Operational Manual
for
Implementation
of
Malaria Programme 2009

Government of India

Directorate of National Vector Borne Disease Control Programme
22 Sham Nath Marg
Directorate General of Health Services
Ministry of Health and Family Welfare

Operational Manual for Implementation of Malaria Programme

Directorate of National Vector Borne Disease Control Programme
Ministry of Health & Family Welfare
Government of India
New Delhi

December 2008

Acronyms

ABER	Annual Blood Examination Rate
ACD	Active Case Detection
ACT	Artemisinin-based combination therapy
API	Annual Parasite Incidence
ASHA	Accredited Social Health Activist
AWW	Anganwadi Worker
BCC	Behavior Change Communication
CBO	Community Based Organization
CDMO	Chief District Medical Officer
CHC	Community Health Center
CHV	Community Health Volunteer
CME	Continuing Medical Education
CMO	Chief Medical Officer
CQ	Chloroquine
DBS	Domestic Budget Support
DDT	Dichloro Diphenyl Trichloroethane
DPIP	District Program Implementation Plan
DVBDCO	District Vector Borne Disease Control Officer
DMO	District Malaria Officer
DMHO	District Medical & Health Officer
EMCP	Enhenced Malaria Control Project
EMP	Environment Management Plan
FTD	Fever Treatment Depot
GFATM	Global Fund for the fight against AIDS/HIV, Tuberculosis and Malaria
GOI	Government of India
HIMS	Health Management Information System
HQ	Head Quarter
IDSP	Integrated Disease Surveillance Project
IEC	Information, Education and Communication
IM	Intra muscular
IMA	Indian Medical Association
IMCI	Integrated Management of Childhood Illnesses
IMCP	Intensified Malaria Control Programme
IMNCI	Integrated Management of Neonatal & Childhood Illnesses
IPC	Interpersonal Communication
IRS	Indoor Residual Spraying
ITN	Insecticide Treated (bed) Nets
IV	Intra venous
IVM	Integrated Vector Management
JAT	Joint Appraisal Team
JMM	Joint Monitoring Mission
LLIN	Long lasting insecticidal nets
LQAS	Lot Quality Assurance Sampling
LT	Laboratory Technican
MDGs	Millennium Development Goals
M & E	Monitoring and Evaluation
MIS	Monitoring Information System
MO	Medical Officer
MOHFW	Ministry of Health and Family Welfare
MOU	Memorandum of Understanding
MPO	Modified Plan of Operation
MPW	Multi-Purpose Worker
MTS	Malaria Technical Supervisor
NGO	Non-Governmental Organization
NIMR	National Institute of Malaria Research
NMCP	National Malaria Control Programme
NMEP	National Malaria Eradication Programme

NRHM	National Rural Health Mission
NVBDCP	National Vector Borne Disease Control Programme
OPD	Out Patient Department
PCD	Passive Case Detection
Pf	*Plasmodium falciparum*
*Pf*CP	*Plasmodium falciparum* Containment Programme
PHC	Primary Health Center
PMMR	Programme Management Monitoring Reports
PPP	Public Private Partnerships
PQ	Primaquine
PRI	Panchayat Raj Institutions
Pv	*Plasmodium vivax*
RDK	Rapid Diagnostic Kit
RDTs	Rapid Diagnostic Test
RRT	Rapid Response Team
RNTCP	Revised National Tuberculosis Control Programme
ROH&FW	Regional Office of Health & Family Welfare
RTI	Right to Information
SMS	Short Message Service
SOP	Standard operating procedures
SOE	Statement of Expenses
SP	Sulphadoxine - Pyrimethamine
SPO	State Programme Officer
SPR	Slide Positivity Rate
SSMO	Sentinel Site Medical Officer
TA	Technical Assistance
TAC	Technical Advisory Committee
T*fr*	Test *falciparum* rate
TPR	Test (Slide+RDT) Positivity rate
UC	Utilization Certificate
UMS	Urban Malaria Scheme
VBD	Vector-borne disease
VCP	Vulnerable Community Plan
WHO	World Health Organization

Table of Contents

Chapter 1.

Introduction

Malaria is one of the most widespread parasitic diseases in the world. There are four species of *Plasmodium* which are known to cause malaria in human beings, namely *vivax, falciparum, malariae* and *ovale*. *P. falciparum* and *P. vivax* are the most common species which cause malaria in India. Recent evidence indicates towards the occurance of malaria due to *P. knowlesi* also.

Malaria was a major scourge in India contributing 75 million cases with about 8 lakhs deaths annually, prior to the launching of National Malaria Control Programme (NMCP) in 1953. The spectacular success of NMCP led to the launching of National Malaria Eradication Programme (NMEP) in 1958. The NMEP was initially a great success with malaria incidence dropping to 0.1 million cases with no deaths reported in 1965. However, the resurgence of malaria since then resulted in escalation of incidence to 6.4 million cases in 1976. The implementation of Urban Malaria Scheme (UMS) in 1971-72 and the Modified Plan of Operation (MPO) and *Plasmodium falciparum* containment programme (PfCP) in 1977 reduced malaria incidence further to around 2 million cases per year by 1984.

Though malaria had been contained in many parts of the country, focal outbreaks have been reported from different parts of the country from mid 1990s. New features emerged which were not commonly seen before, namely, vector resistance to insecticides, extensive breeding sites created by development projects, urbanization and industrialization, change in parasite load in favour of *P. falciparum* and resistance of *P. falciparum* to chloroquine and other antimalarial drugs. Various ecotypes of malaria were identified such as rural malaria, urban malaria, forest malaria, industrial malaria, border malaria and migrant malaria.

Presently, screening of fever cases for malaria is done under the National Vector Borne Diseases Control Programme (NVBDCP) covering about 10% of the population annually, of which about 1.5 to 2.0 million are positive for the malarial parasite; around 45%-50% of these cases are due to *Plasmodium falciparum*. Though the Annual Parasite Incidence (API) has come down in the country, it varies from one state to another. The malaria situation remains a major problem in certain states and geographical pockets. Majority of malaria cases and deaths in India are being reported from Orissa, the seven North Eastern states, Jharkhand, Chattisgarh, Madhya Pradesh and Rajasthan with Orissa alone contributing more than 20% of the cases in the country.

The broad distribution of malaria cases, *P. falciparum* cases and deaths due to malaria in India are given in the following table.

Table 1.1 Distribution of malaria cases, *P. falciparum* cases and deaths in India (2006)

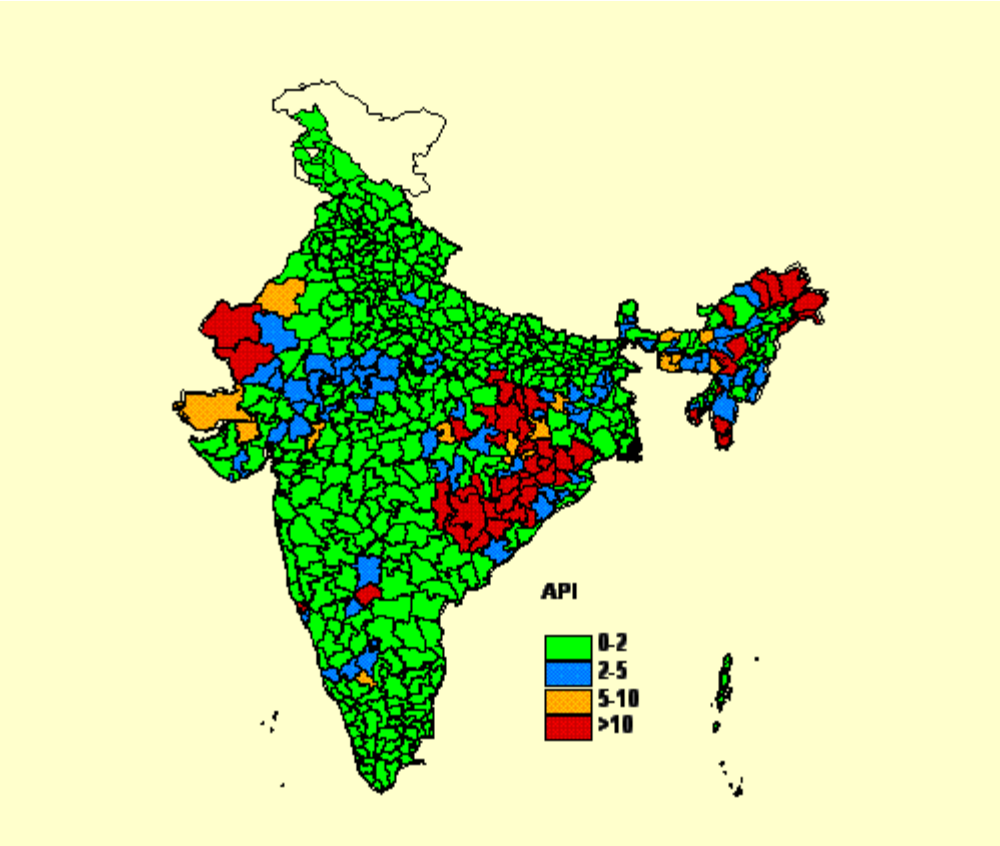
States	Percentage of			
	Population	Total malaria cases	P. falciparum cases	Deaths due to malaria
North Eastern states*	4	13	18	53
Other high endemic states**	42	64	74	33
Remaining states	54	23	8	14

**** North Eastern states***
Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram. Nagaland, Tripura and Sikkim

***** Other high endemic states***

The API wise picture of malaria endemicity in various districts of India is illustrated in figure 1.1 below.

Fig. 1.1 District wise malaria endemicity in India (2006)



The National Vector Borne Disease Control programme (NVBDCP) is providing 100% central assistance to the seven North Eastern states for malaria control activities including provision of manpower, bed nets and spray wages. The Enhanced Malaria Control Project (EMCP) with World Bank assistance was implemented during 1997-2005 in 100 districts of eight high malaria incidence states. The World Bank will be assisting the programme again through the National Vector Borne Disease Control Project which is being launched in 2009. The Intensified Malaria Control Programme (IMCP) funded by Global Fund for the Fight against HIV/AIDS, Tuberculosis and Malaria (GFATM) is in operation since 2005 in 106 districts of 10 states. These projects provide special inputs in these areas in the form of Rapid Diagnostic Tests (RDTs), Artesunate Combination Therapy (ACT), Insecticde Treated Bednets (ITNs) and Health Systems Strengthening (HSS).

The National strategy on prevention and control of malaria has lately undergone a paradigm shift with the introduction of Rapid Diagnostic Test (RDT) which has enabled early diagnosis of falciparum cases and complete treatment by trained health workers and volunteers in the most remote areas of the country. This has resulted in availability of effective treatment in all parts of the country, thereby facilitating prevention of severe malaria and also breaking the chain of transmission. Emergence of chloroquine resistance in falciparum malaria has led to rolling out of Artemisinin based Combination Therapy (ACT) as the first line treatment of Pf cases in 117 districts of the country and additional 253 PHCs as on December 2008. The Drug Policy on Malaria was also accordingly revised in 2008.

Indoor Residual Spray (IRS) had been the mainstay of vector control in the programme, along with introduction of use of Insecticide Treated Nets (ITNs). Long lasting Insecticide impregnated Nets (LLINs) which are more effective have now been adopted by the programme.

Modern concepts in Monitoring and Evaluation (M&E) have now been incorporated into the programme which takes into account the newer interventions like RDTs, ACT, ITNs/LLINs. The National M&E plan provides a common system for monitoring of malaria control activities in the entire country, with newly introduced reporting formats.

