiencing the highest burden of disease and death
- Reduce malaria burden by increased curative services to care for the sick by improving access and quality.
- Progressive elimination from the endemic margins, to shrink the malaria map
- Research, to bring forward better drugs, diagnostics, insecticides, and other tools

This document has been prepared to convey how the MOHFW plans to reduce the malaria burden over the five year period 2012-17. It focuses on the urgently needed intensified public health action in those areas where the disease remains a major cause of morbidity and mortality and categorized strategic interventions to reach pre-elimination status. It includes the actions to prevent resurgence in areas where low endemicity is already achieved. It also includes estimates of 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 12th Five Year Plan, i.e., 2012-2017. The plan 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.

3.3 The Goals for the Strategic Plan 2012-2017

3.3.1 National Goals

- Screening all fever cases suspected for malaria (60% through quality microscopy and 40% by RDT);
- Treating all *P. falciparum* cases with full course of effective ACT and primaquine and all *P.vivax* cases with 3 days chloroquine and 14 days primaquine;
- Equipping all health Institutions (down to PHC level) with microscopy facility and RDT for emergency use and injectable artemisinin derivatives, especially in high-risk areas; and
- Strengthening all district and sub-district hospitals as per IPHS with facilities for management of severe malaria cases in malaria endemic areas.

Outcome Indicators

- 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 2017
- At least 80% of those at high risk of malaria get protected by effective preventive measures such as ITNs/LLINs or IRS by 2017
- At least 10% of the population in high-risk areas is examined under surveillance system annually (ABER >10%)

Impact indicators

- To bring down annual incidence of malaria to less than 1 case per 1000 population at national level by 2017.
- At least 50% reduction in mortality due to malaria by the year 2017, taking 2010 as baseline

Targets: To achieve by the end of 2017

- API < 1 per 1000 Population

3.3.2 International Malaria Control Goals

The key malaria control related MDGs and Roll Back Malaria goals are as follows:

Key Malaria Control Goals and Targets

RBM Partnership

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

Millennium Development Goals

Goal 2: Achieving universal primary education

- Malaria is a leading source 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 anemia in pregnant women and low birth weight

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

- To have halted by 2015 and begun to reverse the incidence of malaria and other major diseases

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

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

3.3.3 Strategic Plan

The strategy adopted during XI Five Year Plan period was for malaria control. Considering the feasibility of malaria elimination defined as no indigenous transmission, it is proposed to change the focus of strategies based on endemicity level. This will facilitate in achieving the long term goal of elimination. This necessitates the stratification of states based on incidence as to decide and execute area specific interventions which would lead to reduction of

incidence in high endemic areas and sustain reduction in low endemic areas to pave the way for the country to enter into the "pre- elimination stage". To reach "pre- elimination stage", entire country would require adequate inputs in terms of technical, logistic and financial support. Accordingly, the states have been stratified as under:

Table 3.3: Definition of 3 categories of states

No.	Category	Definition
1	**Category 1**	**States** with API **less than one**, and all the **districts** in the state are with API **less than one**
2	**Category 2**	**States** with API **less than one** and one or more **districts** reporting API **more than one**
3	**Category 3**	**States** with API **more than one**

Following broad strategies for different categories have been approved by the Technical Advisory Committee (TAC) for the programme:

Table 3.4: Malaria control strategies in the three categories of states

Category	Strategies
1.	• Case based quality surveillance with focus on foci for active, passive and sentinel surveillance • Screening of migrants in these areas • Integrated Vector Management (IVM) by involvement of Village Health and Sanitation Committees, other PRIs and MNREGA schemes • Supportive interventions including IEC and BCC activities
2.	• Epidemiological Surveillance and Disease Management (3 Ts—Test, Treat and Track) • Screening of migrants in these areas • Integrated Vector Management (IVM) by source reduction through minor engineering, environmental management and focal spray • Supportive interventions including IEC and BCC activities with the involvement of private health care providers, community involvement and NGOs
3.	• Epidemiological Surveillance and Disease Management: by EDTC • Management of severe malaria cases by strengthening of district and sub-district hospitals and quality referral services • Integrated Vector Management (IVM) by IRS and LLIN distribution so as to saturate the entire high risk population • Supportive interventions.

For areas having perennial transmission (more than 5 months in a year)

- Two rounds of IRS with DDT/ SP or 3 rounds with Malathion, depending on vector susceptibility and priority distribution of LLINs as per the guidelines.

For areas having seasonal transmission (less than 5 months in a year)-

- One round of IRS with DDT/ SP or Malathion before start of transmission, focal spray whenever and wherever needed; priority distribution of LLINs as per the guidelines.

Further, for surveillance, the states which are reporting an API of < 1 for three consecutive years shall process for declaring malaria as a notifiable disease in the state.

Strategy for different categories of the states

Category 1: **States with API less than one, and all districts in the state have API less than one**

Keeping a high level vigil in this category of states is important as low endemic areas are more prone for malaria outbreaks. Therefore, passive and sentinel surveillance will be strengthened in these states.

Epidemiological surveillance and disease management

- Focus on foci with passive & sentinel surveillance with emphasis on accurate diagnosis and reporting all malaria cases
- Involvement of Government health system (state and central), medical colleges (public and private), Railways, defence, paramilitary forces, Employees State Insurance Corporation, AYUSH, mission hospitals and enlisting, training, logistic support and reporting of private providers and private laboratories
- Screening of migrants in project areas
- Screening in hot spots and individuals residing near known cases
- Case based surveillance - investigation of cases for determining origin and recent movements
- Treat all cases and infections with effective anti-malarials as per the drug policy
- Referral, if necessary
- Epidemic preparedness and response

IVM

- Source reduction, biological control, focal/space spray during outbreaks/epidemics and complex emergencies, effective entomological surveillance in sentinel and random sites at quarterly intervals by designated teams.

Supportive interventions including IEC and BCC activities through village health and sanitation committee meetings on monthly basis and involvement of other sectors for social mobilization towards prevention and control of malaria

Category 2: States with API less than one and one or more districts reporting API more than one

More intensified surveillance and interventions would be required in this category of states. Therefore, surveillance will be strengthened through active, passive and sentinel institutions.

Epidemiological surveillance and disease management

- Strengthening of referral services through total support from NVBDCP for strengthening district and sub-district hospitals under NRHM
- Epidemic preparedness and rapid response
- Case based surveillance - investigation of cases for determining origin and recent movements in very low endemic areas
- Treat all cases and infections with effective antimalarials as per the drug policy

IVM

IVM will be implemented along with entomological surveillance in sentinel and random sites at quarterly intervals, appropriate use of insecticides for supervised IRS with full support from NVBDCP, use of LLIN (if supported and feasible), intensified anti-larval measures in urban and peri-urban areas within these states/districts along with supportive intervention components like use of larvivorous fish, source reduction, minor engineering etc. and use of focal spray in case of any increase in incidence or outbreak.

Supportive interventions including IEC and BCC activities through village health and sanitation committee meetings on monthly basis, intersectoral collaboration meetings in district and blocks with API more than 1 and involvement of other sectors for social mobilization towards prevention and control with coordinated efforts of district programme managers.

Category 3: States with API more than one.

This category needs maximum attention for all the activities with a view to reduce disease burden in control mode. Therefore, surveillance will be strengthened through active, passive and sentinel institutions with all possible inputs for microscopy, RDT and collection of data and its quick reporting.

Epidemiological surveillance and disease management

- Early case detection and complete treatment
- Active, passive and sentinel surveillance,
- Early diagnosis and complete treatment
- Management of severe malaria cases (strengthening of district and sub-district hospitals)
- Referral mechanism (NVBDCP funding for referral including transportation)

IVM

IVM will be implemented involving

- entomological surveillance in sentinel and random sites at monthly intervals;
- appropriate use of insecticides for supervised IRS with full support (including spray wages) from NVBDCP;
- scaling-up use of LLIN;
- treatment of community owned bed-nets;
- intensified anti-larval operations in urban and peri-urban areas within the states /districts;
- scaling up use of larvivorous fish with exploring outsourcing to NGOs under PPP model; and

- promotion of source-reduction, minor engineering etc. by involvement of panchayati raj institutions at village level.

Supportive interventions including IEC and BCC activities through village health and sanitation committee meetings on monthly basis, inter-sectoral collaboration meetings in district and blocks with API more than 1 and involvement of other sectors for social mobilization towards prevention and control with coordinated efforts of district programme managers. Training, Monitoring and supervision for the activities will be undertaken as well as monitoring towards timely performance of the activities.

Major activities according to API

For areas having API less than 1

- Vector control by minor engineering measures like desilting, deweeding and cleaning of canals and irrigation channels, biological control by use of larvicides and environmental management
- Involving PRIs by sensitizing them in rural areas and municipal bodies in urban areas
- Cooperation from VHSCs and nodal officers from MNREGA

For areas having API between 1-2

- Vector control by source reduction and biological control
- Active surveillance by ASHA/ANM and positioning of MPW in SCs where there is provision for 2nd ANM

For areas having API between 2-5

- Vector control by distribution of LLIN if acceptability of IRS is low @ 2 LLIN per household of 5 members.
- For areas which can be supervised and accessible, quality IRS for selective vector control based on epidemiological impact of earlier vector control measures, if needed; these areas can also be provided with LLINs

For areas having API above 5

For areas having perennial transmission (more than 5 months in a year)

- 2 rounds of IRS with DDT and 3 rounds with Malathion
- Priority distribution of LLINs as per the guidelines
- Vector bionomics studies for future change of strategy

For areas having seasonal transmission (less than 5 months in a year)

- 1 round of IRS with DDT before start of transmission
- Focal spray whenever and wherever needed
- Priority distribution of LLINs as per the guidelines

The broad strategies to be adopted are as under:

Epidemiological surveillance and disease management for reducing parasite load in the community

- Early case detection by further strengthening existing surveillance system
- Involvement of private providers
- Prompt, effective and complete treatment
- Strengthening of referral services for serious cases
- Epidemic preparedness and rapid response
- Monitoring of drug resistance

IVM for reducing mosquito density

- Use of ITNs including LLINs for protection from mosquito bites
- IRS in selected high risk areas
- Use of larvivorous fish in perennial water bodies
- Anti-larval measures in urban areas including use of bio-larvicides
- Use of chemical larvicides
- Monitoring of entomological resistance
- Effective entomological surveillance
- Source reduction using minor engineering methods
- Implementation of legislative measures

Supportive Interventions

- Behaviour Change Communication
- Public Private Partnership & intersectoral convergence
- Human resource development through capacity building
- Operational research including studies on drug resistance and insecticide susceptibility
- Logistic Management Information System (LMIS)
- Monitoring and evaluation through periodic review/field visits and operationalization of web-based computerized National Anti-Malaria Management Information System (NAMMIS) /integration with HMIS of NRHM.

Activities

Broad activities proposed for different strategies are as follows; however their intensity and applicability will vary as per the category of respective states:

Epidemiological surveillance and disease management

1. Early case detection by further strengthening existing surveillance system and involving private providers

- Strengthening of active, passive and sentinel surveillance by providing additional MPWs, LTs and involving more ASHAs, GPs, RMPs and medical practitioners of other health partners
- Strengthening diagnosis by providing additional microscopes and scaling up use of RDTs.
- Diagnostic and treatment facilities will be strengthened by increasing the number of microscopy centers and capacity building of technicians, scaling up use of RDTs and providing microscopes and by establishing malaria clinics @ 1 clinic per 20,000 population in urban slums.

- Ensuring continued availability of diagnostics and anti-malarial drugs at all levels of health facilities
- Adopting newer evidence-based technologies for improving diagnosis and treatment services like introduction of bivalent RDT, fixed dose ACT etc.

2. Strengthening of referral services

- For rapid transportation of severe malaria cases to the nearest health facility, transport available under NRHM will be used and if not available, programme will support transportation.
- Strengthening of referral centers by equipping them with requisite diagnostics and anti-malarials for management of severe malaria cases.
- Optimal utilization of life-saving support systems available under NRHM.

3. Epidemic preparedness and rapid response

- Use of early warning system for detection of likely epidemic in coordination with IDSP
- Strengthening of rapid response team in each district with financial support from NVBDCP
- For tackling outbreaks, adequate stocks of antimalarials, diagnostics, insecticides etc. will be provided by earmarking 20% buffer stock

IVM

1. ITN / LLIN

LLINs have been introduced in the program for personal protection and to interrupt transmission. The scaling up of LLINs is on priority and about 20 million LLINs are expected to be procured and distributed in next five years.

2. IRS in selected high risk areas

Depending on the API different areas would be covered with appropriate insecticide. Currently, about 80 million population is covered with IRS annually. To ensure quality spray, supervision would be strengthened along with safety precautions.

3. Biological control using larvivorous fish

Biological larval control using larvivorous fish is feasible in certain ecotypes and settings and would be propagated in these areas as supportive intervention to control the breeding. The source for supply of larviorous fish, its applications and monitoring would be put in place.

4. **Larvicides**

The judicious use of currently used Temephos, the chemical larvicide and bio-larvicides would be monitored.

5. Source Reduction using minor engineering methods

Control of larval breeding would be done to limit the transmission of the VBDs. Clearing the margins of water bodies, de-weeding to ensure proper water flow, and filling of small temporary water collections will be done to limit the breeding with the active involvement of

VHSCs. However, for large excavations and water bodies, technical guidance for prevention of mosquito breeding would be provided to the agencies creating the mosquitogenic conditions.

6. Effective entomological surveillance

Entomological surveillance would be carried out by the zonal entomologists. The entomological teams will survey for entomological parameters viz., vector density (adult and larval), seasonal prevalence, susceptibility status to insecticides in vector mosquitoes, feeding behaviour, quality of IRS spray, and residual effectiveness of insecticides through conducting cone bioassays. These parameters would provide data on impact of the on-going vector control interventions in the zone to suggest for mid-course corrections. These teams will also assess the effectiveness of ITNs and LLINs.

7. Implementation of legislative measures

Civic by-laws exist for prevention and control of mosquitogenic conditions in a few states/ towns. State governments would be encouraged to extend these by-laws to other towns/cities and implement them effectively.