It may be noted that the primary purpose of this operational manual is to bring out guidelines for planning, implementation, monitoring and evaluation of the malaria control programme at the district level. The manual provides the norms and Standard Operating Procedures (SOPs) for malaria control activities in India along with specific action that is required to be taken in high malaria burden districts. The roles and responsibilities of various categories of health staff and community volunteers are also described. Detailed information on entomology and research studies are beyond the scope of this operational manual, for which standard textbooks on the subjects may be referred.

Chapter 2.

Strategy for malaria prevention and control

2.1 Programme Strategy

The National Vector Borne Disease Control Programme (NVBDCP) is an umbrella programme for prevention & control of vector borne diseases and is an integral part of the India's National Rural Health Mission (NRHM). The NVBDCP envisages a well informed and self-sustained, healthy India with equitable access to quality health care and the Programme activities are in tandem with the NHP and NRHM goals as well as the Millennium Development Goal of halting and reversing the incidence of malaria and other vector borne diseases by the year 2015 towards reduction of poverty.

2.2 Programme Objectives

Overall Objectives

The Objectives of the Malaria Control Programme are:

- Prevention of deaths due to malaria
- Prevention of morbidity due to malaria
- Maintenance of ongoing socioeconomic development

Specific Objectives

- API 1.3 or less in the XIth Five Year Plan
- At least 50% reduction in mortality due to malaria by the year 2010, as per National Health Policy document-2002*
- To halt and reverse the incidence of malaria by 2015 **

2.3 Malaria Control Strategies

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

2.3.1 Surveillance and case management

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

2.3.2 Integrated Vector Management (IVM)

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

2.3.3 Epidemic preparedness and early response

2.3.4 Supportive Interventions

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

** National Health Policy 2002*
*** Millennium Development Goals*

The strategy on prevention and Control of Malaria is outlined below. Each strategy is elaborated in individual chapters later in the manual.

2.3.1 Early Diagnosis and Complete Treatment

2.3.1.1 Disease Surveillance

Surveillance is defined as the ongoing and systematic collection, analysis, interpretation, and dissemination of data about cases of a disease and is used as a basis for planning, implementing, and evaluating disease prevention and control activities.

Malaria surveillance in India was traditionally a system based mainly on slide results, which has been refined over many years. It relied on surveillance of fever cases in the community by means of active fortnightly case detection conducted mainly by the MPW (M).

A. Passive and Active case Detection

Passive surveillance implies the detection of malaria cases from those fever cases who visit the Health facilities and are tested for malaria either through slide microscopy or through RDT. The new norms for case management emphasize quality care for patients. Quality care is expected to attract more patients to come early and will therefore strengthen surveillance through passive case detection.

Active case detection implies that the MPW (M) would visit all villages within the Subcentre area fortnightly and look for occurrence of fever cases between the current and previous visit. Due to constraints of MPWs in the system, this is not feasible and the yield of positive cases is also less.

In villages where no ASHA or other volunteer has been trained and deployed for providing early diagnosis and effective treatment, active case detection (ACD) will be implemented with regular, preferably weekly visits by a health worker, who provides case management as indicated above.

B. Sentinel Surveillance

Sentinel surveillance is necessary for events which are not being captured by the regular system of reporting viz severe cases of malaria, their management and on malaria deaths and effectiveness of the antimalarial drugs being used. Therefore, to monitor in-patient case management it is important that data on this important aspect is collected, compiled and analyzed. Further to track these events in the light of introduction of rapid diagnostic tests and artemisinin-based combination therapy (ACT) for falciparum malaria, it is expected that changes in annual parasite incidence (API) would occur and these improvements should lead to a decrease in the incidence of severe malaria and malaria deaths. Thus, monitoring of these latter events may indicate the availability and efficiency of primary level services which require timely management.

A minimum of two Sentinel Sites will be selected in each district to provide reliable data on the trend of these events for effective Programme management. These sites will act as watch dogs and providing detailed information on indoor patient admissions. Few sentinel sites will also be selected in border districts to provide information on imported cases.

The objective of Sentinel Surveillance is to capture trends on in-patient malaria, severe malaria and malaria deaths. It will also enable the programme to estimate diseases burdern in the country.

Set-up and functioning of Sentinel Sites

A minimum of two sentinel sites will be established in each district. Hospitals with large OPDs and inpatient case loads will be chosen. Sentinel sites will also be established among the private/faith-based

sector as many patients seek care there and this data is most often not reflected in the HMIS. Districts which have Medical Colleges will establish a site in these tertiary care centers, if they are known to handle a sizeable load of malaria cases.

The Sentinel Sites will be adequately staffed and Medical Officers and laboratory technicians (LTs) will be trained. A nodal Medical Officer (SSMO) will be in charge of all activities regarding malaria in the sentinel sites. There will be a laboratory with a qualified laboratory technician in charge, where malaria microscopy is quality controlled.

2.3.1.2 Case Detection and Management

The primary purpose of case management is to prevent the development of severe disease and death and shorten the duration of symptoms. Early effective treatment is also important for limiting transmission. Therefore, case management for malaria must be based on **early diagnosis, which is followed immediately by complete, effective treatment**. The following four elements are required for this.

A. Recognition of malaria

People living in malaria-endemic areas will be informed 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.

B. Diagnosis of malaria

A patient with fever and no other obvious cause of fever is considered a case of *suspected malaria*. Any volunteer, health worker or health professional observing a case of suspected malaria must immediately initiate a diagnostic test by

1. Microscopy of blood for malarial parasites and/or
2. Rapid Diagnostic Test

Antimalarial treatment is given only on the basis of a positive diagnosis. Under the programme Slide Microscopy for Malaria is the standard diagnostic tool & wherever a microscopy result **can** be made available within 24 hours, microscopy will be maintained as the only routine method for diagnosis of malaria.

Due to problems of nonavailibilty of Lab Technicians at certain block PHCs & the huge time lag between the slide collection & reporting of results from the block PHCs where Microscopy Facilities are expected to be routinely present specially from remote & in accessible areas, in these situation the microscopy result cannot be made available within 24 hours. In such *Pf* predominant areas RDTs will be supplied and used for diagnosis. The criteria for selection of these villages (or subcenter areas, where village data is not available) are:

- Pf % > 30 and SfR > 1%:
- Consistently high API and deaths are reported
- Inaccessible areas - cut off during transmission season, areas with limited road and public transportation facility.

RDTs will be used in PHC and other health facilities only in emergencies for treatment of severe and complicated malaria requiring immediate medical attention in the absence of the laboratory technician (LT).

C. Treatment.

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. In cases RDT has been done a positive RDT result will be followed by immediate treatment for falciparum malaria.

In *Pf* predominant areas or *Pf* is resistant to chloroquine treatment for falciparum malaria is an artemisinin-based combination therapy (ACT) lasting three days. The currently selected ACT is artesunate (3 days) + sulfadoxine-pyrimethamine (single dose on 1st day). The use of a combination treatment will delay the development of resistance. Artemisinin derivatives will not be used as monotherapy, as the development of resistance to these uniquely effective drugs will prove to be a disaster. All treatment providers in the country, including those in the private sector, will be motivated to adhere to these norms. The antimalarial for vivax malaria is chloroquine for three days and primaquine for 14 days as per prescribed guidelines to kill the hypnozoites, which can cause relapses.

If microscopy is not available within 24 hours and RDT has not been done, then clinically suspect malaria cases will be treated in *Pf* predominant areas with Chloroquine for three days till the results of microscopy are available.

D. Referral.

Patients with symptoms & signs of severe disease, suggesting malaria & associated pregnancy as well as those, who do not improve quickly on antimalarial treatment or whose symptoms return within 14 days, will be referred to higher levels of care, where their problems can be competently managed. Organization of the referral system depends on local conditions and a mechanism for referral and timely transportation will be established at all levels. Cases of severe malaria will receive in-patient care and parenteral treatment with artesunate. artemether, arte-ether or quinine.

While the primary responsibility of government health services is to ensure that free case management is accessible in villages, where no other service is present, for example through the ASHA, it is still recognized that many patients have become accustomed to seeking care from private providers. It is therefore important that diagnosis and treatment provided by the private providers also conform to national norms (National Drug Policy on Treatment & Prevention of Malaria-2008).

2.3.1.3 Epidemic Preparedness

The aim of the NVBDCP is to prevent or identify epidemics/outbreaks in their incipient stages and to prevent them from progressing into full-blown epidemics. Prevention requires high level of preparedness and is closely linked with the Integrated Disease Surveillance Project.

A. Detection of Early Warning Signs

Climatic/ environmental changes conducive to vector propagation viz increase in rainfall, increase in humidity, population migration to and from the endemic areas, lack of manpower and facilities for malaria surveillance, and logistics result in build up of malaria cases without detection by the system, which leads to occurrence of outbreaks.

The early warning signals, therefore include increase in fever rate (Fever Rate of one-third or more of new OPD) & severe malaria increase in fever incidence in the population (indicated by Health Workers & Community Volunteers) increase in malaria incidence(as compared to the same month previous year) Increase in TPR, Pf%, Proportion of gametocytes to other stages, increase in resistance, no clinical response to antimalarials, increase in malaria mortality and increase in consumption of anti-malarial. The alert communicated to medical officers at PHC level will enable them to pay the greatest attention to weekly trends. Fever alert surveillance for malaria has been integrated with the Integrated Disease Surveillance Project (IDSP).

2.3.2 Integrated Vector Management (IVM)

Integrated Vector Management (IVM) is a process for managing vector population in a way to reduce or interrupt transmission of disease. The characteristic feature of IVM including *methods based on knowledge of factors influencing local vector biology disease transmission and morbidity *use of range of interventions often in combination and synergistically (chemical, biological, environmental methods) the aim of IVM is to reduce the number of bites by infected vectors of malaria by control of anophelines mosquitoes; this may include a large number of measures. Anophelines breed in clean water and it may therefore be possible to reduce their densities by proper drainage and other environmental measures or by the use of larvivorous fish or chemical larvicides. Where such methods have proven effective, they should be systematically promoted.

However, in most high-risk areas, long-term measures targeting adult mosquitoes are more generally effective and applicable. Two such methods are now available: Indoor residual spraying (IRS) and insecticide-treated mosquito nets (ITNs). As these methods are costly and based on insecticides, they shall be targeted to high-risk areas, which must be identified according to prevalence of criteria. The choice between IRS and ITNs will be based on operational factors, community acceptance and local experience. The unit of intervention will be the village through microstratification.

2.3.3 Supportive Interventions

2.3.3.1 Training and Capacity Building

Training shall not only strengthen technical skills but also help motivate field staff for discipline, diligence and dedication in their work. Through good planning and implementation of training activities, trainers can serve as role models in this respect. The training will be an ongoing programme with an inbuilt provision to update knowledge and skills in the light of scientific and technical advances.

2.3.3.2 Behaviour Change Communication

The ultimate objective of the malaria control program is to provide relief to the community at large from the scourge of malaria. Behaviour Change Communication has been defined as a process of learning that empowers people to take rational and informed decisions through appropriate knowledge; inculcates necessary skills and optimism; facilitates, stimulates pertinent action through changed mindsets, modified behavior and reinforces the same. BCC is an integrated process that involves linkage of advocacy, social mobilization and communication efforts with enhancement of knowledge, beliefs, values, attitudes, confidence, suitable practices at individual, family, societal levels, removal of barriers that restrict people from acting, development of enabling environments as well as with service delivery. It is evidence based; cost-benefit oriented and aims at pre-identified actions, impact and outcomes amongst a specified “target” audience. Monitoring and evaluation are intrinsic aspects in this model.

The communications strategy of the malaria control program is expected to serve the larger goal of the program: the reduction in morbidity and mortality from malaria. Specifically, effective communication is expected to lead to the following:

A. People and their representatives, particularly in high-burden districts, become aware of their entitlements under the malaria control program, and actively demand and monitor the realization of these entitlements.
B. Services offered by the program are widely and correctly utilized by affected families and communities.

These goals are mutually reinforcing: the rights-based approach is expected to ensure the availability and quality of services, and their availability and quality is expected to lead to greater demand. Eventually, this positive feedback loop should lead to the achievement of program goals.

2.3.3.3 Community participation

Community participation is essential in health development, but is often difficult to put into practice. The malaria control strategy in high burden districts offers possibilities for re-invigorating community participation e.g.

(a) RDTs used in services in the local community make it possible not only for the individual patient to "see the diagnosis", but also for the community to monitor its malaria situation, if the health worker displays a simple chart showing number of positive tests and number of suspected malaria cases every week or month. In this way, the community can see whether its malaria situation is improving, and the health worker can detect early signs of an outbreak and alert their supervisors.
(b) ITN is an educational tool making it easier to understand the relationship between night-biting mosquitoes and malaria.
(c) Involving the community in the choice between ITN and IRS (when possible) enhances community ownership and should increase the chance that people will collaborate by using the nets correctly or by allowing complete spraying and not re-plastering before the next spray-round.

2.3.3.4 Intersetoral Collaboration

Inter-sectoral collaboration will play a key role in the containment of malaria. District and block co-ordination Committees have been set up, for developing area specific plans on the basis of broad guidelines issued by NVBDCP. Since the areas specific objectives as well as the thrust would be different depending on the endemicity and the people's perception of malaria as a problem, delineation of areas shall be carried out in two broad categories namely, high risk and low risk areas. Promotional and containment activities will be taken up in high risk areas. Importance of involving educational institutions like schools and colleges in creating awareness among people and the necessity of intensifying efforts for Continuing Medical Education (CME) on Malaria for private practitioners will be stressed. The strategy in low risk areas will largely focus on promotive activities with thrust on dissemination of information on malaria, malariogenic potential, transmission and prevention.

2.3.3.5 Public Private Partnership

A large number of fever cases seek health care from the private providers which are not regulated by government directly. Therefore control of their treatment practices is difficult. To implement standard treatment protocols in the private sector Public Private Partnerships will be forged involving the private practitioners, NGOs, CBOs etc through various PPP schemes.

2.3.3.6 Planning, monitoring and evaluation and supervision

The district is the key unit where monitoring and planning can happen effectively. New tools such as geographic information systems, complemented by computer spreadsheets and databases shall be of great help in management. A small set of operational indicators and targets will be used for each level of health care delivery system. Staffing problems will be mitigated by the deployment of District Consultants and sub-district level malaria technical supervisors (MTS) to provide supportive supervision and assistance in monitoring in identified high disease burden areas. Periodic evaluation of disease burden and programme implementation will also be undertaken by NVBDCP as well as by hiring external agency for the purpose.

At the same time, district malaria control managers will be encouraged to think creatively about problems and obstacles, identify new opportunities, try new approaches and engage in mutual learning together with their colleagues from other districts and with other programmes and sectors within their districts. It is expected that each annual district plan will seek funding for innovative elements beyond the scaling up and maintenance of interventions, in for example implementation research or behaviour change communication. Innovations will be introduced through adequate training and new tools. The most important lessons on malaria are learnt in the communities affected by it.

2.3.3.7 Legislation

Legislative interventions like civic bye-laws are of significance in urban areas where vector breeding takes place largely in manmade sources. Efforts will be made to pass legislation to strictly control mosquitogenic conditions in such settings.

Chapter 3.

Case detection, case management and Chemoprophylaxis[1]

The objectives of malaria case management are:

- To provide complete clinical and parasitological cure to malaria cases
- To prevent severe disease and death in patients
- To shorten the duration of symptoms
- To reduce malaria transmission
- To prevent relapses of vivax malaria

3.1 Case Detection

Case Definition

Suspected Case: A patient with fever in endemic area during transmission season, or who has recently visited an endemic area, without any other obvious cause of fever like:

1. Cough and other signs of respiratory infection
2. Running nose and other signs of cold
3. Diarrhoea
4. Pelvic inflammation indicated by severe low back ache, with or without vaginal discharge and urinary symptoms
5. Skin rash suggestive of eruptive illness
6. Burning micturition
7. Skin infections e.g. boils, abscess, infected wounds
8. Painful swelling of joints
9. Ear discharge

In practice the ascertainment of an "obvious cause" can only be expected from well-trained and experienced health staff. A volunteer or health activist working in a high-risk area should be taught to consider any fever case in the absence of specified symptoms as suspected malaria.

Case detection is through the mechanism of screening of fever cases for malarial parasites. Two methods of case detection are pursued in the programme.

Passive Case Detection (PCD): Detection of cases through the agency of health care staff like ASHAs/ CHVs/ AWWs and MO-PHC who do not search for cases through active efforts in the field is termed as Passive Case Detection. Such fever cases seek health care on their own. These cases are important to the programme as their health care seeking behaviour is based upon their felt need and recognition of illness. With the deployment of ASHAs in malaria endemic areas it is expected that a major proportion of malaria cases will be yielded through this modality. Some such cases will also directly go to the MPW (M) or MPW (F) and would be considered passive detection.

Active Case Detection (ACD): Detection of cases through house to house search of fever cases by MPW (M) is Active case detection. In villages where no ASHA or other volunteer has been trained and deployed for providing early diagnosis and effective treatment, active case detection (ACD) is implemented with regular, preferably weekly visits by a health worker, who provides case management. The health worker during these house to house visits inquires whether there is a fever case in the house hold residents or visitors on the day of the visit or was there a fever case between the current and previous visit. If the answer is yes an RDT is done and a blood slide is taken. MPW (F) may also encounter fever cases during ANC clinics or village visits.

3.1.1 Recognition of malaria

[1] The technical content of this chapter is based on: Ministry of Health and Family Welfare (2008). *National Drug Policy on Malaria*. http://www.nvbdcp.gov.in/Doc/drug-policy-08.pdf

People living in *Pf* predominant areas areas need to be informed that any febrile disease might be malaria and that malaria can rapidly become a very dangerous disease if not treated timely. They also need to be informed about where they can obtain quality care for malaria. This is particularly important for migrants to endemic areas (for example temporary labour), who may be ignorant both of what malaria is and where treatment is available.

3.2 Diagnosis of malaria

Any volunteer, health worker or health professional observing a case of suspected malaria must immediately initiate a diagnostic test by

Microscopy of blood for malarial parasites and/or
Rapid Diagnostic Test[2]

Wherever a microscopy result **can** be made available within 24 hours, microscopy will be maintained as the only routine method.

Antimalarial treatment is given only on the basis of a positive diagnosis. All efforts will be made to make Microscopy services available to the health care providers managing the patient within 24 hours (in practice on the day, when the patient presents or the day after). If a microscopy result cannot be made available within 24 hours in *Pf* predominant areas, RDTs will be supplied and used for diagnosis. The criteria for selection of these villages (or subcenter areas, where village data is not available) are:

- Pf % > 30 and TfR (Test Falciparum Positivity Rate) > 1%:
- Consistently high API i.e. more than 5 and deaths are reported
- Inaccessible areas - cut off during transmission season, areas with limited road and public transportation facility

RDTs will be used in PHC and other health facilities only in emergencies for treatment of severe and complicated malaria requiring immediate medical attention and for the diagnosis of fever cases in the absence of the laboratory technician (LT).

An RDT is done in front of the patient and a slide is taken. If the RDT is negative, the slide is sent for microscopy. If it is positive, the patient is treated for falciparum malaria, and the slide is discarded in order to reduce the load on the microscopy services. Mixed infection cannot be ruled out in such cases, but the risk is low. The ACT treatment for *P.falciparum* is also effective for the blood stages of *P.vivax*. If the patient should have a *P.vivax* relapse later, he or she is expected to return and then be diagnosed and treated with primaquine. The limitations on the deployment of RDTs, which are imposed through the application of these criteria are meant to avoid wastage of these products. In areas, where the risk of falciparum malaria is very low, it is not cost-effective to test every patient with fever. However, in such areas, a small number of RDTs should be available at health facilities to test fever patients with a very high suspicion of falciparum malaria such as those, who have recently stayed overnight in a falciparum endemic area.

Microscopy

Quality microscopy remains the best method of diagnosis. Functional microscopy should therefore be strategically positioned in all PHCs. If needed, laboratory staff under NRHM & RNTCP should be trained on malaria microscopy. Strengthening of lab services in terms of manpower and infrastructure may be done under NRHM. Wherever a microscopy result can be made available within 24 hours, microscopy should be the only routine method. Under such conditions RDTs should be used only in emergencies in the absence of the laboratory technician (LT).
The technique of smear preparation is provided in Annex F. New norms for quality assurance for microscopy are described in Annexure G. of the present Operational Manual.

Mechanisms to expedite slide transportation and reporting

[2] Currently, the program uses HRP2 based rapid diagnostic tests

As obtaining the results of the slide examination are crucial for effective treatment, all options to expedite slide transportation and reporting are required to be explored and utilized. These options may involve use of local bus or any other vehicle making daily trips to the block HQ town, the postal system, daily migrant workers proceeding from the village to the town, school children from the villages etc. Mechanisms have to be built in to ensure that the slides not only reach the block HQ town but also the laboratory and report reaches back. The ASHA/community volunteer must all care to ensure that the slides are protected from any damage en route. For obtaining the results from the laboratory, all these measures may be utilized and in addition, telephones (landline/mobile/SMS) may be used. If any reporting is done over the phone, special attention should be paid for identification of the patient correctly.

Rapid Diagnostic Tests

Technique of RDTs is described in Annexure F. It should be noted that these tests have a short shelf-life and that they may deteriorate at high ambient temperatures. Some manufacturers now indicate that their product has a longer shelf-life. Although this is encouraging, malaria control staff and medical officers should manage rapid diagnostic test kits (RDKs) under the assumption that the shelf-life is 12 months. The logistics of RDTs are described in Annex H and quality assurance in Annexure G.

Interpretation of rapid diagnostic tests

HRP2-based tests for *P.falciparum* detect a circulating antigen excreted by asexual plasmodia. The tests have a sensitivity of about 95%, when the asexual parasite density is above 200/µℓ. Malaria patients are rarely symptomatic at lower densities. If a suspected malaria patient has a negative RDT, it can therefore be assumed that the patient does not have falciparum malaria and another cause of the symptoms should be sought. If no other cause can be found and the clinical suspicion is high (e.g. intermittent fever with rigors and sweats), the test should be repeated after about 24 hours and special efforts should be made to obtain the microscopy result rapidly.

HRP2 antigen can persist for up to 4 weeks after clearance of asexual parasitaemia through treatment. False positive tests are therefore common, especially in patients with a recent history of treatment. RDTs should therefore **not** be used for following up patients after treatment. If a patient, who has been treated, is febrile within one month after the treatment and the RDT is positive, the patient **may** have malaria. If possible, the diagnosis should then be confirmed by microscopy.

The above rules for use of diagnostics should be applied at all levels of care and in passive as well as active case detection.