Supportive Interventions

1. Behaviour Change Communication

- Establishing IEC/BCC Cell at Directorate of NVBDCP with a communication expert supported with media assistants;
- Development of strategy specific prototype materials and healthy public policy by hiring an agency;
- IEC/BCC activities through print and electronic media at national, state and regional level;
- Strengthening of IEC/BCC activities at grass-root level through inter-personal communication, folk media etc. for social mobilization towards acceptability of services provided under programme;
- Special campaigns during spray, distribution of LLINs and anti- malaria month; and
- Strengthening of service delivery through vulnerable community plan for marginalized sectors.

2. Public Private Partnership(PPP) and intersectoral convergence

- Improving outreach services through partnership with NGOs, FBOs, CBOs and local self-government (PRIs);
- Implementation of existing 6 PPP Schemes of NVBDCP by earmarking separate budget;
- Flagging the issue of intersectoral convergence through planning commission to various ministries like agriculture, urban development, education, information and broadcasting, tribal and social welfare, railways, surface transport, civil aviation, port health authorities and textiles etc. to ensure support and incorporation of health impact assessment component in the projects under respective ministries; and
- State level annual intersectoral meeting and district level quarterly meeting for sensitization

3. Human resource development through capacity building

- Providing additional HR like national, regional, state, zonal and district consultants, malaria technical supervisors/kala-azar technical supervisors at sub-district level, LTs and MPWs at PHC and subcentre level respectively so that implementation of programme activities are carried out efficiently;
- Emphasizing that states create / fill up required positions at various levels;
- Continuation of performance based incentives to the programme personnel including ASHAs /village level volunteers
- Capacity building of trainers by involving medical colleges and apex institutions like NIH&FW for providing job-specific training to newly recruited personnel and reorientation of existing programme personnel.

4. Operational research including studies on drug resistance and insecticide susceptibility

- Operational research studies would be undertaken with the help of NIMR to monitor drug resistance, pharmacovigilance, quality assurance and insecticide resistance ;
- Studies on vector bionomics and changes in their biting and resting behaviour; and
- Research would also be conducted for development of new tools and methods for vector control.

5. Logistic Management Information System (LMIS)

- Procurement division of NVBDCP would be strengthened by recruiting a regular procurement specialist officer of Joint Director level supported by consultants; and
- Supply chain monitoring would be done through a hired agency to ensure the availability of commodities up to PHC level.

6. Monitoring and evaluation through periodic reviews/field visits and web based MIS

- The existing NAMMIS would be made fully functional by replacing all old computers and providing internet facility at district level;
- Communication support would be provided i.e. computer/laptop/palmtop and communication systems like data-card, internet, mobile, telephone etc. would be provided to MIS staff as per their role;
- Integration of reporting of core indicators with the NRHM –HMIS;
- Establishing Sentinel Surveillance Sites (SSS) at districts and prominent hospitals to monitor the trends of disease morbidity and mortality;
- Periodic review at all levels and programme evaluation at periodic intervals;
- Positioning of consultants at national, state and district levels, VBD Technical supervisors at block level and data managers at district level;
- Use of Lot Quality Assurance Sampling (LQAS) survey methodology at sub-district level for monitoring the implementation of programme and project activities; and
- Periodic population-based and facility-based surveys.

The details for each component of the Strategic Plan for the period 2012-2017 are discussed in the following sections.

Section- 4: Case management and surveillance

4.1 Diagnosis

The malaria surveillance system in India was initially set up in the 1950s to detect any 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; 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 by microscopy. 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 surveillance is, however, low in a few states, while in 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.

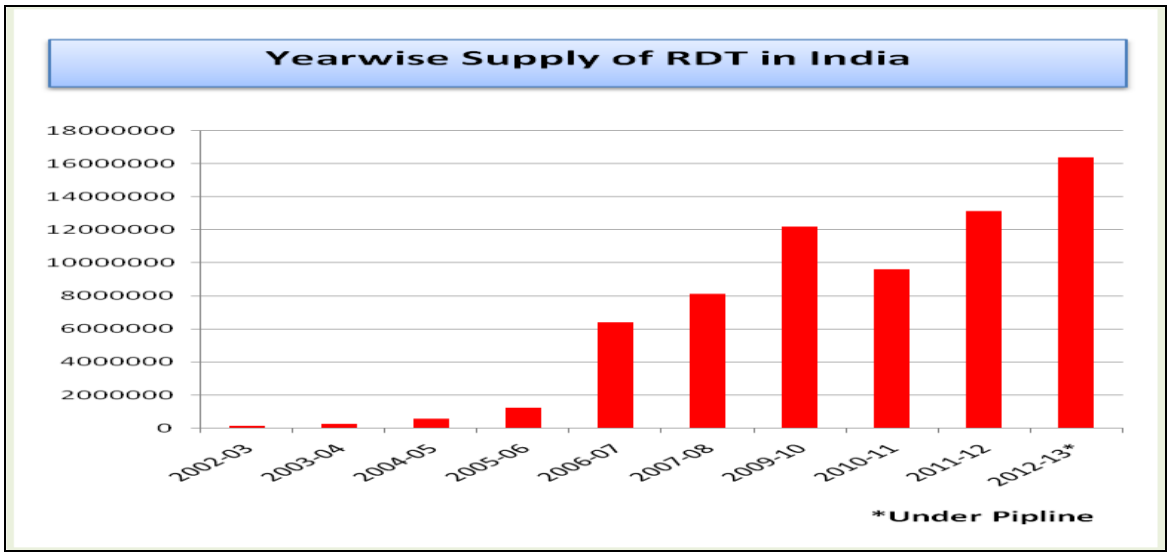
There are about 100 million blood slides collected from fever cases in India annually from which 1.5 – 1.8 million malaria cases are detected. The new norms for case management emphasize quality care for patients. The implementation of RDTs and ACT and the improvements in service delivery is expected 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 PCD and case management will be improved. The programme also plans to supply RDT kits to private providers in return for data. Therefore, the current level of screening of 100 million fever cases may not be reduced in the near future, 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 -14 million kits per year. In remote and inaccessible rural and tribal areas, RDTs are now the established method of choice for malaria diagnosis.

Currently, *P. falciparum* specific RDTs are procured by the NVBDCP. These kits are deployed in *P. falciparum* predominant areas {Test falciparum rate (TfR) $\geq$ 2% and *P. falciparum* % $\geq$ 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. With the ABER around 10%, there will be about 35 million RDTs performed annually. The RDT supply position in the country from 2002 to 2012 is shown in the following figure.

Figure 4.1: RDT supply position in India during 2002 to 2012



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 *P. falciparum* RDTs, sufficiently sensitive, specific and heat-stable *P. vivax* RDTs and bivalent RDTs (which detect and differentiate *P. falciparum* and *P. vivax*) are now available and have been introduced in 2012.

With the introduction of bivalent RDTs, the requirement of blood slides is expected to decrease to about 60% of the existing levels, as 40% 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 estimated requirements for diagnostics during the five years of strategic plan period 2012-17are as under:

Table 4.1: RDT requirements of the country (all figures in millions)

Year	2012-13	2013-14	2014-15	2015-16	2016-17
Population of India (projected to increase at the rate of 1.6% annually)	1,223	1,243	1,263	1,283	1,303
Estimated population living in remote and hard-to-reach areas where microscopy facilities are not available (assumed to be approximately 30% of the country's population)	366.9	372.9	378.9	384.9	390.9
RDT requirements to achieve 10% ABER based on fever rates in the population in remote and hard-to-reach areas	36.7	37.3	37.9	38.5	39.1
25% reserve (buffer stock) of RDTs	9.2	9.3	9.5	9.6	9.8
Total RDT requirements in the country	**45.9**	**46.6**	**47.4**	**48.1**	**48.9**

The planned procurement of RDTs from 2012-13 to 2016-17 is kept below the actual requirements as the capacity of community volunteers to conduct RDTs and distribute ACTs

is being scaled up in this period in the country. There has been a steady increase in the proportion of *P. falciparum* cases reported in India over the years and now *P. falciparum* cases account for nearly 50% of the reported cases of malaria. The large scale introduction of *P. falciparum* RDTs is likely to lead to exaggerated estimates of the *P. falciparum* proportion. Also, the decline in P. vivax case rate is more than that in *P. falciparum* cases resulting in higher *P. falciparum* proportion. However, with the introduction of bivalent RDTs in the programme, the true picture of *P. vivax & P. falciparum* proportion is expected to emerge. Presently, RDTs are being used for early and easy diagnosis of *P. falciparum* 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.

4.1.1 Objective

To ensure that by 2017, at least 80% of fever cases suspected for malaria are diagnosed either by RDTs or microscopy within 24 hours of their first contact to health services.

4.1.2 Strategies for malaria diagnosis

- Ensure functional microscopy in all existing facilities in high malaria burden areas.
- Upscale use of RDTs (including bivalent) 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 skill / need-based capacity building at all levels.
- Linkages with labs in Government and private laboratories
- Case-based investigation in areas with very low caseload

4.1.3 Operational Design

Till now, ABER is being used to determine the level of surveillance activities for malaria case detection through ACD and PCD. As the yield of case detection through ACD was poor, it is now planned to shift the emphasis on strengthening PCD. ABER would include fever cases screened through slides as well as RDTs. For bringing objectivity and to address operational issues, the minimum target of ABER of 10% (blood slide or RDT) will continue to be applied. ACD will be relied upon in areas without a village level health worker / volunteer trained in performing RDT and administering ACT with the MPWs expected to carry out ACD in these villages.

One of the key strategies under the NRHM is having one ASHA for every village / a population of 1,000. The recruitment of ASHAs is being continued by the states. Detailed guidelines have been issued by the GoI on selection and training of ASHAs and now, more than 8 lakh ASHAs are in position in the country. These ASHAs are being trained in the use of RDTs and ACT in the *P. falciparum* predominant high burden areas to make diagnostic and treatment facilities available at the village level. With the introduction of bivalent RDTs, the ASHAs will be trained to use bivalent RDT in those areas where it is introduced. The volunteers of NGO partners involved in this activity will also be trained.

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;

what are the major symptoms of malaria; and the preventive measures to be taken for prevention from malaria.

Malaria is to be suspected in all patients living in malaria-endemic 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. In addition, under NRHM the states receive inputs for contractual LTs also. 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 with one of the following conditions:

- *P. falciparum* % ≥ 30 and SPR ≥ 2%;
- Consistently high API; and
- Deaths reported in the village.

Anti-malarial treatment will in principle be given only on the basis of a positive diagnosis. Bivalent RDT solves the problem of early diagnosis of *P. falciparum and P. vivax* cases. If a microscopy result cannot be made available within 24 hours and *P. falciparum-specific* RDT (when used) 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.

The MOs of the health centres will be trained and reoriented to diagnose a case of malaria and also identify the symptoms and signs of severe malaria cases to improve their diagnostic capabilities; they, in turn, will improve the capability of all other health functionaries including the volunteers for diagnosis of malaria. Implementation of quality assurance guidelines for RDT and microscopy will also be ensured by him.

4.1.4 Output indicators

- Number of PHCs with functional microscopy
- Number of slides examined by facility
- Number of ASHAs involved in diagnosis
- Number of RDTs done by ASHA
- Number of healthcare staff of various cadres trained in diagnosis of malaria

4.1.5 Outcome indicator

- Percentage of fever cases suspected for malaria in high-risk districts receiving malaria test result (RDT/microscopy) no later than the day after first contact with health care provider.
- Percentage contribution of ASHAs in total blood slide examination
- Percentage of contribution of ASHAs in total case detection

4.2 Treatment

The primary purpose of case management is to shorten the duration of symptoms, 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.

4.2.1 Criteria for change in drug policy

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

The drug policy is changed in areas/block PHCs having treatment failure (early or late treatment failure) of 10% or more 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 all *P. falciparum* cases in the country. However, its therapeutic efficacy is being monitored regularly and the appropriate change in the policy will be made if more than 10% treatment failure is observed.

4.2.2 Calculation of requirements of antimalarial drugs

The stopping of presumptive treatment of malaria and introduction of ACT for *P. falciparum* cases in the country is unlikely to result in an immediate, drastic reduction in the requirement of chloroquine. Also, with the introduction of bivalent RDT, the load of 'unconfirmed (clinical) malaria' is expected to decrease leading to lesser chloroquine requirements. It is expected that in the initial few years, at least about 30% of fever cases (30 million suspected malaria cases) would be treated with a full 3 day course of chloroquine.

It is expected that in the initial few years after country-wide introduction of ACT use for treatment of P. falciparum 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 not decrease below existing levels as the public health system could attract 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 cases each of *P. vivax* and *P. falciparum*, with the present *P. falciparum* 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 antimalarials to avoid stock-outs even in circumstances like unforeseen outbreaks and procurement delays are as follows:

- The data of positive malaria cases of the last completed year is taken as basis for calculation.
- 25% additional quantity is taken as buffer stock requirements
- In order to cater 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:

$$\text{Number of chloroquine tablets required} = \frac{\text{No. of blood slides collected}}{2} \times 6 \text{ tablets}$$

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 fever cases (suspected malaria) in areas where bivalent RDT is going to be used, as the diagnosis of *P. falciparum and P. vivax* by RDTs will be readily available and only those confirmed as *P. falciparum* or *P. vivax* will be provided the treatment as per the National Drug Policy.

Primaquine (2.5 mg) tablets

Primaquine (2.5 mg) tablets are used for radical treatment of *P. vivax* cases in children in the age group 1 to 14 years. This age group constitutes about 30% of total *P. vivax* 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 *P. vivax* cases x 30% x 4 per day x 14 days) + 25% buffer and 40% for exigencies

Primaquine (7.5 mg) tablets

Primaquine (7.5mg) tablets are used in adult patients who constitute around 70% of the total *P. vivax* cases occurring in the country. The dose is 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 *P. vivax* cases x 70% x 2 per day x 14 days) + 25% buffer and 40% for exigency

All P. falciparum cases in the country will be treated with ACT.

At present, ACT-SP is available as combiblister pack for adults and four combinations for the paediatric age groups (< 1 year, 1-4 years, 5-8 years and 9-14 years) in the national programme.