3.3 Treatment

3.3.1 Antimalarial drugs used in public health in India

1) Schizonticidal drugs
Chloroquine, quinine, sulfadoxine-pyrimethamine,
artemisinin derivatives: artesunate, arte-mether, arte-ether (artemotil).

2) Gametocytocidal and anti-relapse drug
Primaquine.

3.3.2 Selection of drugs

All fever cases diagnosed positive by either microscopy or RDT need to be promptly started on effective treatment. The treatment will depend upon the species of *Plasmodium* diagnosed.

A. Treatment of uncomplicated vivax malaria

P.vivax in India remains fully sensitive to chloroquine. NVBDCP has adopted the 14 day regimen for radical treatment with Primaquine, recommended by WHO. Primaquine can lead to hemolysis in G6PD

deficiency. Patient should be advised to to stop primaquine immediately if he develops symptoms like dark coloured urine, yellow conjuctiva, bluish disclouration of lips, abdominal pain, nausea, vomiting etc. and should consuslt doctor immediately.

B. Treatment of uncomplicated falciparum malaria

In areas at low risk of *Pf* and sensitive to chloroquine, Pf cases should be treated with chloroquine and primaquine as given in box below:

Chloroquine (CQ) for 3 days (Day 1: 10mg/kg + Day 2: 10mg/kg + Day 3: 5mg/kg) plus primaquine 0.75mg/kg daily on day1.

In *Pf* predominant areas or *Pf* is resistant to chloroquine, *Pf* cases are treated with Artesunate Combination Therapy as described below. List of districts, block PHCs and cluster of PHCs in which treatment with ACT is given are at **Annexure L**.

Artesunate Combination Therapy: Artesunate 4mg/kg body weight daily for 3 days plus sulfadoxine-pyrimathamine 25mg/kg + 1.25 mg/kg as a single dose on the first day plus primaquine (PQ) in a single dose on the first day.

In *Pf* predominant areas, all clinically suspect malaria cases (unconfirmed cases) should be treated with chloroquine in situations where a laboratory diagnosis result cannot reach the patient at least the day after fever is reported to the health facility and RDT is not done.

Precautions/ Contraindications

Primaquine is contraindicated in pregnancy, children under one year and persons with a history of haemolysis following primaquine treatment. Patients belonging to these categories should not receive primaquine.

Sulfadoxine-pyrimethamine can, in rare,cases cause serious cutaneous or muco-cutaneous eruptions and/or agranulocytosis. Any patient with a cutaneous or muco-cutaneous reaction within a month after taking sulfadoxine-pyrimethamine should, if there is not an obvious alternative explanation be considered allergic to sulphonamides and not be given sulfonamide treatment (including cotrimoxazole) again.

ACT side effects should be reported to NVBDCP with individual case reports. NIMR will monitor safety of ACTs in sentinel sites (pharmaco-vigilance).

Note: Artemisinin derivative monotherapy must not be given under any circumstance for uncomplicated malaria, as there is great concern that use of such monotherapy could lead to artemisinin resistance.

Treatment failures

ACT is a very effective drug and treatment failures are expected to be very rare with it. Most cases of apparent treatment failures will probably be caused by inadequate patient compliance. Therefore, apparent treatment failures should be treated with quinine plus tetracycline or doxycycline or clindamycin for 7 days.

Pregnancy

The treatment of uncomplicated falciparum in pregnancy, which should be available at sub-centre and higher levels, is:

Quinine (as tablets) 10mg quinine salt/kg (600 mg adult dose) 3 times daily for 7 days.

Being relatively new drugs, artemisinin derivatives should be avoided in pregnancy. However, according to current WHO guidelines, ACTs is safe in the second and third trimesters, and, in severe malaria it is considered that the benefits of artemisinin derivatives outweigh the theoretical side-effects.

Pregnant women with falciparum malaria should be referred from village level to sub-centre for treatment with quinine. Women in reproductive age (15-45 years) with Pf, who are not obviously pregnant, should be asked if they are pregnant. If the answer is yes, they should be referred. If the answer is uncertain, they should have a pregnancy test or be referred for one. If the answer to the question is no or pregnancy test is negative, they should be treated with ACT.

Quinine is safe in pregnancy. It has unpleasant side-effects in most patients, namely metallic taste, nausea and sometimes tinnitus (ringing ears). It needs to be explained to the patient that such side-effects may occur, that they are not dangerous, that they will cease, when the treatment is over and that it is very important to complete the treatment exactly as prescribed. Because quinine may induce hypoglycaemia, pregnant women should not start taking quinine on an empty stomach and should eat regularly, while on quinine treatment. No special diet is needed.

C. Teatment of *P. ovale* and *P. malariae* :

In India these species are very rarely found in few places. *P. ovale* should be treated as *P. vivax* and and *P. malariae should be treated as P. falciparum.*

D. Treatment of mixed infections

All cases of mixed infection are to be treated as *Pf* as per the drug policy applicable in the area plus primaquine for 14 days

Dosage schedules and algorithms for uncomplicated malaria in high burden areas

Age-specific Drug Schedules

1. Chloroquine tablets of 150 mg chloroquine base

Age in years	Day 1	Day 2	Day -3
	Tab. chloroquine	Tab. Chloroquine	Tab. Chloroquine
<1	½	½	¼
1-4	1	1	½
5-8	2	2	1
9-14	3	3	1½
15 & above	4	4	2

2. **Primaquine tablets of 7.5 or 2.5 mg base**

Age (in years)	*P. falciparum*		*P. vivax*	
	Primaquine 0.75 mg/kg on day 1		Primaquine 0.25 mg/kg daily dose for 14 days*	
	mg base	No. of Tablets (7.5 mg base)	mg base	No. of Tablets (2.5 mg base)
<1	Nil	0	Nil	Nil
1-4	7.5	1	2.5	1

5-8	15	2	5.0	2
9-14	30	4	10.0	4
15 & above	45	6	15.0	6

* Primaquine is contraindicated in children under one year and pregnant women.

3. Artesunate 50 mg tablets + sulfadoxine-pyrimethamine 500 + 25 mg tablets (ACT) combination (for pregnancy, see 4.)

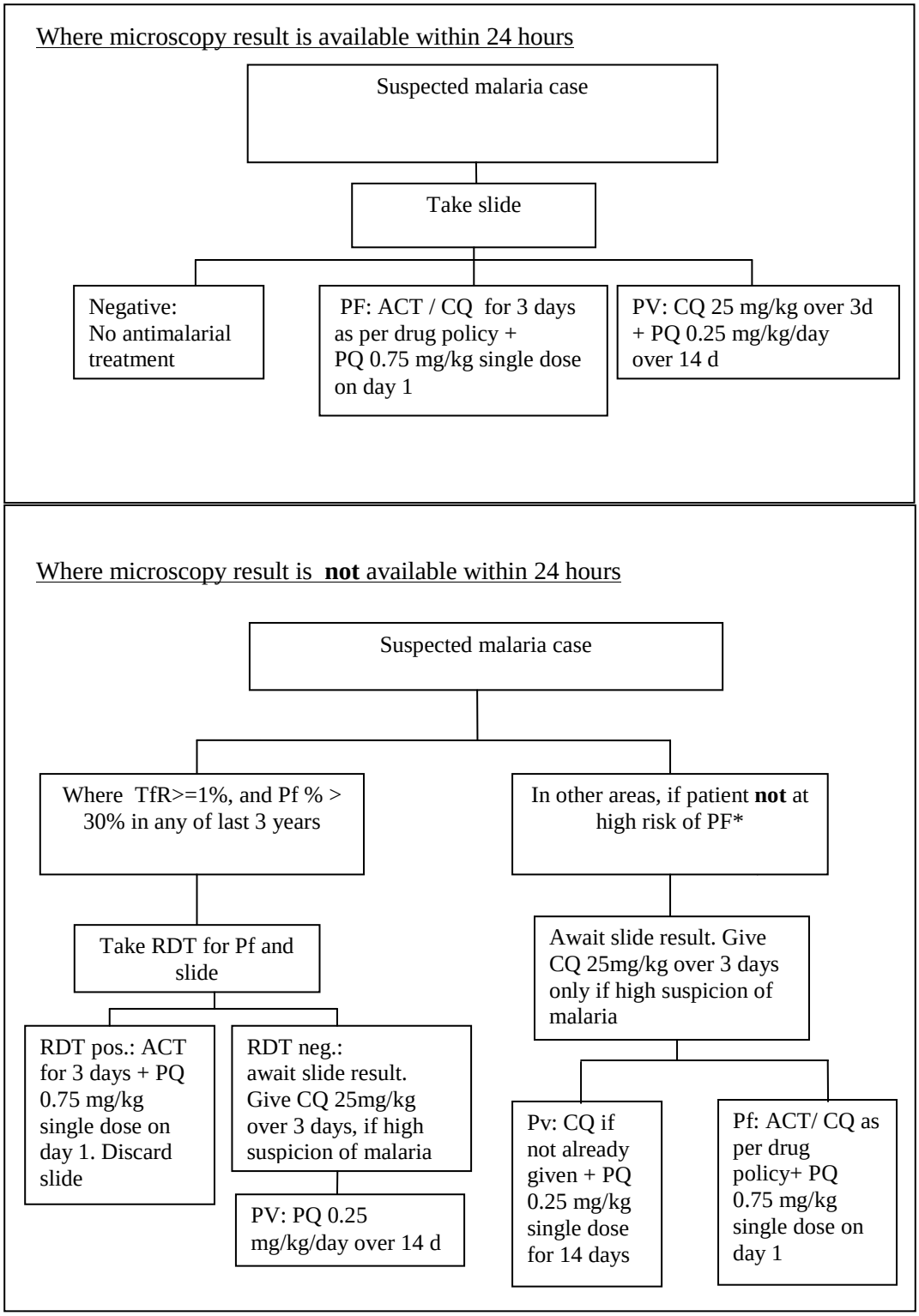
Age		**1st Day (number of tabs)***	**2nd Day (number of tabs)**	**3rd Day (numbers of tabs)**
<1 Year*	AS SP	½ ¼	½ Nil	½ Nil
1-4 Yeas*	AS SP	1 1	1 Nil	1 Nil
5-8 Year*	AS SP	2 1 ½	2 Nil	2 Nil
9-14 Year*	AS SP	3 2	3 Nil	3 Nil
15 and above	AS SP	4 3	4 Nil	4 Nil

** till such time as age-wise blister packs are made available for all age groups*

4. Quinine tablets in pregnancy

Quinine (as tablets) 10mg quinine salt/kg (600 mg adult dose)
3 times daily for 7 days.

Fig 3.1: Fever Diagnosis and Treatment Algorithm



ACT= artemisinin-based combination therapy (artesunate + sulfadoxine-pyrimethamine); CQ= chloroquine; PQ=primaquine
ACT should be avoided in pregnancy. Quinine orally should be given instead.
PQ is contra-indicated in pregnancy and in children under 1 year.
** patient has not travelled to an endemic area*
GAGAN gagan wak

3.3.3 Initiation of treatment and advice to the patient/caretaker

Once a suspected case is diagnosed positive by RDT or microscopy, treatment is started. The first dose is always taken in the presence of the health volunteer/worker. If the patient is a child under 5 years or a

pregnant woman, ask her or him to wait for 15 minutes after taking the first dose. If it is vomited within this period, let the patient rest for 15 minutes, then give a first dose again (i.e. open a new blister-pack and discard what remains of the old. If the patient vomits again (recurrent vomiting), it is considered a case of severe malaria (see below for further line of management).

The remaining part of the treatment is given to the patient/caretaker to take home with clear instructions.

Explain to the patient/caretaker

- That if the treatment is not completed as prescribed, the disease may recur, possibly being more serious and more difficult to treat.
- To come back immediately, if there is no improvement after 24 hours, if the situation gets worse or the fever comes back.
- That regular use of a mosquito net is the best way to prevent malaria.

3.3.4. Recording of treatment

All suspected cases of malaria are to be entered in M1 format by all health facilities and peripheral workers like ASHAs/ AWWs, CHVs. Therefore an ASHA or any other Community Volunteer, MPW and MO would maintain case record in this format. In M1, each row corresponds with one patient record. Serial No is filled in column 1 which is started fresh each month. Details of village, village code, name of fever case and Head of Family are entered in Col 2 to 5. Each village and provider will be assigned a code which is to be retained once and for all. In exceptional cases where a fever case is a visitor to the village, 991/ 992 is filled in the respective Col. Whether collection is during Active / Passive surveillance is filled as A or P in Col 6. For all purposes the ASHA/ CHV/ MO PHC will be passive agencies. Therefore in these cases the entry in Col 6 will be always P. It is only an MPW who can be involved in both types of collections. Fever cases coming to the MPW on their own will be entered as P while fever cases detected actively will be entered as A. Age is entered in Years/ months. Sex is to be entered as M for Male or F for Female. Duration of fever, date of RDT/ BSC, Slide No, sending and receipt of slides, result of examination of slides and RDTs, date of start of treatment, Nos of Tablets, referral and deaths if any are to be sequentially entered in the form.

If the RDT is positive, the blood slide need not be sent for examination and therefore Col 14 to 18 are to be skipped and are simply slashed (/).Treatment in such cases is started immediately for Pf. In cases where RDT is negative blood slide is sent for examination. The result of RDT or slide should be entered by ASHA/ Health Worker/ MO in column 13, 17 & 18 of M1. Any positive test result is to be marked in red with a tick (√). Slide No is started fresh at the beginning of each year and continued over the subsequent months. In areas where RDTs are not supplied and RDTs have not been done column 13 is simply marked with a cross (X).

In case of Blood slide the date of dispatch of slide and receipt of result are entered in column 15 and16. This will indicate the time lapse between the date of slide collection and receipt of results. During supervisory visits the time lag between slide collection or RDT and initiation of treatment should be identified.

Depending upon the species, ASHA/ Health worker/ MO will decide the anti-malarials to be administered. The date of starting treatment will be entered in column 20. Suppose ACT has been selected then Number of Tablets/ blisters will be entered in column 21 while in columns 22 to 27 a cross (X) is put.

Mark a tick (√) in column 28, if severe malaria is suspected. In column 29, date of referral of pregnant women suffering from malaria or severe malaria cases is entered. Date of deaths is entered in column 30.

The lower part of the form consists of record of logistics. Opening balance at the beginning of the month, stock received, utilization and closing balance should be entered by ASHA or other service providers after physical verification of stocks. The ASHA/ CHV will fill M1 in duplicate and at the end of the fortnight, after allowing for 7 days for completion of patient records of the last few days of the

reporting fortnight will forward the form to the Subcentre. In the middle of M1, the MPW will enter the summary of cases. The MPW will compile M4-SC by compiling the M1 of all ASHAs and adding his/ her own M1.

3.4 Severe and complicated malaria (for additional details, see Annex J)

A case of uncomplicated malaria usually presents with fever, rigors, headache, bodyache, fatigue, anorexia and nausea.

Serious complications can arise in *P.falciparum* infection. Recently, severe malaria has been described also in vivax malaria in South and South-East Asia including India. Complications sometimes develop suddenly over a span of time as short as 12 -24 hours and may lead to death, if not treated promptly and adequately. These complications are:

- Cerebral malaria presenting with convulsions, lethargia, coma, paralyses and other neurologic manifestations
- Severe anaemia
- Renal failure, which may be combined with severe haemolytic anaemia in the syndrome of black water fever
- Adult respiratory distress syndrome, which may progress to pulmonary edema
- Liver failure with jaundice and haemorrhagic tendency
- Septicaemia
- Bacterial pneumonia
- Hyperpyrexia
- Dehydration
- Hypoglycaemia (often caused more by quinine than by malaria)
- Circulatory shock (rarely with disseminated intravascular coagulation)

In children, febrile convulsions, repeated vomiting and dehydration are common if the temperature is high from any cause. Therefore, these symptoms are not necessarily indicative of severe malaria. However in routine program situations, children with such symptoms, should be referred to a health facility equipped to manage severe malaria and a diagnosis of malaria should be confirmed at the earliest.

In pregnancy, malaria, especially *P.falciparum*, is a serious disease because with each bout of malaria, there is a reduction in haemoglobin and profound anaemia may develop rapidly They are also at high risk of abortion in early pregnancy. Later in pregnancy, sequestration of parasites in placenta may restrict oxygen and nutrients flow to the fetus, causing intrauterine growth retardation. Malarial infection in pregnancy is therefore associated with maternal anaemia and with low birth weight. This low birth weight may be due to prematurity as well as intrauterine growth retardation. There is also an increased risk of stillbirth.

The **management of severe malaria** requires immediate administration of life saving drugs. Therefore essential requirements for management of severe malaria are as follows:

- A person trained in nursing serious/ comatose cases
- Antimalarials which can be given parenterally: Artesunate, arte-ether, arte-mether or quinine
- Supportive treatment: Antipyretics, anticonvulsants, diuretics, antibiotics, Saline/dextrose for intravenous transfusion
- Intravenous infusion equipment
- Facilities for blood transfusion
- Well equipped laboratory: Blood smear examination & parasite count with result within one hour, Routine examination of urine, haemoglobin, blood glucose
- Oxygen respirator, Oxygen

The DVBDCO/ DMO should list all facilities in the district where emergency care for severe malaria is available and this list should be available in PHCs and with all Community Workers like ASHA. MO-PHC should develop links with these institutions. **For timely referral of severe cases, transportation should be provided from untied funds available under NRHM from Rogi Kalyan samity (RKS**).

3.4.1 The role of peripheral workers

The community comes in contact with ASHA and MPW (M&F) as a routine. They depend on these persons for advice and treatment of different diseases, malaria being one of them. Therefore, Medical Officers **while training these workers should emphasize the need to recognize a serious case of malaria before it is too late.** These workers should be conversant with the signs and symptoms of malaria and those which are likely to indicate serious complications.

They should be **instructed that if the patient does not get relief from symptoms of malaria within 24 hours, and/or headache/fever continues to increase, the patient should report to the nearest PHC/CHC/Hospital.**

Criteria for immediate referral to Primary Health Centre

a) Persistence of fever after 48 hours of initial treatment.
b) Continuous vomiting and inability to retain oral drugs.
c) Headache continues to increase
d) Severe dehydration – dry, parched skin, sunken face
e) Too weak to walk in the absence of any other obvious reason
f) Change in sensorium e.g. confusion, drowsiness, blurring of vision, photophobia, disorientation
g) Convulsions or muscle twitchings
h) Bleeding and clotting disorders
i) Suspicion of severe anaemia
j) Jaundice
k) Hypothermia

In training of volunteers and health workers this list of signs and symptoms needs to be adapted to their level of training and skills.

3.4.2 Role of MO - PHC

The PHC Medical Officer should be capable of performing a full clinical assessment and ensure that all the facilities including parentral anti-malarials for management of severe malaria at PHC. **If these are not available,** intravenous or intramuscular antimalarial should be administered and referral to a higher level facility should be done.

Criteria for referral to District Hospital

a) Cerebral malaria patients not responding to initial antimalarial treatment.
b) Severe anaemia warranting blood transfusion
c) Bleeding and clotting disorder
d) Haemoglobinuria
e) Pulmonary oedema
f) Cerebral malaria complicating pregnancy
g) Oliguria not responding after correction of fluid deficit and diuretics
h) Fluid, electrolyte and acid base disturbance.

3.4.3 Diagnosis

All attempts should be made to confirm the diagnosis using microscopy or RDTs. Wherever possible, treatment should be guided by microscopy. At PHCs, CHCs & District level hospitals RDTs should be used in emergency hours only in the absence of technician/microscopist. High degree of parasitaemia and presence of stages of the parasite other than ring and gametocyte indicate poor prognosis. Severe malaria in the absence of microscopical evidence of asexual *Plasmodium falciparum* (or *P.vivax*. see below) is exceedingly rare. In such cases, all efforts should be done to identify an alternative cause. If microscopy is negative and RDT is positive for *P.falciparum*, it is possible that the explanation is that antigen is persisting from an earlier infection. However, if the symptoms clearly point to severe malaria and there is no alternative explanation, such a case can be recorded as having severe malaria. Such occurrences are possibly more common in patients, who have started an ACT treatment a few days

before. Severe malaria with negative RDT is possible, but extremely rare. A patient with negative microscopy and negative RDT should not be recorded as severe malaria, but may be treated as such, if the responsible clinician deems it necessary.

3.4.4 Treatment

In severe malaria cases, a parenteral artemisinin derivative **or** quinine is the drug of choice.

It has been shown that intravenous artesunate is the most effective treatment for severe malaria in adults in Asia. It is presently being investigated whether this is so for young children also, but there is no reason to assume a priori that it is inferior. If injectable artesunate and the facilities for IV administration are available, this should therefore be the preferred treatment in all patients.

Dosage regimens

Artesunate: 2.4 mg/kg IV/ IM followed by 2.4 mg/kg after 12 and 24 hours then once daily.
Arte-mether: 3.2 mg/kg IM followed by 1.6 mg/kg once daily.
Arte-ether: 150 mg daily IM in adults only for 3 days

Artesunate is dispensed as a powder of artesunic acid. This is dissolved in sodium bicarbonate (5%) to form sodium artesunate. The solution is then diluted in approximately 5 ml of 5% dextrose and given by intravenous injection or by intramuscular injection to the anterior thigh. The solution should be prepared freshly for each administration and should not be stored.

Parenteral treatment should continue until the patient is able to take oral treatment. When that is the case, full course of ACT should be administered to patients treated with artemisinine derivatives.

Quinine: 20 mg salt/kg as a loading dose, then 10mg salt /kg 8 hourly in 5% dextrose or dextrose saline. The infusion rate should not exceed5 mg salt/kg per hour. Loading dose may not be given if the patient has already received quinine or if Clinician feels inappropriate. As soon as the patient is able to take orally, oral quinine should be given. The total duration of treatment should be 7 days including parentral dose.

Pregnant women with severe malaria should be treated like any other adult patient. In these patients, the benefits of the artemisinin derivatives outweigh the theoretical hazards. Particular attention should be given to the high risk of hypoglycaemia in pregnancy.

3.5 Chemoprophylaxis

As chloroquine is no longer considered an effective treatment for falciparum malaria in India, it is no longer used for chemoprophylaxis. In pregnant women, there is no safe and effective alternative to chloroquine, which has been tested in India. Therefore, chemoprophylaxis is no longer recommended as a routine method of prevention in pregnancy. Personal protection should be used in children under 8 years, pregnant women and long term travelers and will now be based on the use of insecticide-treated nets

Use of chemoprophylaxis is limited to following situations:

*****a). Short term travelers/Tourists (less than 6 weeks) from non-malarious areas to malarious areas. Drug of choice is Doxycycline 100 mg daily in adults and 1.5mg / kg daily in Children; beginning 2 days before travel – 4 weeks after leaving a malarious area. It is not recommended in pregnant women and children below eight years.