Necessary action has been taken for stopping artemisinin monotherapy in the country by stopping sale of loose tablets of artesunate. The Drug Controller General (India) has implemented the decision not to grant manufacturing licences or renew marketing licences for oral artemisinin monotherapies and to withdraw permissions given already for the same.

Thus the production, sale and export of oral artemisinin as a single drug have been banned in India.

The number of P. falciparum cases treated in the public health system is around 0.7 million cases annually in the country. It is expected that the incidence could 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 subcentre have also been worked similarly at higher amounts. The combiblister 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)
- Subcentres- 3 courses per paediatric age group + 6 adult courses (Total – 18 courses)
- PHCs - 10 courses per paediatric age group + 25 adult courses (Total – 65 courses)
- CHCs - 15 courses per paediatric 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 reserves 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 *P. falciparum* endemic areas, in the first year, have been worked out as below.

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

Total - 1,943,570

The calculation of ACT requirements from 2012-13 is as follows:

Table – 4.2. ACT requirements (all figures in millions)

Year	2012-13	2013-14	2014-15	2015-16	2016-17
Population of India (increasing at 1.6% annually)	1,223	1,243	1,263	1,283	1,303
Number of P. falciparum cases as per epidemiological data (cases are assumed to decline by 30% in 5 years)	0.60	0.55	0.49	0.44	0.42
Number of ACT courses required (A)	0.60	0.55	0.49	0.44	0.42
25% buffer stocks (B)	0.15	0.14	0.12	0.11	0.11
Deployment reserve stocks to be maintained for 4 different paediatric age groups and one adult age group at all levels to ensure that there is no stock-out of any ACT in any P. falciparum endemic areas (in all areas and villages which have recorded P. falciparum cases in the past 3 years) (C)	0.97	0.97	0.97	0.97	0.97
Estimated requirements in public sector (A+B+C)	1.72	1.66	1.58	1.52	1.50

25% to be issued for treatment of malaria cases in the non-government facilities which will give regular reports on case management along with buffer stock and reserves (D)	0.43	0.42	0.40	0.38	0.37
Total requirements (for public and private sector) (A+B+C+D)	2.15	2.08	1.98	1.90	1.87

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

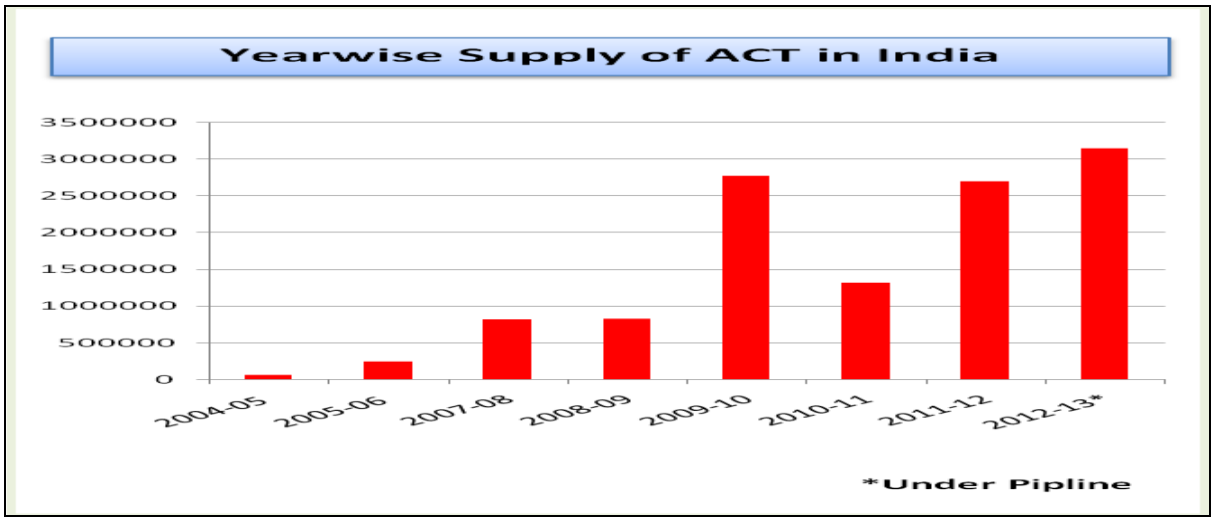
- Adult cases - 60% of total cases
- Paediatric cases - 40% of total malaria cases with further distribution as follows:
  - Under 1 year - 10%
  - 1 to 4 years - 22%
  - 5 to 8 years - 30%
  - 9 to 14 years - 38%

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.

The supply position of ACTs in India during the years 2004-05 to 2012-13 is given in figure 4.2 below.

Figure 4.2: Supply position of ACTs in India during 2004-05 to 2012-13



4.2.3 Objective

To ensure by 2017 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.

4.2.4 Strategies for Treatment

- Policy decisions for malaria diagnosis and treatment based on the evidence
- Provision of complete course of anti-malarial treatment as per drug policy and guidelines.
- Effective treatment with ACT for all the *Pf* cases in all the districts of the country.
- The currently selected ACT is artesunate (3 days) + sulfadoxine-pyrimethamine (single dose on 1st day). All treatment providers in the identified areas of the country, including those in the private sector, are motivated to adhere to ACT and no artemisinin monotherapy.
- Drug efficacy /Resistance monitoring
- Based on the resistance studies appropriate ACT /drugs to be introduced for treatment of Malaria
- Treatment of *P. vivax* cases with chloroquine for three days and primaquine for 14 days
- Provision of treatment by Private providers 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.
- Effective Behvaiour Change Communication to improve treatment seeking behaviour

4.2.5 Operational Design

A positive RDT result for *P. falciparum* will be followed by immediate treatment with ACT and primaquine. If bivalent RDT or microscopy is used and *P. vivax* is diagnosed, then full course of chloroquine for three days and primaquine for 14 days will be administered. 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. Fever detection camps and clinics will be conducted regularly during monsoon months. MOs will be reoriented about the current guidelines under the National Drug Policy revised from time to time based on results of therapeutic efficacy studies.

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 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 anti-malaria treatment. 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.

4.2.6 Output indicators

- Number of ASHAs providing treatment services
- Number of cases treated by ASHA
- Number of healthcare staff of different cadre trained in treatment of malaria
- Number of ACT procured (PSM)
- Number of *Pf* cases treated with full course of ACT
- Number of *Pv* cases treated with full course of Chloroquine and Primaquine
- Number of IPD cases at sentinel sites admitted for treatment of malaria

4.2.7 Outcome Indicators

- Percentage of microscopy/ RDT positive *Pf* cases among adults receiving ACT no later than the day after the diagnosis and the positive *Pv* cases receiving Chloroquine no later than the day after the diagnosis.
- Percent of designated providers of malaria diagnosis and treatment who have not had an ACT or RDT stock-out for more than a week during the last 3 months.
- Percentage of villages with trained designated provider of malaria diagnosis and treatment services.
- Percentage of malaria IPD cases among all IPD cases in sentinel sites
- Percentage of fever cases accessing provider within 24 hrs of onset of fever
- Percentage of hospitalized malaria cases among all hospitalized cases in sentinel sites

Table 4.3: Category wise strategy for diagnosis and treatment

Intervention	Category 3	Category 2	Category 1
Diagnosis	95% parasitological diagnosis of all fever cases	100% parasitological diagnosis of all fever cases	100% parasitological diagnosis of all fever cases
Treatment	100% of all confirmed cases will be treated with ACT/CQ & primaquine	100% of all confirmed cases will receive radical treatment(ACT /CQ & primaquine)	100% of all confirmed cases will receive radical treatment(ACT/CQ & primaquine)

4.3 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.

4.3.1 Objective

To strengthen the capacity for managing severe malaria cases and reducing deaths

4.3.2 Strategies

The management of severe malaria cases at the secondary and tertiary levels shall be focusing on followings:

- Identify emergencies and refer them immediately to the next level of care using NRHM referral services.

- Providing technical support to rural and urban health centres and hospitals to ensure existence of an effective referral system and sufficient equipments to manage the severe cases

4.3.3 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 and management of organ involvement with appropriate life-saving services. Sentinel site hospitals have been identified and made functional especially in project areas during the 11th Five Year Plan. Additional sentinel sites will be identified in other areas to manage and monitor the trend of severe cases. The MOs, the healthcare staff /volunteers and community members will be oriented for identification of symptoms of severe cases through training and BCC/IEC activities, respectively.

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 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
- BCC/IEC for community for identification of symptoms of severe malaria cases and timely referral to appropriate healthcare facility where they should refer /take the patient.

4.3.4Output indicators

- Number of sentinel sites for severe malaria
- Number of referrals of severe malaria cases to the identified hospitals (CHC / Sentinel sites, Secondary care hospitals) with pre-referral treatment

4.3.5 Outcome indicators

- Case fatality rate at sentinel sites providing treatment for severe malaria cases
- Deaths due to malaria
- Proportion of severe malaria cases out of total indoor patients at Sentinel Site Hospitals
- Proportion of inpatient cases with an onset of fever less than 3 days prior to admission

4.4 Malaria epidemics

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.

One of the main aims of 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 NVBDCP is closely linked with the IDSP in this regard.

4.4.1. Objective

To effectively detect, control, and prevent outbreaks of malaria

4.4.2 Strategies

- Using the surveillance data, IDSP data and epidemic threshold charts to identify impending outbreak / epidemic at an early stage
- Ensuring the investigation of potential outbreaks
- 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.

4.4.3. Key Interventions

The emergence of early warning signals, best obtained by intersectoral collaboration with municipalities, departments of agriculture, transport, the military etc., should lead to increased alert. The alert communicated to MO-PHCs will enable them to pay more attention to the weekly trends. The epidemic threshold chart developed by WHO is a useful tool to detect in advance the likelihood of an impending epidemic. It can be used to identify at least in one month advance the impending epidemic which can then be prevented or its magnitude reduced through effective preventive measures and ensuring the essential supplies. Efforts will be made to identify and map malaria foci for effective targeting of interventions, by strengthening a passive weekly surveillance system in category 1 & 2 areas, and continuing an active surveillance system in category 3 areas.

Surveillance

The following activities would contribute to increased surveillance for early detection of outbreaks/epidemics.

- Additional surveillance staff capacity to oversee data collection, quality control, submission, evaluation, case investigation
  - Surveillance / M&E officer at national level
  - Data manager at national level
  - Surveillance officers at state level
  - Community health workers at field level
- Standardized case definitions - fever/uncomplicated malaria/severe malaria
- Standardized tools for data collection, reporting, monitoring, analysis and feedback, case investigation across all districts and states
- Increased use of data at all levels for trend analysis; feedback loop to provide regular feedback to lower levels
- Comprehensive, on-going support and evaluation through supervisory visits, with new guidelines, training materials, and supervisory checklists for both surveillance and Epidemic Preparedness and Response (EPR)

- Integrated training on surveillance, and EPR, Geographic information system (GIS) and M&E at regional and district level on a regular basis for all core surveillance and peripheral staff
- Reporting of all cases detected in private health systems by mandating private providers to report to surveillance system
- Increased capacity to track infections and test fevers in remote communities through introduction and expansion of community health workers in surveillance activities
- Accurate mapping and identification of malaria foci and analysis of trends in transmission – temporal and spatial – through timely and complete reporting of passively detected cases through weekly surveillance system
- Weekly surveillance system in all States and throughout the year
- Disaggregation in reporting of indigenous and imported cases, particularly in border districts, and in Categories 1 and 2 states
- Mapping of transmission to identify and target foci using GIS software; annual stratification by PHCs
- Enhanced communication tools and infrastructure for timely reporting at facility level (test reporting via short message services (SMS)
- Interruption of onward transmission through active case based surveillance in Category 1 & 2 States
- Case-based reporting and case investigation of each confirmed malaria case within 5 days of notification followed by case classification
- Active case search with parasite screening within a pre-defined radius (~2km) around each confirmed malaria case (only locally acquired confirmed cases in areas classified as "no local transmission") followed by treatment of confirmed cases, combined with entomological surveillance and targeted vector control
- Spot mapping of imported and locally acquired confirmed malaria cases in health facility catchment areas to identify malaria foci for targeted interventions (in areas with low transmission)
- Malaria case registers at outpatient and inpatient departments of health facilities , laboratories, and at district level

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 /RDT positivity rate respectively to assess the magnitude of the 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.

4.4.4 Epidemic preparedness and response

- Dedicated staff capacity to coordinate and mount speedy responses to outbreaks through District VBD Officer
- Revision of the Malaria Epidemic Preparedness and Response Guidelines taking into account the changed epidemiological situation; epidemic preparedness and response activities costed and emergency fund in place.
- Outbreak detection strengthened through implementation of weekly surveillance system throughout the year, in all regions, and annual updating of thresholds used for the detection of epidemics; this includes a new definition of an outbreak adapted to the new epidemiological situation and to pre-elimination/elimination targets
- Forecasting of disease trends and potential epidemics through correlation of malaria data with meteorological data for the past decades to identify association

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:

4.4.4.1 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:

4.4.4.2 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.

Table 4.4: Category wise Strategy for surveillance and EPR

Intervention	Category 3	Category 2	Category 1
Surveillance	• Weekly passive surveillance	• Weekly passive surveillance + Case based active surveillance • Case investigation of each confirmed malaria case followed by case classification • Active case search around each confirmed malaria case followed by case management and vector control activities if needed	• Weekly passive surveillance + Case based active surveillance • Case investigation of each confirmed malaria case followed by case classification • Active case search around each confirmed indigenous malaria case followed by case management and vector control activities if needed
Epidemic Preparedness & Response	• Thresholds using the mean and the third quartile of reported cases in the same week in preceding years used to calculate alert and epidemic thresholds respectively	• A cluster of 3 or more laboratory confirmed cases used as threshold	• Every confirmed locally acquired case constitutes an outbreak and must be thoroughly investigated and responded to with adequate control activities

4.4.4.3 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.

4.4.5 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 take action to prevent epidemics in future.