*****b). Long term travelers where appropriate eg. Military & Paramilitary Troops on night patrol duty etc in malarious areas.The decision of Medical Authority is to be followed. Drug of choice is Mefloquine 250 mg weekly for adults & 5 mg/kg for children once a week; beginning 1 week before - 4 weeks after exposure. Mefloquine is contraindicated in cases with history of convulsions, neuropsychiatric problems and cardiac conditions. Hence, necessary precautions should be taken and all should undergo screening before prescription of the drug.

Chapter 4.

Integrated Vector Management (IVM)

4.1 The concept and scope of integrated vector management

Integrated Vector Management (IVM) has been defined by WHO as a rational decision making process for the optimal use of resources for vector control. It is based on the premise that effective vector control is not the sole preserve responsibility of the health sector but requires the collaboration of various public and private agencies and community participation.

IVM entails the use of a range of biological, chemical and physical interventions of proven efficacy, separately or in combination, in order to implement cost-effective control and reduce reliance on any single intervention. It includes safe use of insecticides and management of insecticide resistance.

The scope of IVM is broad, and includes:

- *Inter-sectoral collaboration*, not only in terms of enlisting the collaboration of for example economic development projects in risk mitigation, but also working with other sectors, especially agriculture and environment, to ensure coordinated, safe and judicious use of insecticides.
- Collaboration, possibly, integration, with other disease vector control programmes, seeking maximal cost-effectiveness and synergy. Examples include the use of identical vector control methods to control malaria and leishmaniasis in rural areas, or malaria and dengue in urban areas.
- *Community participation through IEC*, for example, for peridomestic sanitation in urban areas, targeting nuisance mosquitoes as well as disease vectors.

Measures of vector control and protection include:

- Measures to control adult mosquitoes: Indoor Residual Spray (IRS)
- Larval control: Chemical, biological, environmental
- Personal protection: for example bed nets, including insecticide treated

The National Vector 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 already been introduced in the program, and the program envisages a scale up in their use as an option that addresses environmental, operational and community acceptance considerations of IRS.

General guidelines for the choice of measure to apply in a given situation may be summarized as under:

1. In rural areas, high-risk populations must be protected by either IRS or insecticide-treated bed nets
2. Vector control measures should be applied primarily to high-burden areas
3. In such contexts, insecticide treated bed nets (especially long-lasting insecticidal nets) will be preferred in those areas where IRS is operationally difficult to satisfactorily execute
4. Over time, the use of bed nets will be scaled up, and the use of IRS will correspondingly decrease.
5. It is recognized that epidemiological and entomological evidence, in addition to operational and local contexts would determine the choice of method to be used. Based of such considerations, guidelines will be refined from time to time.

4.2 Methods of malaria vector control

4.2.1 Indoor residual spraying

.

The effectiveness of IRS depends on adherence to the specified criteria of the insecticide and application procedure, public acceptance of spraying, the use of well maintained equipment, adequately trained personnel, good coverage and effective supervision. Timing of IRS is essential and must be based on epidemiological and transmission dynamics data. In general, spray operations should take place approximately one month before the start of the potential seasonal increase in incidence. In India, the peak transmission season(s) are usually determined by rainfall.

A systematic effort is needed to improve the quality of IRS. People's perception of IRS should be changed through dialogue and flexible communication methods instead of enforcement. Safe insecticide management practices must be incorporated in all chemical vector control operations (See Annexure B).

4.2.1.1 Target surfaces. Generally, all the interior walls and ceilings are sprayed. In addition to permanent human dwellings, Jhoom huts where people sleep during the plantation or harvesting season should be sprayed. The underside of furnitures, back of the doors, outside eaves and porches must be treated. Human dwellings and mixed dwellings should be sprayed, but **not cattle sheds**, with a view to conserve insecticide, improve coverage of human dwellings and prevent diversion of mosquitoes from cattle sheds to human dwellings. The residual effect of insecticides may be short on some surfaces, e.g. porous mud walls, oil painted wood and alkaline white wash, so these may require re-treatment after for example three months.

4.2.1.2 Selection of Insecticides, calculation of required quantities and safety precautions: See Annexure B.

Spray Timing

Spraying is usually started to coincide with the build up of vector populations and before peak malaria transmission. The recommended state wise spray schedule for DDT and synthetic pyrethroids is given below. Two rounds of sprays are done for DDT and synthetic pyrethroids to provide protection during the entire transmission season. Three rounds are required in case of malathion since the insecticide is effective over a shorter period. It is expected that the spray operations will start in time to cover the entire transmission season, which is usually about 5 to 6 months in most parts of the country.

States	**Dates of Spray**
A&N Islands	I – 1/3 II – 18/5
Karnataka, Meghalaya, Tripura, Mizoram, Arunachal Pradesh, Nagaland, Assam, Manipur	I – 15/3 II – 1/6
Himachal Pradesh, Pondicherry	I –1/ 4 II – 1/7
Tamil Nadu	I –16/ 4 II – 1/7
Sikkim	I –16/ 4 II – 1/8
Punjab	I –16/ 4 II – 1/8
Daman & Diu	I –1/ 5 II – 16/6
Andhra Pradesh, Bihar, Chandigarh, Chattisgarh, Goa, Gujarat, Jammu & Kashmir, Jharkhand, Madhya Pradesh, Orissa, Uttranchal, Uttar Pradesh.	I –1/5 II – 16/7
Haryana, Dadra & Nagar Haveli	I –15/ 5 II – 1/7
Rajasthan, West Bengal	I –15/ 5 II – 1/8
Maharashtra	I –1/ 6 II – 16/7
Delhi, Kerala, Lakshadweep	Focal spray
I - first round; II – second round	
All States using Malathion will conduct a IIIrd round of spray also	

NB. These are guiding principles, marginal deviations may occur depending on the local situation

It is the responsibility of the DMO to arrange for certification of spray equipment before each round of spray as a part of microplanning. At the end of each round, a certifcate from Gram Panchayat/ VHSC has to be obtained regarding actual implementation in each village.

4.2.1.3 Spray Technique: Spray is a technical task and should be carried out by a properly trained person only. When ever spray work is outsourced to any agency like NGOs or assigned to community based organization which includes Village Panchayat, Village Sanitation Committee, should ensure that their spray workers are properly trained . Details of spray technique is given in the Annexure C.

4.2.1.4 Spray Supervision- work

Involvement of Village health and Sanitation committee under NRHM is essential for successful Indoor Residual spray . Panchayats/ village/ local bodies/ village heads/ Block Development Officers/ Mahila Mandals, religious groups etc., are to be informed about spray schedule at least a fortnight before the spray. This advance information must be given by Surveillance Workers/Malaria Inspectors/ District Malaria Officer so as to facilitate the villagers to extend full cooperation in getting the spray inside human dwellings with the objective of full coverage of targeted population. Local activities like Miking in villages, village level meetings and rallies are to be organised at village level to improve the acceptance of IRS Supervision of spray operations is important to ensure that operations are carried out according to correct technical procedures, so that corrective action can be taken, to achieve the programme goals. Supervision is carried at all levels by SPO, DMO, AMO, MI and MO-PHC . It can be concurrent or consecutive. A stratified sample should be taken for consecutive supervision.

Concurrent supervision

The following should be checked during such inspections:

(d) Date of advance notification and the maintenance of time table for spray operations
(e) Turn out of spray crew
(f) Nozzle tip discharge rate
(g) Conditions of spray pumps
(h) Preparation of insecticide suspension
(i) Actual spraying operation including the technique, speed and coverage etc.
(j) Extent of refusal to accept spray and the numbers and percentage of locked houses
(k) Maintenance of spray records
(l) Consumption of insecticide as determined by the quantity issued and stock in hand
(m) Date and time of checking of the squad by Inspectors/ Supervisors and other supervisory personnel and their remarks, if any
(n) Arrangements for mopping up
(o) Future programme and time schedule
(p) Whether exterior has been sprayed

Consecutive supervision

The following is to be checked in consecutive supervision

1. Evidence of insecticide deposit on sprayable surface particularly on the ceiling and wooden material like windows etc.
2. Dispersal of the insecticide deposits on the walls to verify uniformity of deposits
3. Number of rooms in each house sprayed satisfactorily, partially and not at all
4. Percentage of refusals and locked houses
5. Factors responsible for not spraying any area as elicited through enquiries from the residents
6. Attempts made for mopping up operation in the event of high refusal
7. Extent of mud plastering on the walls, if any and other relevant matters.

4.2.2 Insecticide Treated Bed nets

Considering the current net use pattern , all programme procured ITNs and LLINs will family size.

Ordinary untreated mosquito nets provide limited physical barrier between mosquito and the man and protection as they may still bite through the net or get inside the net, if it is torn or not used properly. Mosquito nets treated with insecticides provide much more effective protection by killing mosquitoes as well as repelling them

Evidence for efficacy and effectiveness of ITNs

Bednets, whether impregnated or not act as a physical barrier reducing the risk of the user getting bitten by any night-biting mosquito. Insecticide treated nets, like IRS, also reduce the longevity of vectors. A number of studies have shown that ITNs have a community effect, when the population coverage is 60% or higher. While studies in Africa have focused on children under 5 years and found that their all cause mortality is reduced by 18% (median) by ITNs, studies in Asia have focused on malaria morbidity in all age groups and found that it is typically reduced by 50% by ITNs. A longitudinal study in Keonjhar district, Orissa revealed that there is a reduction in malaria cases after distribution of ITNs whereby malaria cases declined by 32% over a period of 6 years. Similarly there was a decline in Slide Positivity Rate (SPR) in six PHCs of Kanker district, Chhatisgarh.

It must be expected that IRS will be more effective in certain areas, e.g. where summer heat precludes the use of nets, ITNs in others, e.g. where the population rejects IRS. More will be learnt about such factors through practice. It should be mentioned that lack of knowledge about nets is not a reason for not adopting this habit. Experience in Africa and Southeast Asia indicates that the use of nets may become popular a few years after introduction through public health, especially if there is a significant insect nuisance.

Combination of ITNs and IRS is possible, but as long as it has not been proven to be cost-effective, it will be too costly an option, given that the programme does not yet have sufficient resources to protect all high risk populations.

4.2.2.1 Long-lasting insecticidal nets (LLINs) are mosquito nets/bed nets, which have insecticide incorporated in their fibre, so that it is not removed by as many as 20 washes. Because these nets have an even and quality controlled insecticide application, they are generally more effective than conventional ITNs. Furthermore the price ex factory of an LLIN is now about INR 200-300, and it is therefore less costly (and more effective) to distribute LLINs and replace them after 3-5 years (the time it usually takes before an LLIN under conditions of normal usage either becomes too torn or loses its insecticidal effect) than to distribute conventional bed nets and treat them with insecticide once or twice a year. Conventional ITNs are therefore only a rational option in areas, where the population already has so many nets that at least 50% of people sleep under one (See also 4.3.4).

4.2.2.2 Provision of LLINs

It is reiterated that insecticide treated (bed) nets (ITNs) are now becoming one of the main methods for control of malaria transmission. In populations targeted for bed nets, coverage must be as close to 100% as possible and the delivery should be a free public service. Targeting is determined by the malaria risk and operational factors favouring nets over spraying, not by socio-economic status.

The type of bed nets that can be provided depends on the brands registered in India and the supply situation. NVBDCP will inform States about the expected effective life of the types of nets provided each year and any specific requirements.
Unless data to the contrary is available, it can be assumed that an average household has 5 members (2 adults and 3 children). It is then possible for one LLIN to cover on average 2.5 persons (2 adults or 3 children or 1 adult plus 1-2 children). Thus, for a given village the number of LLINs to be provided is usually equal to the number of households multiplied by 2 or the total population divided by 2.5. However, some villages may have many large households, which will need additional nets. It is therefore prudent to add 20%, i.e. plan:
►Number of LLINs = Number of households x 2.4.
This will normally ensure a sufficient quantity for the following schedule:

1-2 persons: 1 LLIN
3-5 persons: 2 LLINs

6-7 persons: 3 LLLINs
8-10 persons: 4 LLINs

Sometimes, villagers may complain that the number of nets assessed by the above schedule is not sufficient, because all the household members sleep apart. They should receive the reply that the public sector is not able to take such variations in account; such families may buy additional LLINs or bednets from the market.

In areas where it is a local practice for men to move to the fields/ forests for purpose of cultivation and malaria is therefore, acquired outside the houses, while distribution of nets provision of additional nets should be made or the community should be informed on the importance of carrying nets to the field or forests.

Generally, for a targeted village, the required number of LLINs should be distributed in one single operation. However, if LLINs are not in sufficient supply, it can be considered to distribute one per household per year over a period of two years, i.e. with two rounds of distribution separated by 12 months. Timing of LLIN distribution is less critical than the timing of IRS or re-treatment of nets. However, for educational as well as logistical reasons, distribution shortly before the start of the rainy season may be optimal.

In addition to distribution to targeted high-risk villages aiming at complete population coverage, LLINs should be given to pregnant women in high risk areas and to special groups such as children in tribal schools and hostels. These children should take the nets home with them during vacations.

4.2.2.3 Logistics including Transportation. See Annex E.

4.2.2.4 Community involvement and communications

Preparatory work should be done so that the nets are optimally utilized, including identification and recording of the eligible families and health educational activities in the community. Involvement of local community representatives, self help groups and NGOs should be encouraged to promote transparency of operations and optimal use by the community.

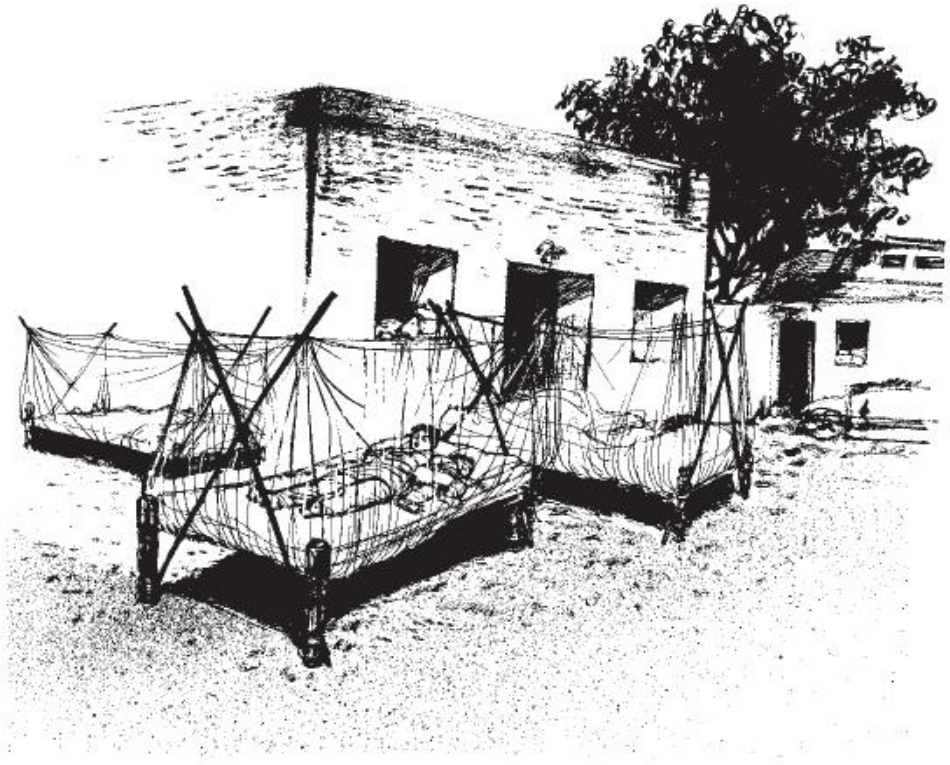
Health workers at health facilities and community health volunteers should provide key information during one-to-one encounters – especially when treating patients with malaria and during antenatal care and EPI attendance. Additionally, health talks can be given to small groups, especially those waiting for health services; pre-recorded audio and video tapes may be used in this context and demonstrations, e.g. of the correct way to hang bed nets, can be extremely useful.

Existing materials, such as flipcharts, guidelines, leaflets and flash cards, should be adapted as necessary to support interpersonal communication within the context of an integrated curriculum for training health workers in malaria treatment and prevention.

Informative print materials such as signs, posters and billboards are used to identify bed nets distribution points, including antenatal care facilities. Brochures and leaflets can provide simple information on how to hang and look after an LLIN, etc., and these can be taken home from the distribution point by community members. Health workers in health facilities can use these materials to help teach families how to use bed nets.

The quantity of materials to be produced should be sufficient to cover the entire target population and will be determined by the number of outlets and communities.

Volunteers involved in bednet/LLIN work should be able to demonstrate correct hanging and also placement of nets on four sticks outside (see figure, reproduced from J.Rozendaal. Vector Control. Geneva, WHO, 1996).



Key messages on bednets

a) "Insecticide Impregnated bednets" are safe, also for young babies and pregnant women. Direct skin contact with the insecticide on a wet net may cause a tingling sensation. This is not harmful. After treatment, the net may smell of insecticide. Both of these effects will subside in a few days and are not harmful.
b) They kill a variety of insects, so they prevent several diseases, especially malaria.
c) By killing the insects, they also allow better sleep
d) Within a family, the most important persons to protect are young children and pregnant women, because malaria is very dangerous for them. However, as much as possible, all family members should be protected, because all can become sick from malaria.
e) Use the insecticide-treated net every night, all year round, even if mosquitoes are not seen or heard.
f) If any family member needs to go and sleep in a forest it is important to bring a medicated bednet, because otherwise it is easy to catch malaria in the forest (there may be few mosquitoes there, but they are very dangerous).
g) They work best, when they are hung in such a way that there are no gaps, where insects can come in.
h) They should only be washed when really necessary, because every wash will remove some insecticide.
i) Ordinary bednets need to be medicated again every six months.
j) Long-lasting nets are special and precious. They are distributed specially to people at high risk of malaria and should be kept and used in the family, until the day, when they are replaced by the health services or the family can buy a new one.
k) During daytime, to conserve nets well, they should be neatly folded and stacked in one part of the house. However, if there is little time for hanging them up every evening, they can be folded up in the place, where they are hung.

Preparatory activities

It is important that preparatory work is done to ensure optimal use of nets. Each year during the pre-transmission season a survey should be conducted to enumerate the bednets available with the community and determine the communities' requirement for the year:

a) Survey of the area – number of households, number of persons in each household, Number of plain mosquito nets/ LLINs in use, Number of bednets to be impregnated
b) Preparation of the list of beneficiaries
c) Selection of site(s) and persons for insecticide impregnation.
d) Training of personnel and necessary supplies should be arranged
e) Identification and involvement of community representatives, self help groups, women's organizations and NGOs
f) Communication among the community for the regular and proper use of the nets; for ensuring that especially pregnant women and young children sleep under a bed net; insecticide treatment of conventional bed nets and proper care for all nets

4.2.2.5. Distribution of the nets

a) Organize camps for distribution of insecticide treated mosquito nets
b) Keep records of mosquito net distribution
c) Make arrangements for distribution to those who were unable to attend the camp(s)

4.2.2.6 Post Distribution Activities

g) Periodic visits must be made to check net use. In communities which have not had a habit of using nets, frequent communication by local health workers after distribution is essential.
h) Arrangements for re-impregnation of conventional nets annually or bi-annually prior to the high transmission season (s)

4.2.2.7 Technique of bednet impregnation: See Annex D.

4.2.2.8 Characteristics and logistics of LLINs: See Annex E.

4.2.3 Larval control

The breeding of anophelines can be reduced by a variety of physical, chemical and biological methods. In most situations these methods have less impact than methods, which, like IRS and insecticide-treated bed nets 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 or bed nets.

NVBDCP recommends using larvivorous fish in man-made breeding sites in rural and peri-urban areas, freshwater bodies in rural areas. In rural areas, larval control plays a greater role in arid areas, where breeding sites are scarce and well delimited. In contrast, in forested areas and other areas with dense vegetation, it may not be practically possible to identify and target enough of the breeding sites.
Larvivorous fish are widely used in urban areas, but are being expanded to all feasible areas, including rural areas. For details, see Guidelines *of Larvivorous Fish for Vector Control* at http://www.nvbdcp.gov.in/iec.html.

4.3 Micro-stratification

Micro-stratification has been applied in malaria control for decades, but can now become more rigorous, as resources are increasing, making it possible to replace the "fire-fighting" paradigm with "protection of the populations at high risk". Using local surveillance data and vector control experience, including the knowledge, habits and attitudes of the local community, district VBDC staff is responsible for identification and mapping of risk areas and risk populations as a basis for planning vector control. The stratification must be flexible, but firm enough to provide the corner-stone for planning, monitoring and evaluation.

4.3.1 High-risk areas and populations

Areas with API more than 2 are classified as high risk. The Technical Advisory Committee on Malaria in its meeting held on 30.05.2002 has rationalized the criteria for undertaking indoor residual spraying. These criteria are as follows:

i) To spray on priority basis all areas taking sub-centre as a unit, with more than 5 API with suitable insecticides where ABER is 10% or more.
ii) To spray on priority basis with suitable insecticide all areas reporting more than 5% SPR (based on passive collection of blood slides), if the ABER is below 10%
iii) Due priority be accorded for spray if Pf proportion is more than 50%.
iv) 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 area.
v) To make provision for insecticidal spraying in epidemic situations.
vi) Rotation of insecticides may be done so as to prolong their effectiveness.
vii) 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, which must be identified by:

b) the size of the population,
c) a list of the sub-health centre areas or villages included, and
d) a presentation of these sub-centre areas and villages areas on a map.

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

High–risk areas and populations must be re-defined at least annually taking into consideration . Populations living temporarily in a high-risk area should be included in the high-risk category, although their delimitation may pose practical difficulties. Data from the **latest three years**.

4.3.2 Eligible populations for indoor residual spraying (IRS) and insecticide treated nets (ITNs)

Within the high-risk population, the populations that should be protected by particular vector control methods must be defined. In practice, in rural areas, the two methods for which it is possible to plan population coverage are IRS and ITNs. Thus, **high-risk populations should be protected by either IRS or ITNs**, so

High-risk population = IRS eligible population + ITNs eligible population

Some part of both of these populations may also be protected by some form of larval control. However, it is unlikely that larval control would be the sole method of malaria vector control for a high risk population in a rural area.

4.3.3 Choosing between IRS and ITNs

Based on experience, the entomological situation, the record of past community collaboration or absence thereof and the expected supply situation, either IRS or ITN should be selected for a given population. Given the difficulties in maintaining high coverage and quality of IRS, it is expected that over some years, ITNs, especially LLINs, will replace IRS in most areas, although the latter method will still be needed to combat epidemics and in areas, where people cannot use ITNs. In certain areas of the country such as Rajasthan, summer temperatures are extremely high and people are therefore unwilling to use nets. Fortunately, IRS is generally highly effective in such situations, if carried out correctly with an effective insecticide.