4.4.6 Output indicator

- Number of outbreaks detected
- Number of outbreaks investigated

4.4.7 Outcome indicator

- Proportion of PHCs with a malaria outbreak

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 management of insecticide resistance. The measures of vector control and protection include:

- Measures to control adult mosquitoes: IRS
- Anti-larval measures: chemical, biological and environmental
- Personal protection: use of bed nets, including ITNs/LLINs

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 in high-risk areas 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 at 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.

Areas with API ≥ 2 are considered high risk areas. The Technical Advisory Committee on Malaria (2002) rationalized 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 subcentre as the unit;
- To spray on priority basis with suitable insecticide all areas reporting $\geq 5\%$ SPR (based on passive collection of blood slides/RDT), if the ABER is below 10%;
- Due priority be accorded for spray if *P. falciparum* 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; and
- Other parameters including entomological, ecological parameters, etc. may also be considered while prioritizing areas for spraying.

The population living in high-risk areas is the high-risk population identified by:

- Size of the population;
- List of the subcentre areas or villages included; and
- Presentation of these subcentre areas and villages on a map.

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 subcentre 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 micro-stratification, 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; the coverage will be more than 80%, whatever may be the intervention. Larval control will be applied, where it can be effective and it is the main method 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 drainage and other environmental measures or by the use of larvivorous fish or chemical larvicides. These methods would be systematically promoted in areas wherever they have been 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

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

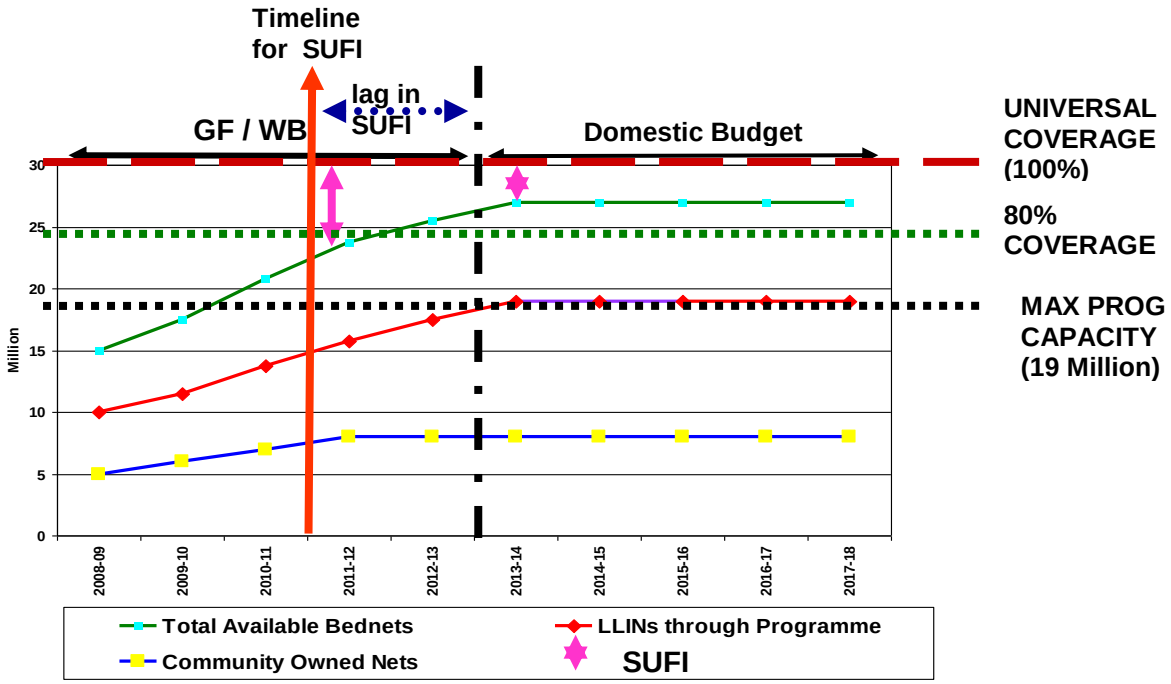
Commitment to rapid national scale-up for impact (SUFI)

The NVBDCP is committed to reduce the burden of malaria in high-risk areas by rolling out a package of following interventions:

- A new and highly effective drug policy with use of more effective drugs;
- Scale up of transmission-reduction using ITNs / LLINs; and
- Selective and targeted application of IRS.

The intensive scale up of coverage of personal protection interventions (ITNs / LLINs) and focused IRS will have rapid and significant impact on malaria illness, deaths, and health care costs. The graph below shows the plan for bed-net distribution to achieve scale up for impact (SUFI) during the XII Five-Year plan period.

Figure 5.1: Plan for LLIN Scale Up For Impact (SUFI) in XII Five-Year Plan period



The following assumptions have been made in the planning to scale up for bed-nets:

- Population with API more than 2, eligible for vector control: 190 million
- Population in remote & operationally difficult areas, eligible for bednets: 75 million
- Therefore, total bed nets required for universal coverage @ 2 nets for 5 persons: 30 million
- Community ownership of bed nets at present: 5 - 6 million
- Programme supplied nets available in field at present: 10 million
- Max programme capacity for procurement and purchase annually: 5 million
- Bednets have life of 4 years, so replacement each year at sustained level: 5 million
- By 2010-11 Programme nets @ above capacity and replacement: 11 million
- Therefore from above by 2010 total nets: 11 million
- Gap for SUFI: 19 million
- Maximum sustainable level of programme achieved by 2012–13: 22 million
- Maximum community sustainable level by 2012–13: 22 million
- Therefore by 2012–13 total sustainable level: 22 million

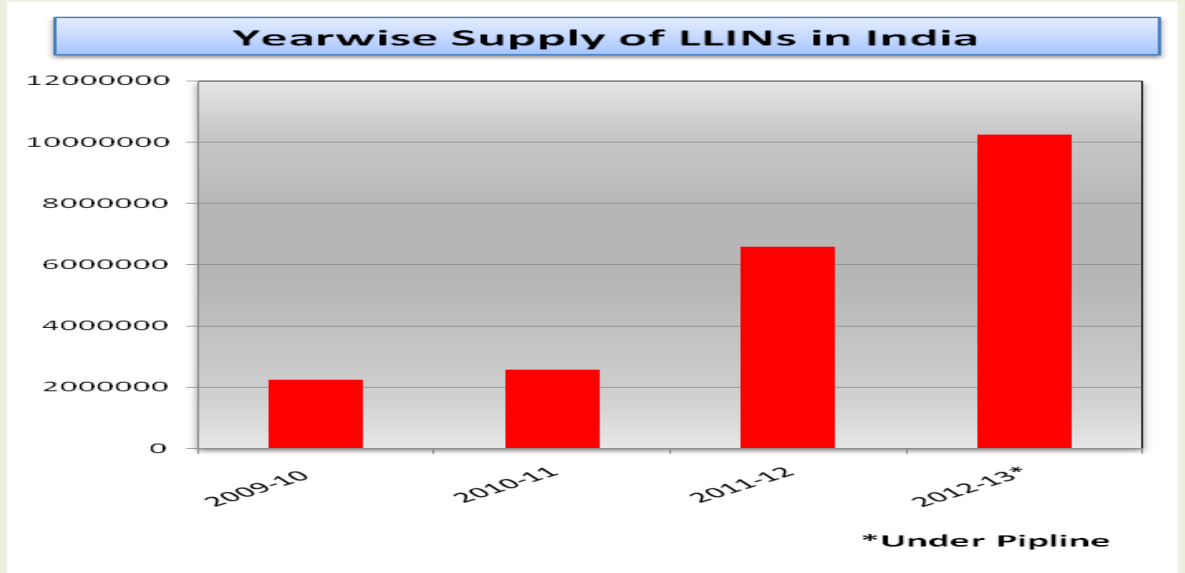
Initially it is planned for coverage of the population living in areas with API ≥ 5 (69.1 million in 2008) with LLIN. This population is projected to increase at the rate of 1.6%. The number of LLINs required is planned @ 2 family size LLINs per household, with the assumption that an average household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

Table 5.1: Estimation of LLIN requirements (in millions)

Year	2012-13	2013-14	2014-15	2015-16	2016-17
Total population of the country (population projected to increase at the rate of 1.6% annually)	1223	1243	1263	1283	1303
High risk population living in areas above API > 2	139.59	141.82	144.09	140	130
Population to be covered by LLIN (the population living in areas where API > 5)	73.63	74.81	76.00	70	65
Number of LLIN required in the country for sustaining the level	29.45	29.92	30.40	28	26

After the introduction of LLIN in 2009 in the country, the supply status of LLINs is shown in the following graph:

Figure 5.2: LLIN supply in India from 2009-10 onwards



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 re-impregnated with insecticides regularly. In addition, about 2.5 million bed nets purchased by the community are also treated regularly. From 2010-11, plain nets are not distributed any more by the programme and only nets purchased by the community will be re-impregnated. The programme is supplying LLINs from 2009.

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 9 supported Project and World Bank aided Project, LLINs are supplied in high risk areas. However, 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 increasing their numbers in the World Bank project as well as procurement through the domestic budget.

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, range Rs. 1567–2209) than IRS (Rs. 3121, range Rs. 2386–4177)[1].

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.

5.3.2 Objective

To ensure that at least 80% of people in high-risk areas (target areas) sleep under effective ITNs/ LLINs by 2017.

5.3.3 Strategies

- Rapid scale up of ITN/LLIN coverage through a mass distribution campaign. Every eligible household will be supplied with LLINs @ 2 nets per 5 persons.
- Re-treatment of plain nets with synthetic pyrethroid done free of cost to the community.
- BCC to ensure that there is regular use of ITNs/LLINs.

[1] 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

- 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 in areas with vulnerable population.

5.3.4 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 LLINs country-wide, NVBDCP has refocused 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 LLNs has been determined as mass distribution of 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 LLINs will be distributed through PPP initiatives (social marketing), with the government providing a partial subsidy, depending on the household economy.

5.3.5 Output indicators

- Number of LLINs distributed
- Number of ITNs retreated
- Number of LLINs replenished

5.3.6 Outcome indicator

- Percentage of population in high-risk project areas provided with effective ITNs/ LLINs
- Percentage of HH with 1 LLIN for every 2 people
- Percentage of individual who slept under LLIN/ITN the previous night

5.4 IRS

IRS is at present carried out in high risk areas (API $\geq$ 2) 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; 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 are given in Annexure- 1.

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.

5.4.1 Objective

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

5.4.2 Strategies

- IRS is still the best method for vector control in certain parts of the north-western states of India, where vectors are highly endophilic and the summer temperatures are so high that people do not like to use bed nets.
- Environment management plan will be implemented to minimize the damage to the environment due to insecticides.
- Monitoring the development of resistance to the insecticides in current use

5.4.3 Operational design

During the strategic plan period (2012-17), 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 choice of 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. Environment management plan will be implemented to minimize the damage to the environment due to insecticides.

5.4.4 Output indicators

- Percentage of targeted households / rooms sprayed

5.4.5 Outcome Indicators

- Percentage of population in high-risk project areas protected with effective IRS
- Percentage of population in high-risk project areas protected with either effective IRS or LIN

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 anti-larval 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. The 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 Pirimiphos methyl.

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.

5.6 Major activities for IVM according to API

For areas having API less than 1

- Vector control- By minor engineering processes like desilting, deweeding and cleaning of canals and irrigation channels, biological control, by use of larvicides and environmental management
- Involvement of PRIs in rural areas and municipal bodies in urban areas by sensitizing them
- Cooperation from VHSCs and nodal officers for MNREGA

For areas having API between 1-2

- Vector control by source reduction and biological control

For areas having API between 2-5

- Vector control by distribution of LLIN @ 2 LLIN per household of 5 members if acceptability of IRS is low.
- For areas which can be supervised and accessible –Quality IRS for selective vector control based on epidemiological impact of earlier vector control measures, if needed; these areas can also be provided with LLINs

For areas having API above 5

For areas having perennial transmission (more than 5 months in a year)

- 2 rounds of IRS with DDT or 3 rounds with Malathion
- Priority distribution of LLINs as per the guidelines
- Vector bionomics studies for future change of strategy

For areas having seasonal transmission (less than 5 months in a year)

- 1 round of IRS with DDT before start of transmission
- Focal spray whenever and wherever needed
- Priority distribution of LLINs as per the guidelines

Table 5.2: Target for vector control coverage by category

Intervention	Category 3	Category 2	Category 1
IRS	95% coverage	100% IRS coverage in identified foci	None, unless indicated by entomological surveillance
LLINs	85% of people in targeted communities sleep under LLINs	100% targeted LLIN coverage in identified foci	For travellers to Category 3 states, and for personal protection against mosquito bite
Larviciding	95% coverage of identified breeding sites	95% coverage of identified breeding sites	None, unless indicated by entomological surveillance

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, staffs 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), Laboratory 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, some of the posts of MOs, LTs, HS (M), HS (F), MPW (M) and MPW (F) are vacant against the sanctioned numbers (percentage varying from time to time). 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. These posts will be filled through NRHM and later sustained by the states.

In view of lessons learnt during XI Five Year Plan and challenges encountered, it has been felt that special focus has to be given to some of the vital components and additional inputs for supporting engagement of key technical manpower need to be provided for effective implementation, supervision, improving monitoring and evaluation and reporting. Further, it has also been observed that due to inadequate /non- availability of funds for procurement of decentralized insecticides and operational cost for IRS, the coverage of IRS which is a key vector control measure, has not been achieved at the desired level. This necessitates that during XII Plan period, this component should be fully supported by the Central Government. The component wise details are as follows:

6.1.1 Human resource

6.1.2 ASHAs

ASHAs are the important resource for implementation of national programmes at field level. This is especially true for NVBDCP where surveillance in the field is an important component of EDCT. Presently ASHAs are involved in the diagnosis and treatment of malaria cases and bringing the kala-azar cases to health facilities. ASHAs perform RDT, prepare slides and give treatment to malaria positive cases. ASHAs are given incentive for each of these activities - Rs. 5 per RDT and slide preparation, Rs. 20 for complete treatment for a *P. falciparum* case and Rs. 50 for radical treatment of *P. vivax* malaria. Presently, NVBDCP is giving such incentive to ASHAs in 257 identified high risk districts mainly in the World Bank and Global Fund supported project areas. The programme proposes in the 12th plan to extend the incentive to all ASHAs in all districts for services for all six VBDs depending upon their endemicity in the area. More than 8 lakh existing ASHAs will be involved throughout the country. The programme has earmarked Rs. 250 per ASHA per month with an overall ceiling of Rs. 3000 annually for this. It is expected that this incentive will greatly help in increased surveillance of all the six VBDs under the programme for taking timely corrective actions.

6.1.3 MPW (M)

As against the requirement of 145894 MPWs sanctioned MPWs are 79774 and in place are 57439. Thus there is a vacancy of 26208 MPWs. But considering the total requirement as per the population norms, there is an actual shortfall of 88483 MPWs. Recently the Union Government has proposed to revitalize MPW training centres in the states, so as to make adequate number of MPWs available for the field work. NRHM may initiate steps to recruit and train such numbers in the 12th plan period. MPWs are essential for NVBDCP as they are the health workers (besides ASHA) who are responsible for surveillance in the field and constitute an integral part of EDCT. Success of the programme depends heavily on them. Effective field workforce will greatly help the programme in achieving the desired outcomes. NVBDCP has recruited 9956 MPWs contractually in the XI Plan period in the high endemic states supported by World Bank and Global fund and proposes to continue with these contractual MPWs till regular appointees join the programme or the existing contractual workers are absorbed in the health services of the respective states.

6.1.4 Laboratory technicians

There are presently 12904 LTs in place as against the sanctioned strength of 17219 leaving a vacancy of 5591 (Rural Health Statistics, 2009). However NRHM has calculated the LT requirement as 27901, based on the provision for one LT each for PHC/CHC taking into account the shortfall in existing PHCs/CHCs. Therefore, the actual shortfall is of 15244 LTs (@ one LT for a population of 40,000. Out of this shortfall, nearly 20% has been filled by contractual LTs recruited under RNTCP, NACP III etc.; thus having a present vacancy of nearly 12,195 LTs. As microscopy is still the gold standard for malaria diagnosis and crucial for EDCT, the programme proposes to recruit these 12,000 LTs with a provision for binocular microscope for quality diagnosis and treatment.

6.1.5 VBD technical supervisors (MTS/KTS)

NVBDCP has started an innovation for effective monitoring and evaluation of malaria and Kala-azar in the form of Malaria and Kala-azar technical supervisors in the high endemic areas in the project states. This has paid rich dividends as these supervisors have proved very effective for supervision, M&E of programme implementation, management of logistics and drug supply and tracking of cases at block /field level. Encouraged by the outcomes, NVBDCP plans to expand this approach and proposes to recruit one VBD Technical Supervisor in each block of the country for control of VBD(s).

6.1.6 District VBD consultants

NVBDCP has also recruited District VBD consultants in the high endemic districts of the WB/GF project states which has improved M&E and implementation of the programme. Therefore, NVBDCP has planned to expand the district VBD control network to all 640 districts in the country @ one per district. They will assist the district programme officers who, at times, are over-burdened with various other duties and are not able to devote adequate time to VBDs. They will be provided with support for mobility and operational expenses. In addition, it is planned that each district will have one data entry operator to facilitate the recording and reporting of the programme data.

6.1.7 State level consultants

In order to strengthen M&E activities and supervision of implementation of the programme at the state level additional support is required in the form of contractual consultants who are qualified experts for various functional areas. They will be provided mobility and operational support. Like the District VBD consultant, they will assist the state programme officers at the state level. Each state will have one M&E consultant (medical graduates with public health specialization), one VBD consultant (preferably entomologist), one finance and one logistics consultant. The project states already have such consultants working and the plan is to further extend the staffing to cover all States. In addition to this, one data entry operator shall also be provided at each state HQ to facilitate the recording and reporting of the programme data.

6.1.8 Strengthening of ROH&FW

At present, there are 19 RoH&FWs in the country, many of which are facing acute shortage of skilled manpower. RoH&FW offices perform the function of monitoring the programme as well act as liaison between the directorate and state programme offices besides training and other activities. NVBDCP is of the opinion that RoH&FW need strengthening and accordingly, it is proposed to have one entomologist and one epidemiologist at each of these regional offices with mobility and operational support.

6.1.9 Strengthening of Zonal entomology units

During the 12th Five Year Plan, the NVBDCP proposes to revive and reactivate the 72 Zonal entomological units in the country with an adequate budget provision. It is proposed that central Government support will be provided for filling up 37 posts of entomologists and 65 posts of insect collectors. Assistance will also be provided for mobility, equipment etc., so that adequate data on various entomological aspects is generated on a regular basis. Provision will be made for training of newly recruited entomologists. It is projected that Rs. 93.3 Crores will be required for this component during 12th Five Year Plan.

6.1.10 Objective

- To place 80% of the sanctioned staff in target areas and ensure they are trained in malaria control

6.1.11 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 /operational /supervision support to National Office and States through consultants for various functional areas and for districts to manage temporary staffing pools for rapid scale up of malaria control efforts e.g., District Vector Borne Disease Consultants (DVBDCs) and MTSs.

6.1.12 Operational Design

- Utilise available resources to contract non-governmental staff.
- Advocate for extension of staff retention and compensation incentives for key technical and management staff in addition to cadres of health care providers. Incentives for ASHA given in high endemic areas may need to be extended to other ASHAs in case of requirement.

- Provide support to RoH&FW and research institutions of higher learning for capacity development for management and HR planning.

6.1.13 Output indicators

- No. of human resources engaged against the target for that particular cadre

6.1.14 Outcome 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 programme at all levels.

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, and helps motivate staff for discipline, diligence and dedication in their work. The training will have in-built 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 after 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 staff. A 1½ 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.

6.2.1 Objective

To train at least 80% of the health care staff, health volunteers and ASHAs in high-risk areas in anti-malarial activities by 2017

6.2.2 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

- Invest in and conduct training of all health care providers (MO, LT, DVBDC, MPW, MTS and ASHA including Private sector healthcare providers) for delivery of better service

6.2.3 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 VBDs already exists to ensure quality health manpower development. The training will be an on-going program with in-built provision for updating knowledge and skills in the light of technical advances.
- Preference will be given to technical training related to job requirements of ASHAs, MTSs, VBD consultants, etc. as they are new to the health care delivery system so that at the end of the training, they are 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 counselling skills including IPC.
- Government training institutions will be used for training; services of private/NGO training institutions will also sought, wherever they have sufficient capacity, by entering into partnership.
- Training of private sector care providers will be carried out by entering into partnerships with professional organizations having expertise and experience, and developing appropriate training materials for private sector care providers with the help of experts.
- Trainings will emphasize standard approaches and active learning methods.
- 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 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.

6.2.4 Output indicators

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

6.2.5 Outcome indicators

- Percent of targeted trained healthcare staff is available at all level.
- Extent of improvement in trainee knowledge and skills.

Section 7: Intersectoral collaboration and Behaviour 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 are 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.

An intersectoral National Task Force (NTF) under the chairmanship of Union Secretary for Health and Family Welfare and comprising non-health ministries and departments, private sector, NGOs etc. already exists under the NVBDCP. This task force meets annually to prepare a plan of action for observance of the anti-malaria month in June. Under the NRHM, state and district health missions, Rogi Kalyan Samitis and Village Health and Sanitation Committees 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.

7.1.1 Objective

To establish intersectoral collaboration with organizations for prevention and control of malaria

7.1.2 Strategies

- Sustained advocacy at political and administrative levels to prioritize malaria control and inculcate keenness for partnerships within public / private / NGO sectors.
- Fostering Public Private Partnership with non health ministries and departments, private / NGO sectors at national and sub-national levels including IMA and other professional Associations.

7.1.3 Operational design

The following actions will be taken up for increasing intersectoral collaboration and partnerships:

- Scheduling of NTF meeting prior to 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 Azad Medical College, Lady Hardinge Medical College etc.), to make it one of the most significant drivers of the NVBDCP at national level for intersectoral collaboration. Follow-up meetings of the nodal officials during November-December will also be planned to review progress in action.

- Identification of stakeholders 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, nodal officers from both NVBDCP and partner organizations will develop an action plan 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 intersectoral 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.

The anticipated roles of various sectors in malaria control /elimination programme are given in the following table:

Table 7.1: Role of various sectors in malaria control/elimination

No.	Sector / Department	Roles
1.	Agriculture	• Adopting the concept of dry-wet irrigation by irrigation department • Pesticide management • Education of farmers for integrated pest and vector management
2.	Water resource	• Intermittent irrigation and maintenance of canal system • Design modification and lining of canals • Weeding for proper flow of water in canals • Creating small check-dams away from villages • Health Impact Assessment (HIA) prior to large dam construction
3.	Water supply	• Timely repair of leakages and restoration of taps to prevent water pooling and wastage • Diversion of waste water to natural or artificial ponds/pits • Staggering water supply • Mosquito-proofing of water harvesting devices, repair of sluice valves
4.	Road and Building	• Proper planning as per bye-laws • Merging pits / breaking bunds • Excavations in line with natural slope/gradient, making way for water to flow into natural depression /pond/river • Follow-up actions after excavation
5.	Urban development	• Implementation of building bye-laws • Improved design to avoid undue water logging • Building use permission after clearance from health department • Safe rain water harvesting • Use mosquito-proof design of dwellings • Housing location at safe places
6.	Industry; mining	• Safe water storage /disposal and improving drainage/sewerage system • Safe disposal of solid waste /used containers • Mosquito-proofing of dwellings • Use of ITN/LLINs among labours especially migrant labourers
7.	Railways	• Proper excavations • Maintenance of yards and dumps • Anti-larval activities within their jurisdiction • HIA for safeguards
8.	Environment/ Forest	• Pesticide and environment management policy • Reclamation of swampy areas • Social forestry
9.	Fisheries	• Institutional help /training in mass production of larvivorous fishes • Promotion of composite fish farming schemes at community level
10.	Remote sensing	• Technical support/training help in mapping environmental changes and disease risk using GIS
11.	Private Pest Control agencies	• Judicious use of insecticides • Promotion of IVM-based sustainable preventive and control methods
12.	Planning	• Involvement of health agencies at planning stage for HIA

		• Incorporation of risk-mitigating actions in development projects
13.	Sea/Air Ports	• Vector surveillance and control measures
14.	Education	• School health activities incorporating vector control • Developing training material in local languages and incorporating in the school curriculum
15.	Mass media	• IEC activities • Advocacy
16.	Village councils	• Overall cooperation in the on-going health programmes and to ensure public participation as and when needed (IRS, LLIN)
17.	Local Government	• Update public health bye-laws • Mandatory case reporting in epidemic situation
18.	Community	• Household sanitation, use of LLIN, acceptance of IRS
19.	NGOs	• Community mobilization for acceptance of IRS, use of LLIN and developing timely treatment seeking behaviour • Village level training, distribution of IEC material
20.	R & D industry	• Development of new, safer and more effective insecticides/formulations • Promoting safe use of pesticides • Development of vaccine against malaria • Development of new user friendly drug formulation
21.	Health	• Lead sector to develop IVM guidelines • Conduct situation analysis for vector management need assessment • Plan, implement, coordinate, guide, monitor and evaluate IVM activities • Operation research, capacity building, advocacy and resource generation • Promoting LLINs through other health and family welfare services

7.1.4 Output indicators

- Updated PPP guidelines disseminated to non-health ministries and departments.
- Number of agencies applied for partnerships in anti-malaria activities
- Number of organizations that have signed MOUs for implementing PPP schemes

7.1.5 Outcome Indicators

- Number of partnerships renewed

7.2 Behaviour 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, 2007; and Joint Monitoring Mission, 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.

7.2.1 Objective

To increase coverage of BCC for the population at risk to at least 80% by 2017 to improve knowledge, awareness and responsive behavior with regard to appropriate malaria control interventions.

7.2.2 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.
- 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.
- Engagement of stakeholders in BCC planning, implementation, and M&E.

7.2.3 Operational design

- Problem definition for BCC and setting of behavioural 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.

7.2.4 Output indicators

- Number of mass media activities (radio / TV) conducted at national level against planned number of activities.
- Percentage of villages where at least 80% households were reached through IEC during the BCC campaign for LLIN / IRS / during anti malaria month for adoption of suitable measures
- Locale specific BCC strategy and operational guide developed by states and districts in line with national guidelinesh

7.2.5 Outcome Indicators

- Percentage of eligible / high risk villages reached by any community outreach activity in the last six months
- Percentage of population in the targeted villages aware about cause, symptoms, treatment and prevention measures and availability of anti-malarial services
- Percentage of sever malaria cases referred in time

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.

M&E 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 RDT, ACT & LLIN and recruitment of ASHAs 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. With the technical changes in the strategies, the formats will be revisited from time to time and it will be revised to include necessary output requirements for the programme as well as project based activities. It is envisaged that with the operationalization of these tools, 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. Each sentinel site will be equipped with a laboratory 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. The programme has identified 201 high endemic districts based on epidemiological criteria which will be provided specific inputs in the form of manpower for M&E. Each district will be provided a District Malaria Consultant/ District Vector Borne Disease Control Consultant 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 conducted by NVBDCP in collaboration with NIMR. Every year, 15 therapeutic efficacy studies are required to 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. There are 72 entomological zones of which only 13 are functional today. Scarcity of staff has prevented these zones from working to full capacity and has severely hampered generation of evidence regarding vector susceptibility to insecticides in use. It is therefore envisaged to strengthen the zonal Offices by provision of additional manpower and each year at least six studies by each entomological zone will be conducted to study vector susceptibility to insecticides.

8.1.1 Objective

- To ensure that 100% of districts in target areas will collect, analyse, and effectively use routine data and estimate their impact.

8.1.2 Strategies

- Strengthen collection, processing, analysis, and use of malaria epidemiological data.
- Establishment of functional MIS.
- M & E systems are capable of providing feedback to programme implementers, partners and relevant authorities to improve programme planning, management and accountability.
- Evaluate how the planned strategies and resource allocations have achieved expected outcomes and impacts.
- Reporting of data by partners and its integration at various levels

8.1.3 Operational Design

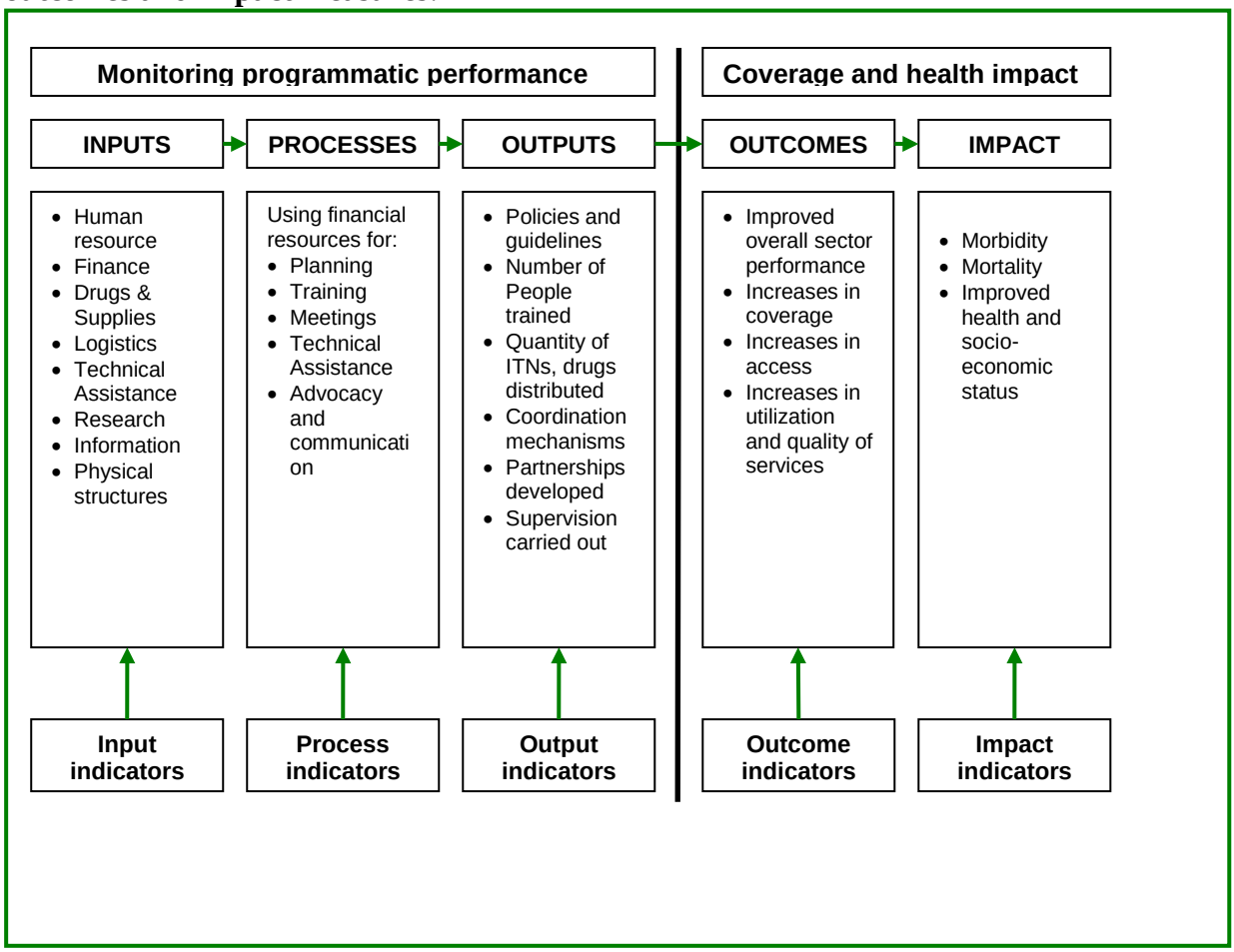
The key functions and actions of the national malaria M&E system have been developed and strengthened within the context of general health and disease M&E systems in India. Systems will be put strengthened to assure that challenges and opportunities that exist at national, state and district levels in 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 (2012-2017) will facilitate documentation in future reports the progress made towards the achievement of country's targets and the prospects for reaching the overall RBM goals and the targets of the MDGs by 2015.

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

- Strengthening of MIS for tracking malaria incidence and operational indicators including the revival of 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 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 8.1: 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 ACT 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 ACT and comparison of data on coverage in populations at risk with data obtained through population based surveys and LQAS surveys.
- 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 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 malaria cases (outpatient and in-patient) 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 hospitals 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 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 ACT 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 surveys. 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.

8.5 Population based surveys

Cross-sectional household surveys to collect data plus other selected variables, especially malaria prevalence, will be carried out in 2013, 2015 and 2017 across high malaria burden districts. Population surveys will give representative data on the malaria situation and coverage of LLINs, conventional nets, IRS and early diagnosis and adequate treatment for fever cases.

8.6 Logistic Management Information System (LMIS)

During the 11th Five-Year Plan, a LMIS has been established in the programme with the help of an agency engaged for supply chain monitoring. This has been created to track LLINs, insecticides, RDTs and ACT from their purchase or point of entry into India through the districts to the decentralized distribution points in the PHC areas. The LMIS uses 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 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 HMIS. MoH&FW is in the process of establishing a comprehensive LMIS for the health sector also.

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 ACT, 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 is done by NVBDCP in collaboration with NIMR based on an established protocol. ACT therapeutic efficacy and molecular markers for ACT-SP resistance is collected from 30 sites, where patients are sampled and examined every second year in each site. In addition, susceptibility of *P. vivax* to chloroquine is also monitored at 3 - 4 of these sites. This activity will be continued during the plan period with the help of NIMR.

8.9 Pharmacovigilance

For any newly adopted ACT on a large scale in India, it is important to monitor safety 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 protocol for prospective monitoring, coordinated with drug susceptibility testing in five sites has therefore been established by NIMR and pharmacovigilance will also be undertaken 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 control 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 2013 and 2017 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.

8.12 Output Indicators

- Monthly reporting received from each unit by 20th of next month or as in time as prescribed
- Feedback given to the reporting unit in time as prescribed
- Household / evaluation survey conducted
- 90% of validated data on MIS

8.13 Outcome Indicators

- Percentage of reporting unit submitting the report in time as prescribed
- Estimate of impact of the SAP on malaria incidence compared to the baseline
- Timely dissemination of information (reports) and feedback (to states, districts and community).
- Functional National Anti Malaria Management Information System (NAMMIS) to support the decision making towards development of need based actions.

Section 9: Programme management and other strategies

9.1 Programme management and organizational alignment

9.1.1 Objective

To strengthen the capacity of national, regional, state and district health systems for effectively and efficiently planning, implementing and managing malaria control efforts.

9.1.2 Strategies

- NVBDCP will be strengthened as a technical support unit with the responsibility for coordination of all national malaria control efforts. This includes harmonizing the support from the donors viz. World Bank and the Global Fund.
- Increase the ownership of states, as the main implementers.

9.1.3 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.

9.1.4 Output indicators

- Successful and harmonized implementation and achievement of stated objectives of the World Bank and the Global Fund projects

9.1.5 Outcome Indicators

- Proportion of state funds relative to other sources (DBS, EAC) for each state
- Effective management with consensus on policy and strategy by NVBDCP 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

9.2.1 Objective

- To support all states and districts in formation of Annual Action Plans as per NVBDCP guidelines

9.2.2 Strategies

- Invest in evidence-based programme planning capacity at all levels of the health system;
- Strategic implementation 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; and
- Districts address rapid scale-up of malaria prevention and control as per the local need.

9.2.3 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.

9.2.4 Output indicators

- Number of districts and states who prepared annual action plan
- No. of plans which received feedback from a higher level

9.2.5 Outcome indicators

- All levels of the health system have access to performance data and rationale for best practices from which to make sound programme implementation decisions; and
- Proportion of action plans which incorporated a programme innovation

9.3 Procurement and supply chain management

9.3.1 Objective

- To ensure that at least 80% of health facilities are stocked with high-quality tests and drugs at any time

9.3.2 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, supported by professional agency 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; and
- To develop a quality assurance system in place for post-dispatch inspection of drugs and supplies under NVBDCP.

This would enable the 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.

9.3.3 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. Key partners having effective procurement capacity should be used to ensure that commodities are purchased in a cost-efficient manner, abiding by World Bank/GFATM guidelines and standard programme specific technical specifications.

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.

9.3.4 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;
- 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; and
- Electronic based supply chain monitoring system is in place.
- Number of facilities experiencing a stock-out lasting more than 1 week
- Number of QA assessments conducted

9.3.5 Outcome indicators

- 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
- Quality assurance system is in place to ensure quality of drugs and supplies under NVBDCP.
- Proportion of commodities failing QA

9.3.6 Output indicators of programme management

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

9.4 Legislation

9.4.1 Objective

To adapt and implement model bye-laws to reduce / eliminate mosquito breeding sources in domestic and peri-domestic areas.

9.4.2 Strategies

- Civic by-laws in urban areas to control mosquitogenic conditions
- Health impact assessment of developmental projects
- In very low endemic situation notification of all malaria cases by all the provides including the private sector providers
- Ban on sale of artemisinin monotherapy

9.4.3 Operational design

The field staff will conduct weekly inspection for detection of domestic and peri-domestic breeding sources. Every town will have a cell responsible to initiate legal proceedings against defaulters. Similarly the state will have a monitoring cell to oversee the implementation of civic bye-laws.

9.4.4 Output indicator

- Number of UMS towns with civic by-laws
- Number of prosecutions in UMS towns

9.4.5 Outcome indicator

- Proportion of developmental projects with HIAs

9.5 Research

9.5.1 Objective

To develop and strengthen the national capacity for developing evidence base research for malaria control.

9.5.2 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.
- Collaboration with National Institute for Malaria Research (NIMR), National Institute of Health and Family Welfare (NIHFW) and the Regional Medical Research Centers (RMRC) and other partners. RMRCs.

9.5.3 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.

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

9.5.5 Output indicator

- Research work is conducted as per the needs of the programme.
- Research articles with a programme officer as co-author

9.5.6 Outcome Indicators

- Research findings influencing policy formulation and decision making; and
- Research findings influencing programming.

Section 10: Financial Outlay

10.1 Background

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 and 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 being provided to selected high malaria risk areas in north-eastern states through external aid from GFATM to accelerate anti-malaria activities and improve service delivery in the remote and inaccessible pockets. Furthermore, in 100 districts of 8 states namely Andhra Pradesh, Chhattisgarh, Jharkhand, Gujarat, Madhya Pradesh, Maharashtra, Orissa and Rajasthan, 1045 PHCs predominantly inhabited by tribals were provided 100% support including operational expenses under the Enhanced Malaria Control Project (EMCP) with World Bank assistance since 1997. The new World Bank supported "Malaria control and kala-azar elimination project" for a period of 5 years is being implemented from 2008-09. The GOI provides specified commodities and cash assistance for identified activities in other states. The operational cost for implementation of the programme and certain commodities are met from state funds. The centre also meets the requirement of states during emergency situations.

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 at 24%. It is worth noting that the GOI allocation for malaria was about 45% of the total disease control programme budget including other diseases like 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.9065 Crores in 2006-07. In the 11th Plan period also there has been considerable increase in fund allocation for NRHM which is evident from the fact that in 2007-08, Rs.11010 Crores was allocated which was increased to Rs.12050 Crores in 2008-09 and the similar amount has been sustained for 2009-10. Similarly, the budget of total disease control programme increased from 837.63 Crores in 2007-08 to 1,122.25 Crores in 2009-10 and for NVBDCP, from 361.08 Crores to 450.00 Crores.

10.2 12th Five-Year plan outlay

In the 11th Five Year Plan the proposed budget for prevention and control of VBDs under NVBDCP was 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 (Rs. 245 Crores) for GFATM. The World Bank agreed for US$ 200 million (Rs.980 Crores) for 5 years with US$ 20 million as GOI share making a total of US$ 220 million(Rs.1078 Crores) out of which only 4 years were covered starting from 2008-09 during the 11th Five Year Plan. 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), calculated at 1 US$ = Rs. 49/-

12th Five-Year plan outlay

In 12th Five-Year Plan, the proposed overall budget for prevention and control of VBDs under NVBDCP was Rs 3976.24 Crores including the EAC component. The item-wise and activity-wise details of proposed budget for XII Five Year Plan for each year are given in the following table:

Table 10.1: Component and year wise outlay of 12th Plan (Malaria) in Rs. Crores

No	Components	2012-13	2013-14	2014-15	2015-16	2016-17	Total
A. Diagnostics & treatment							
1	RDTs	59.33	74.16	118.66	118.66	118.66	489.48
2	Microscopy	76.22					76.22
3	ACT	7.36	7.36	7.36	7.36	7.36	36.80
4	Other antimalarials	11.72	11.72	11.72	14.65	14.65	64.45
A	**Sub-total (Diagnostics & treatment)**	**154.63**	**93.24**	**137.74**	**140.67**	**140.67**	**666.95**
B. Vector control (100% support)							
1	Insecticides	250.00	250.00	250.00	250.00	250.00	1,250.00
2	LLIN	295.24	97.53	-	154.63	295.24	842.64
3	Operational cost	51.00	51.00	51.00	51.00	51.00	255.00
4	Biological and environmental management through VHSC	84.00	84.00	84.00	84.00	84.00	420.00
5	Larvivorous fish support	12.00	12.00	12.00	12.00	12.00	60.00
6	Commodities and products (UMS)	85.65	84.24	82.08	87.23	86.11	425.31
7	Commodities and products (Entomological zone)	1.28	-	0.51	-	0.51	2.30
8	Operational Cost (Entomological zone)	10.81	10.81	10.81	10.81	10.81	54.05
B	**Sub-total (vector control)**	**789.97**	**589.57**	**490.40**	**649.67**	**789.67**	**3,309.29**
	Grand total (A+B)	**944.60**	**682.81**	**628.14**	**790.34**	**930.34**	**3,976.24**

The component wise budget including for cross-cutting issues is given in the following table:

Table 10.2: Component and year-wise budget details of cross-cutting matters under 12th Five-Year Plan, in Rs. Crores

Component and year wise outlay of 12th Plan (Cross-cutting)							
No	**Components**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**Total**
A. Human Resource (including M&E)							
1	Human Resource (Malaria)	116.01	131.47	182.07	200.08	219.89	849.53
2	Human Resource (UMS)	16.56	17.98	19.53	21.25	23.13	98.45
3	Human Resource (Entomological Zone)	6.39	6.39	6.39	6.39	6.39	31.95
4	ASHAs	219.33	219.33	219.33	219.33	219.33	1,096.67
5	LTs	109.76	164.64	219.51	241.46	265.61	1,000.98
A	**Sub-total**	**468.05**	**539.81**	**646.84**	**688.52**	**734.36**	**3,077.58**
B. Infrastructure and Equipment							
1	Regional Directors	1.14	-	-	-	-	1.14
2	State / District	89.10	-	-	-	-	89.10
3	UMS	17.26	17.18	17.78	10.88	10.88	73.98
4	Entomological Zone	13.01	4.85	4.85	4.85	4.85	32.39
B	**Sub-total**	**120.50**	**22.03**	**22.63**	**15.73**	**15.73**	**196.60**
C. Training							
1	Malaria	87.39	87.39	87.39	87.39	87.39	436.96
2	UMS	0.41	0.46	0.46	0.46	0.46	2.25
3	Entomological Zone	0.40	0.40	0.40	0.40	0.40	2.00
C	**Sub-total**	**88.20**	**88.25**	**88.25**	**88.25**	**88.25**	**441.21**
D	**Operational Research**	**20.00**	**20.00**	**20.00**	**20.00**	**20.00**	**100.00**
E	**IEC**	**20.00**	**20.00**	**20.00**	**20.00**	**20.00**	**100.00**
F	**Consultancy**	**20.00**	**20.00**	**20.00**	**20.00**	**20.00**	**100.00**
G	**PPP/NGO**	**20.00**	**20.00**	**20.00**	**20.00**	**20.00**	**100.00**
	Grand total (A+B+C+D+E+F+G)	**756.75**	**730.08**	**837.72**	**872.49**	**918.33**	**4,115.38**

10.3 Financial details of NVBDCP (1997 to 2011)

The status of budget allocation and actual expenditure till 2011 under domestic budget source (DBS) and externally aided component (EAC) is shown in the following table:

Table 10.3: Budget allocations to and actual expenditure under NVBDCP from 1997 to 2011, in Rs. million

	Budget Allocations			**Actual Expenditure**			**Difference between Allocation and Expenditures**
Years	**DBS**	**EAC**	**Total**	**DBS**	**EAC**	**Total**	
1997-98	1500	500	2000	1380	40	1430	570
1998-99	1470	1500	2970	1290	350	1640	1330
1999-00	1300	1200	2500	1160	610	1770	730
2000-01	1550	1000	2550	1110	790	1933	617
2001-02	1250	1000	2250	1380	810	2190	60
2002-03	1090	1260	2350	1080	980	2070	280
2003-04	1350	1100	2450	1430	580	2010	440
2004-05	1460	1230	2690	1500	670	2170	520

2005-06	1940	1540	3480	1550	1060	2610	870
2006-07	1380	2340	3720	1670	1520	3190	530
2007-08	1420	2570	3990	1644	2209	3854	136
2008-09	3219	1504	4723	2595	380	2975	1748
2009-10	2436	1984	4420	2281	1108	3389	1031
2010-11	2527	1653	4180	2974	576	3550	630

Source: Budgets of Directorate of Vector Borne Disease Control Program, World Bank Project Appraisal Document. DBS = Domestic Budget Support, EAC = for Externally Aided Component (includes World Bank and Global Fund supported Projects).

10.4 External support

The major external support projects under the NVBDCP are the GFATM and World Bank supported projects.

The Global Fund supported Intensified Malaria Control Project (IMCP) – II covers the seven North Eastern states with a population of 45 million with special inputs under its Round 9.

The World Bank supported Enhanced Malaria Control Project 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 current World Bank assisted National Vector Borne Disease Control Project covers a population of 297 million in 124 districts of 9 states i.e. Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa and West Bengal from September 2008 in phased manner for a period of five years up to 2013.

10.5 Financial Management Strategies

One of the key lessons that emerged from the earlier years was that the financial management arrangements in some states and districts were not adequate, the identified weaknesses mainly being:

- Government staff's lack of knowledge of double entry accounting and maintenance of ledgers resulting in delays in submitting SoEs and preparation of financial statements;
- Inadequate internal and operational controls; and
- Consequent delays in submission of audit reports.

10.5.1 Objectives

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

10.5.2 Strategies

The programme is funded from the domestic budget (central and state sources). The central component is used for drugs, insecticides and larvicides. Additional support in high disease-burden areas is provided by external grants/loans (Global Fund and World Bank loan) and also 100 % cash assistance to North-Eastern states.

- 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.
- Ensure financial support for timely, accurate and efficient disbursement system from the centre to the states.
- An assessment of current and required financial flows for rapid national scale up and maintenance of malaria control programming for all levels of the health system.

10.5.3 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 of NRHM for purposes of standardization, accountability, timely reporting and transparency.

10.6 Integration of financial management under NRHM

The MoH&FW 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 MoH&FW has developed a common financial management manual by Financial Management Group (FMG) applicable for all programmes funded by it, 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 part of the integration of the disease control programmes within NRHM, project finance staff operating under the overall umbrella of NRHM at the state and district levels will be responsible for funding flow, accounting and reporting expenditure of 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 electronic transfer of funds. The funds will be transferred to the designated bank account in the states and districts, maintained as a sub-account of NRHM account, as per NRHM guidelines. States and districts will maintain programme-specific account books including activity-wise ledger accounts as specified in NRHM financial management manual and submit quarterly financial reports to the FMG in

MoH&FW and the Directorate of NVBDCP. The annual audit report of all programmes under NRHM (consolidated for the states and districts) will be carried out as per the TOR specified in NRHM manual / guidelines and will be submitted to MoH&FW within 6 months of close of financial year.

10.6.6 Output indicators

- A financial forecasting and costing framework will be in place that provides timely data for planning and budgeting purposes given programme priorities; and
- A timely, accurate and reliable reporting system that contributes to improved quality of programme implementation is in place.
- Proportion of requested cash grant by states to distributed grant
- Proportion of grants sent on time

10.6.7 Outcome indicators

- All levels of 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 programme implementation is in place; and
- Performance indicators are linked with financial indicators.

Section 11: Planning for Malaria Control beyond 2017

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 within each other in a highly complex system. So strategies will be designed based on the endemicity of the specific state and accordingly the strategy will be based on evidence base.

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

11.1Diagnosis

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 *P. falciparum* and *P. vivax* to be in use and scaled up rapidly in high malaria burden areas;
- Microscopy to 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 to continue; and
- Continued support to be provided to private sector 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 to 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 to be taken to differentiate between imported and indigenous cases in low risk areas by modification of the case record form; and
- The private health sector to be encouraged to participate in malaria surveillance.

11.3 Treatment

It is anticipated that in a few years, the countrywide norm for treatment of *P. falciparum* 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 *P. vivax* can become resistant to chloroquine and in some settings it has proven to be as virulent as *P. falciparum.*

Activities to be undertaken

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

11.4 Vector Control

There will be widespread use of LLINs by people living in high risk areas. The re-impregnation 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 to be investigated in a rigorous controlled design;
- Effectiveness of LLINs in mobile populations of the North-East to be investigated given that effectiveness may be influenced by many local factors;
- Alternative methods to be explored for outdoor use, for example, repellents and hammock-nets;
- Role of larval control methods in rural areas to be reviewed;
- Novel vector control methods to be tested as soon as they become available;
- Pilot trials on alternatives to new chemicals for IRS to be conducted; and
- Operational research to 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

- 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 to be strongly encouraged to give free LLINs to pregnant women in high risk areas;

- Use of ACT in 2nd and 3rd trimester of pregnancy to be initiated after recommendations of the Technical Advisory Committee and policy on use in 1st trimester to 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) to be carried out in collaboration with other partners for taking decision on adoption of IPTp in some areas; and
- Research on *P. vivax* in pregnancy to 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 to be for villages with API ≥ 5;
- Subsequently, villages with API between 2 and 5 to be covered; and
- Existing vector control interventions including larval control to be continued in areas with lower risk where the surveillance to 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 to be done to assess which strategies are likely to become most effective for intersectoral collaboration at national and local level (regulation, advocacy, incentives, etc.); and
- Control of VBDs to 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 to 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 to be taken towards achieving elimination in some states and union territories which have strong health systems with low malaria receptivity and vulnerability and studies on vulnerability and susceptibility to 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 national officers and consultants under the projects, 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 11.1: Overview of National Malaria Control Strategy up to 2022

	7 states of North-East	**Orissa, Chhattisgarh, Jharkhand, West Bengal Madhya Pradesh**	**131 towns under urban malaria scheme**	**Rural malaria (not forest related)**	**National level**
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%	Up to 90%			
	Innovative vector control and case management delivery	Defined high-risk areas			
R & D	Vector bionomics, resistance	Vector bionomics, resistance	Impact & coverage assessments operational research to enhance	Continued operational research with increasing focus on larval control	New treatments against *P.v.* liver stage

	7 states of North-East	**Orissa, Chhattisgarh, Jharkhand, West Bengal Madhya Pradesh**	**131 towns under urban malaria scheme**	**Rural malaria (not forest related)**	**National level**
			efficiency		
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	

Summary: Strategic Plan for the Malaria Control Programme – India -2012-2017

Thematic area	Objective	Strategy	Output Indicators	Outcome indicator
Overall	To decrease malaria burden and move towards pre-elimination	• Effective malaria control	• Number of malaria cases • Number of malaria deaths	• National API • Percent of districts with API less than 1
Diagnosis	To ensure that by 2017, at least 80 % of fever cases suspected for malaria are diagnosed either by RDTs or microscopy within 24 hours of the first contact to health services.	• Ensure functional microscopy in all existing facilities in high malaria burden areas. • Upscale use of RDTs (including bivalent) 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 skill / need-based capacity building at all levels. • Linkages with labs in Government and private laboratories • Case-based investigation in areas with very low caseload	• No. of PHCs with functional microscopy • Number of slides examined by facility • No. of ASHAs involved in diagnosis • Number of RDTs done by ASHA • No. of healthcare staff of various cadres trained in diagnosis of malaria	• Percentage of fever cases suspected for malaria in high-risk districts receives the malaria test result (either RDT or microscopy) no later than the day after first contact. • Percentage contribution of ASHAs in total blood slide examination • Percentage of contribution of ASHAs in total case detection
Treatment	To ensure by 2017 that, at least 80% of malaria cases in targeted districts receive prompt and effective treatment as per national drug policy within 24	• Policy decisions for malaria diagnosis and treatment based on the evidence • Provision of complete course of anti-malarial treatment as per drug policy and guidelines. • Effective treatment with ACT for all the *Pf* cases in all the districts of the country. • The currently selected ACT is artesunate (3 days) + sulfadoxine-pyrimethamine (single dose on 1st day).	• No. of ASHAs providing treatment services • Number of cases treated by ASHA • No. of healthcare staff of different cadre trained in treatment of malaria • No. of ACT procured	• Percentage of microscopy/ RDT positive *Pf* cases among adults receiving ACT no later than the day after the diagnosis and the positive *Pv* cases receiving Chloroquine no later than the day after the diagnosis.

Thematic area	Objective	Strategy	Output Indicators	Outcome indicator
	hours of first contact with the health care provider.	All treatment providers in the identified areas of the country, including those in the private sector, are motivated to adhere to ACT and no artemisinin monotherapy. • Drug efficacy /Resistance monitoring • Based on the resistance studies appropriate ACT /drugs to be introduced for treatment of Malaria • Treatment of *P. vivax* cases with chloroquine for three days and primaquine for 14 days • Provision of treatment by Private providers 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. • Effective Behvaiour Change Communication to improve treatment seeking behaviour	(PSM) • No. of *Pf* cases treated with full course of ACT • No. of *Pv* cases treated with full course of Chloroquine and Primaquine • No. of IPD cases at sentinel sites admitted for treatment of malaria	• Percent of designated providers of malaria diagnosis and treatment who have not had an ACT or RDT stock-out for more than a week during the last 3 months. • Percentage of villages with trained designated provider of malaria diagnosis and treatment services. • Percentage of malaria IPD cases among all IPD cases in sentinel sites • Percentage of fever cases accessing provider within 24 hrs of onset of fever
Management of severe malaria	To strengthen the capacity for managing severe malaria cases and reducing deaths.	The management of severe malaria cases at the secondary and tertiary levels shall be focusing on followings: • Identify emergencies and refer them immediately to the next level of care using NRHM referral services. • Providing technical support to rural and urban health centres and hospitals to ensure existence of an effective referral system and sufficient equipments to manage the severe cases	• No. of sentinel sites for severe malaria • No. of referrals of severe malaria cases to the identified hospitals (CHC / Sentinel sites, Secondary care hospitals) with pre-referral treatment	• Case fatality rate at sentinel sites providing treatment for severe malaria cases • Deaths due to malaria • Proportion of severe malaria cases out of total indoor patients at Sentinel Site Hospitals • Proportion of inpatient cases with an onset of fever less than 3 days prior to admission
Malaria epidemics	To effectively detect, control, and	• Using the surveillance data, IDSP data and epidemic	• No. of outbreaks detected	• Proportion of PHCs with a

Thematic area	Objective	Strategy	Output Indicators	Outcome indicator
	prevent outbreaks of malaria	threshold charts to identify impending outbreak / epidemic at an early stage • Ensuring the investigation of potential outbreaks • 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.	• No of outbreaks investigated	malaria outbreak
Prevention (Vector Control) : LLINs	To ensure that at least 80% of people in high-risk areas (target areas) sleep under effective ITNs/ LLINs by 2017.	• Rapid scale up of LLIN coverage through a mass distribution campaign. Every eligible household in high-risk areas will be supplied with 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. • 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 in areas with vulnerable population. • Social marketing of LLINs.	• Number of ITNs / LLINs distributed treated / retreated replenished	• Percentage of population in high-risk project areas protected with effective LLINs. • Percentage of HH with 1 LLIN for every 2 people • Percentage of individual who slept under LLIN/ITN the previous night
Indoor Residual Spray (IRS)	To achieve at least 80% coverage of households in targeted high risk areas with spray of effective	• IRS is still the best method for vector control in certain parts of India, where vectors are highly endophilic and the summer temperatures are so high that people do not like to use bed nets. • Environment Management Plan will be implemented to minimize the damage to the environment due to	• Percentage of targeted households / rooms sprayed. •	• Percentage of population in high-risk project areas protected with effective IRS. • Percentage of population in high-risk project areas

Thematic area	Objective	Strategy	Output Indicators	Outcome indicator
	insecticides	insecticides. • Monitoring the development of resistance to the insecticides in current use		protected with either effective IRS or LLIN.
Human resource	To place 80% of the sanctioned staff in target areas and ensure they are trained in malaria control	• 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 /operational /supervision support to National Office and States through consultants for various functional areas and for districts to manage temporary staffing pools for rapid scale up of malaria control efforts e.g., District Vector Borne Disease Consultants (DVBDCs) and MTSs.	• No. of human resources engaged against the target for that particular cadre	• 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.
Capacity building	To train at least 80% of the health care staff, health volunteers and ASHAs in high-risk areas in anti-malaria activities by 2017.	• 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 volunteers • Invest in and conduct training of all health care providers (MO, LT, DVBDC, MPW, MTS and ASHA including Private sector healthcare providers) for delivery of better service	• Number of persons trained in each category against planned and disaggregated for ASHAs, health workers, volunteers, MTSs, laboratory technicians, MO-PHCs, etc., in a year. • Number of training courses conducted in a year against planned, disaggregated for ASHAs, health workers, volunteers, MTSs, laboratory technicians,	• Percent of targeted trained healthcare staff is available at all level. • Extent of improvement in trainee knowledge and skills.

Thematic area	Objective	Strategy	Output Indicators	Outcome indicator
			MO-PHCs, etc. in a year	
Inter-sectoral Collaboration	To establish inter-sectoral collaboration with organizations for prevention and control of malaria	• Advocacy at political and administrative levels to prioritize malaria control and inculcate keenness for partnerships with public / private / NGO sectors. • Fostering Public Private Partnership with non health ministries and departments, private / NGO sectors at national and sub-national levels including IMA and other professional Associations.	• Updated PPP guidelines disseminated to non health ministries and departments • Number of agencies applied for partnerships in anti-malaria activities • Number of organizations that have signed MOUs for implementing PPP schemes	• Proportion of partnerships renewed
Behaviour Change Communication (BCC)	To increase coverage of BCC for the population at risk to at least 80% by 2017 to improve knowledge, awareness and responsive behaviour with regard to appropriate malaria control interventions.	• 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. • Campaign and routine information dissemination through mass media. • Intensified BCC campaign for acceptance of IRS and for promotion of tools, i.e., LLIN, RDT and ACT prior to and during high transmission season for timely adoption of interventions. • Engagement of stakeholders in BCC planning, implementation, and M&E.	• Number of mass media activities (radio / TV) conducted at national level against planned number of activities. • Percentage of villages where at least 80% households were reached through IEC during the BCC campaign for LLIN / IRS / during anti malaria month for adoption of suitable measures • Locale specific BCC strategy and operational guide developed by states	• Percentage of eligible / high risk villages reached by any community outreach activity in the last six months • Percentage of population in the targeted villages aware about cause, symptoms, treatment and prevention measures and availability of anti-malarial services • Percentage of sever malaria cases referred in time

Thematic area	Objective	Strategy	Output Indicators	Outcome indicator
			and districts in line with national guidelines	
Monitoring and Evaluation (M & E)	To ensure that 100% of districts in target areas will collect, analyse, and effectively use routine data and estimate their impact.	• Strengthen collection, processing, analysis, and use of malaria epidemiological data. • Establishment of functional MIS. • M & E systems are capable of providing feedback to programme implementers, partners and relevant authorities to improve programme planning, management and accountability. • Evaluate how the planned strategies and resource allocations have achieved expected outcomes and impacts. • Reporting of data by partners and its integration at various levels	• Monthly reporting received from each unit by 20th of next month or as in time as prescribed • Feedback given to the reporting unit in time as prescribed • Household / evaluation survey conducted • 90% of validated data on MIS	• Percentage of reporting unit submitting the report in time as prescribed • Estimate of impact of the SAP on malaria incidence compared to the baseline • Timely dissemination of information (reports) and feedback (to states, districts and community). • Functional National Anti Malaria Management Information System (NAMMIS) to support the decision making towards development of need based actions.
Programme Management and Organizational Alignment	To effectively and efficiently plan, implement and manage malaria control efforts by national, regional, state and district VBDCPs.	• NVBDCP will be strengthened as a technical support unit with the responsibility for coordination of all national malaria control efforts. This includes harmonizing the support from the donors viz. World Bank and the Global Fund. • Increase the ownership of states, as the main implementers	• Successful and harmonized implementation and achievement of stated objectives of the World Bank and the Global Fund projects.	• Proportion of state funds relative to other sources (DBS, EAC) for each state

Thematic area	Objective	Strategy	Output Indicators	Outcome indicator
Programme Planning and Design	To support all states and districts in formation of Annual Action Plans as per NVBDCP guidelines	• Invest in evidence-based programme planning capacity at all levels of the health system. • Strategic implementation, 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. • Districts address rapid scale up of malaria prevention and control as per the local need.	• No. of districts and states who prepared the annual action plan • No. of plans which received feedback from a higher level	• Proportion of action plans which incorporated a programme innovation
Research	To develop and strengthen the national capacity for developing evidence based research for malaria control	• 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. • Ccollaboration with National Institute for Malaria Research (NIMR), National Institute of Health and Family Welfare (NIHFW) and the Regional Medical Research Centres (RMRC) and other partners.	• Research work is conducted as per the needs of the programme. • Research articles with a programme officer as co-author	• Research findings influencing policy formulation and decision making. • Research findings influencing programming.
Legislation	To adapt and implement model bye-laws to reduce/ eliminate mosquito breeding sources in domestic and peri-domestic areas.	• Civic by-laws in urban areas to control mosquitogenic conditions • Health impact assessment of developmental projects • In very low endemic situation notification of all malaria cases by all the provides including the private sector providers • Ban on sale of artemisinin monotherapy	• Number of UMS towns with civic by-laws • Number of prosecutions in UMS towns	• Proportion of developmental projects with HIAs
Procurement and	To ensure that at least 80% of health	• Develop an efficient and effective procurement and supply management plan (PSM) for drugs and	• National procurement and supply chain	• Storage, transport, and inventory management

Thematic area	Objective	Strategy	Output Indicators	Outcome indicator
Supply Chain Management	facilities are stocked with high-quality tests and drugs at any time	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. • 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. • Strengthen the contract management and monitoring of contracts through procurement agencies. • Strengthen the procurement capacity at the national and state level through training, capacity building and strengthening the human resource capacity • 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. • Develop guidelines on supply chain and inventory management and training and capacity building at all levels so as to ensure uninterrupted supply of antimalarials. • Develop a system for monitoring the supply status and buffer stock quantities at the central, state, district and health facility levels. • 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	management plan is in place. • Required drugs and commodities are available in sufficient quantities prior to each malaria season. • 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. • Number of facilities experiencing a stock-out lasting more than 1 week • Number of QA assessments conducted	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 • Quality assurance system is in place to ensure quality of drugs and supplies under NVBDCP. • Proportion of commodities failing QA

Thematic area	Objective	Strategy	Output Indicators	Outcome indicator
		ensure best storage practices at all levels. • Transform the current manual inventory management system into an electronic based inventory control and reporting systems for monitoring of drugs and supplies. • Develop a quality assurance system in place for post dispatch inspection of drugs and supplies		
Financial Management Strategies	To provide financial planning support to states and districts	• 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. • Ensure financial support for timely, accurate and efficient disbursement system from the centre to the states. • An assessment 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 is in place that provides timely data for planning and budgeting purposes given programme priorities. • A timely accurate and reliable reporting system that contributes to the improved quality of the financial reporting is in place. • Proportion of requested cash grant by states to distributed grant • Proportion of grants sent on time	• All levels of the health system have financial planning and management plans inclusive of malaria prevention and control related requirements. • Performance indicators are linked with the financial indicators.

References

National Health Policy 2002, Ministry of Health and Family Welfare Government of India
NRHM websites http://mohfw.nic.in/NRHM/
NRHM websites http://mohfw.nic.in/NRHM/asha.htm#data

Vision India 2020-Planning Commission GOI

EFC Note of NVBDCP

Annual Reports of Malaria (programme reports)

PROJECT APPRAISAL DOCUMENT, Document of the World Bank Report No: 43572-IN.

Kumar A, et al. Burden of malaria in India: retrospective and prospective view. *Am J Trop Med Hyg.* 2007 Dec; 77 (6 Supplement):69-78

WHO and the Millennium Development Goals, http://www.who.int/mdg/en/

World Bank, *Rolling Back Malaria*, *World Bank Strategy and Booster Programme,*

World Health Organisation, Roll Back Malaria, Scaling *Up Insecticide Treated Netting in Africa,* Geneva, Switzerland

World Health Organisation, *Abuja Declaration and the Plan of Action: An Extract from the Africa Summit on Roll Back Malaria,* 2000, Geneva, Switzerland.

World Health Organisation, *The Roll back Malaria Strategy for Access to Treatment through home based malaria management*, Geneva, Switzerland

World Health Organisation, United Nations Children Emergency Fund, New York, *World Malaria Report, 2005*, Geneva, Switzerland

World Health Organization, SEARO. *Revised Malaria Control Strategies*, 2006-2010, Delhi, India

World Health Organization, SEARO. *Malaria Control Strategies,* 2010-2015, Delhi, India

Naman K Shah, Gajender P S Dhillon, Adtiya P Dash, Usha Arora, Steven R Meshnick, Neena Valecha. *Antimalarial drug resistance of Plasmodium falciparum in India: changes over time and space*. Lancet Infect Dis 2011; 11: 57–64

Based on the review of Strategic Plan and the current epidemiological situation, it has been decided to include following changes in the **Strategic Plan for Malaria Control 2012-2017**.

Corrigendum -1: Section: 4.2.2 Calculation of requirement of Anti-malarial drugs (at page No.: 62 after line no. 9) – Add after the distribution of cases:

Current strategy	corrigendum	Justification / Remark
Distribution of cases is as follows: Adult cases (≥15 yrs) – 60 % of total cases Paediatric cases- 40% of total cases: < 1 year - 4.0% 1 to <5 years - 8.8% 5 to <9 years- 12.0% 9 to <15 years - 15.2%	**Add following after the distribution of cases:** 'However, it has been noted that the number of adult Malaria cases are more than the child cases; current distribution of cases observed is as follows (which may be used for planning for procurement of antimalarial drugs): Cases in ≥ 14 Yrs age group - 70% of total cases Cases in 9- < 14 Yrs age group - 10 % of total cases Cases in 3 - < 9 Yrs age group - 10% of total cases Cases in 6 mth - <3 Yrs age group- 10% of total cases	**The Expert Group agreed to incorporate this corrigendum**

Corrigendum- 2: Section 4.3.2 Calculation of requirements of antimalarial drugs (at page no. 61, line no. 5) – Replace as under:

Current strategy	corrigendum	Justification / Remark
Currently 25 % of technical requirement of oral drugs is taken as buffer stock and 50 % as deployment reserve in alternate years.	• As ACT-AL is a new introduction in the programme, for calculation of the requirement of drug to be made available at the field level, the deployment reserve shall be calculated as 75 % of the technical requirement and the requirement for buffer stock shall be calculated as 25 % of technical requirement • For Inj Artesunate buffer stock is to be calculated @ 50% of the technical requirement	*Calculation based on the technical requirement is giving less quantity in view of decline in number of malaria cases and to match the requirement for field level staff, the deployment reserve needs to be increased*. **The Expert Group agreed to incorporate this corrigendum**

Corrigendum -3 Section: 4.2.4 Strategies for treatment (at page No.: 63) Add as bullet at no. 7 after line no. 15

Current strategy	corrigendum	Justification / Remark
ACT-AL was not in the list of treatment strategy though as a group ACT is recommended	**Add as bullet at no. 7** ACT-AL has been introduced in NE states considering the evidences of Late Treatment Failure in this area, while SP-ACT is being continued in all other states for treatment of *P falciparum*. However, based on the situation and operational feasibility, other appropriate ACT combinations shall be used as per the requirement	Introduction of ACT-AL in NE states has been approved by the TAC, so the **Expert Group agreed to incorporate this corrigendum**

Corrigendum -4 Section 5.2 High risk areas and high risk populations: (at page No.: 70, Para 2; Line 1): Replace as under

Current strategy	corrigendum	Justification / Remark
Current statement: 'Areas with API>2 are considered high risk areas'	Change the sentence to: Areas with API >1 are considered as high-risk areas. However, priority for introduction of an intervention shall be given to higher API areas based on the availability of resources and the local situation such as SPR >5, outbreak and death due to malaria.	Justifications for changing API level from >2 to >1: 1. Country Goal is to move towards pre- elimination (defined as API <1) 2. Strategy is in consonance with WHO Strategy 3. More no. of districts have moved from API >2 to API -1-2 category **The Expert Group agreed to incorporate this corrigendum**

Corrigendum -5 Section 5.3.3 Strategies: (at page No.: 74, Bullet no.1) Replace as under:

Current strategy	corrigendum	Justification / Remark
Strategies: Rapid scale up of ITN/LLIN coverage through a mass distribution campaign. Every eligible household will be supplied with LLINs @ 2 nets per 5 persons.	Change to: Rapid scale up of ITN/LLIN coverage through mass distribution campaign as per specified sizes. • By distributing LLIN @ of 1 LLIN for 1.8 person in eligible areas • The LLIN shall be distributed in the areas having API >1 in identified districts based on the priority and availability of resources (LLINs).	WHO has recommended providing 1 LLIN for 1.8 persons. This corrigendum is in line with the Corrigendum no. 4 and the **Expert Group agreed to incorporate this corrigendum**