Where IRS is currently used to protect part of the high risk population in a district, priority should be given to providing ITNs to those high-risk populations, which cannot be reached by IRS because of operational factors such as poor road access. In particular for areas, which are reachable only outside the rainy season, LLINs are appropriate, as they can be delivered several months before transmission picks up. In forest-fringe areas, in villages which have many people returning from forests with parasites

but no transmission in the village, ITNs should be preferred to IRS, as nets can be used in the forest, and it is rarely possible to spray shelters there. Ascertaining whether transmission takes place mainly in the village or in the forest may require special investigation. However, often the villagers and local health staff know it; also the absence or rarity of malaria in young children can usually be taken as a sign that malaria transmission does not occur in or near the home.

Pregnant women are highly vulnerable to malaria. They may be provided with an insecticide-treated net through ante-natal care services at the first ante-natal consultation. Nets delivered in this way to high risk populations should be included in the vector control monitoring (see below). The pregnant women, who receives a net should be guided that she must use it every night during pregnancy and that after delivery she should use it to protect both herself and the infant.

Like for IRS, it must always be planned in ITN operations to achieve 100% coverage in each village. Although ITNs provide some protection to the individual using them, the full benefits are obtained at high coverage levels. Data from trials in Africa suggest that if at least two ITNs are in use in a rural household, so that at least 60% of the inhabitants in every household are sleeping under an effective ITN, then the protection is very good. We can therefore, for a village, use the following as a simple population coverage indicator:
►Percentage of households ***using*** at least two effective ITNs.

4.3.4 Choosing between conventional impregnated bed nets and LLINs

Despite the advantages of LLINs, re-impregnation of bednets, which have been distributed in the past or acquired by the population through commercial or social marketing may still be cost-effective. It should be done in areas, where significant proportion of the community is using bednets (Eg. where at least 30 % of the population would answer yes to the question: “did you sleep under a mosquito net last night?” during the transmission season). It is then assumed that people will be encouraged by re-impregnation operations and behaviour change communication to acquire more nets, so that over time, coverage can approach 100%.

In other areas belonging to the ITN target population, LLINs should be provided. As a general rule, if a village is targeted for LLINs, enough should be provided to cover the whole population of the village, even if some people own conventional bednets. It is expected that LLINs will become the main malaria vector control intervention in high-risk areas over the coming 5-10 years.

4.3.5 Operational planning and monitoring for IRS and ITNs

Often, the supplies, which can be made available for a given plan year do not allow full coverage of the eligible populations. Or, staffing, operational funds or logistics capacity may impose constraints. Within the eligible populations for IRS and ITNs (the latter of which may be divided in conventional ITNs and LLINs eligible populations) it is therefore necessary to identify the populations to be covered in the year under planning: the **annual-plan target populations**. These must be planned under resource constraints giving priority to those with the highest burden (generally, highest API).

This planning is done by the District VBDC Officer in collaboration with the block and PHC Medical Officers concerned. The epidemiological data should be thoroughly analyzed in this process. A meeting of Medical Officers and MPHW supervisers (M) must be convened by CMHO/DMO for this purpose, normally in December. In some districts, it may be necessary to convene such meetings for each block or for clusters of blocks.

The population is obtained from the epidemiological data collected from each of the PHCs of the district. The PHC Medical Officers should bring this information to the meeting in the format given in Chapter 10 including each sub-centre area which has any high-risk population. During the meeting, the planning is reviewed, taking into consideration the epidemiological data and other factors. If needed, the PHC medical officers’ plans are modified, and the agreed plans are then consolidated for each block and for the district.

It is essential to distinguish between eligible populations and annual plan target populations for the main vector control interventions, because of the requirements of monitoring: In the long term, it is necessary to monitor progress in coverage of the eligible populations: Major impact on the disease burden requires high coverage of all high risk populations. In contrast, in short term annual reviews, it is the achievement relative to the annual plan that should be assessed. The performance of a given PHC, block district or state is measured by the coverage of the annual plan target population achieved in the year under review. Both long and short term monitoring exercises are greatly facilitated by correct use of standardized planning formats – See Chapter 11.

Chapter 5

Control of Malaria Epidemics

5.1 Definition of epidemic

An epidemic is defined as the occurrence of sickness of similar nature in the community clearly in excess of normal expectancy during a given time frame. Normal expectancy is in terms of number of persons sick with the same sign and symptoms over a period of time in an area. Excess is usually statistically defined as 2SD (Standard Deviation) above the mean number of cases in proceeding 5 years. In practice usually preceding 3 years epidemiological data is considered provided no outbreaks were reported during these years. In case of malaria the epidemic situation is suspected, if suddenly a large number of fever cases report to the OPD of PHC/Dispensaries, Hospital and majority of these cases are clinically suspected to be suffering from malaria.

5.2 Types Of Epidemics

1. Climate-related
In India Malaria epidemics are usually seasonal, peaking during the rainy season/ monsoon and post monsoon period, which favour development of mosquitogenic conditions. Cyclic epidemics at intervals of 5–7 years or more are also known to occur in epidemic prone areas with unstable transmission.

It is possible that increasing average annual temperatures could lead to malaria spreading to more elevated foot-hill areas. This has been observed in East Africa. There is no clear evidence on this in India, but it is necessary to be alert.

2. Population movement related
Population movements are an important cause of epidemics. Two main types may be distinguished:
(a) The ignition of an epidemic in an area with malaria vectors, where transmission was interrupted in the past, by the arrival of parasite carriers. This happens typically, when an economic development activity attracts workers from malaria-endemic areas.
(b) the arrival of a non-immune population group in a malaria-endemic area. Such population movements can be caused by civil unrest, famine or economic frontier activities, especially in forested, malaria-endemic areas.

3. Health system related
In areas where control activities are disrupted, focal malaria outbreaks (i.e. **localized seasonal epidemics**) occur usually leading to high morbidity and mortality.

For details on other important determinants refer to Chapter 6.

5.3 Key Factors Causing Epidemics

Occurrence of malaria epidemics depends upon a number of environmental, entomological, demographic and operational factors. Continuous Information on these factors should be collected from various departments like municipalities, agriculture, transport, meteorology, military etc. These causal factors are given in Table 5.1

Table 5.1: Key Factors Responsible for Epidemics

S.No	Factor	Description
1	Climatic Factors	• Temperature: malarial parasite develops best between temperature of 20-30°C and a Relative Humidity of more than 60% provides optimal living conditions for anophelines. • Rainfall: increase in rainfall favours mosquito breeding • Natural Calamities: human population & water management are disturbed which favours mosquitogenic conditions
2	Receptivity (entomological factor)	• Urban Slums • Vector: Change in vector bionomics like resting and feeding habits; increase in vector density and breeding; increase in man-mosquito contact • Decline in cattle availability (for zoophilic species)
3	Vulnerability (human factor)	• Population migration (project areas, urban slum, Tarai area), • Low socio-economic status, poor education, • poor nutrition, • ignorance leading to inadequate health-seeking
4	Operational factors	• Staff vacancy, lack of training of staff, • inadequate surveillance, Lack of laboratory network • lack of transport and inadequate supply of drugs and other logistics • Delayed & incomplete treatment
5	Technical factors	• Parasite resistance to antimalarials • Vector resistance to insecticides

5.4 How to Detect a Malaria Epidemic

MO-PHC should keep a constant watch on parasite load by continuous monitoring of No. of fever cases and distribution of *Pv & Pv*. The DMO/ DVBDCO should also analyse these factors. Epidemiological factors which may assist in early prediction of an outbreak are given below.

- increase in fever rate (Fever Rate of one-third or more of new OPD) & severe malaria
- increase in fever incidence in the population (indicated by Health Workers & Community Volunteers)
- increase in malaria incidence(as compared to the same month previous year)
- Increase in TPR, Pf%, Proportion of gametocytes to other stages, increase in resistance, no clinical response to antimalarials, increase in malaria mortality and increase in consumption of anti-malarials

Besides these the DMO/ DVBDCO should look out for entomological factors like increase in mosquito density and malaria vector density. Environmental factors like early or heavy rainfall in the pre-transmission season. Scarce then expected average rainfall should also raise high level of alertness for outbreak. Large scale population migration, labour aggregation in Project/ Agricultural/ Forest Areas should also increase the alertness in the district. These alerts should be communicated to medical officers at PHC level requesting them to pay the greatest attention to weekly trends. Depending on the

local situation, these signals may also lead to a survey in a special migrant group, screening measures, proactive IRS or ITNs or intensified ACD.

Fever alert surveillance for malaria has been integrated with the Integrated Disease Surveillance Project (IDSP). Fever cases are to be reported in the **Weekly Fever Report from PHC** to District Nodal Officer for IDSP and DMO/ DVBDCO. Upon analysis of this report if an increase in fever incidence is observed, Nodal Officer – IDSP will send an alert to the DMO & MO PHC. Similarly, the DMO/ DVBDCO will inform IDSP if any increase in fever incidence is observed. Once a strong degree of suspicion is present the following steps need to be taken:

e) Conduct a Rapid Fever Survey and collect blood slides or conduct RDT to find the Test Positivity rate (TPR) to assess the magnitude of disease
f) Compare the trend of Malaria Incidence in the area during the year under investigation i.e. month-wise malaria incidence, to preceding 2 years.
g) Compare the Test Positivity Rate (TPR) obtained in a) & TPR of the current months to the TPR of the same month in the previous year.
h) Collect information on supportive factors like Climatic conditions, vulnerability, receptivity, vector density etc and try to determine the cause-effect relationship.

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

a) Increase in TPR (about doubled or when TPR in routine surveillance is 5% or more) in the current period as compared to the same period of previous year;
b) Increasing trend of Malaria Incidence in the months of the current year as well as compared to corresponding months in the previous year.
c) Increasing vector density and positive findings for other supportive factors.

High TPR should also be confirmed by cross-checking of slides by an independent LT for ascertaining the quality of lab work.

If the TPR is low but the Fever Rate is high it indicates a disease problem, which is not malaria. In this case, the possibility of inadequate microscopy should also be considered.

Malaria outbreaks usually occur in low transmission areas with unstable malaria. In instances where there is high and stable transmission of malaria, a high TPR may be commonly found, and should not be considered an outbreak by itself, but intensive control measures need to be continued.

Generally if an epidemic occurs in early part of the transmission season, it is more likely to be due to *P.vivax* infection. An epidemic in the later part of transmission season is more likely to be due to preponderance of Pf infection.

5.5 Prevention and Control of Malaria Epidemics

The aim of the NVBDCP is to prevent or identify epidemics/outbreaks in their incipient stages and to prevent them from progressing into full-blown epidemics. Prevention requires high level of preparedness and is closely linked with the Integrated Disease Surveillance Project. The DMO/ DVBDCO/ CMO should ensure that all measures related to preparedness and control in case of a confirmation of epidemic/ outbreak, are in place in the district. Following are the key actions to be taken:

5.5.1 Preparedness

The district should be prepared to respond rapidly to an outbreak/ epidemic whenever the need arises in the transmission season. The prerequisites to be fulfilled for this purpose are the presence of:

(A) Rapid Response Team (RRT)

Rapid Response Team should be constituted in collaboration with IDSP, with the aim to undertake urgent epidemiological investigations and provide on the spot technical guidance required and logistic support.

Constitution:
The RRT at state/provincial levels will comprise district epidemiologists (IDSP), entomologists (IDSP) and a laboratory technician. At local levels such as PHC/CHC, RRT may comprise Medical officer, health supervisor, community volunteers of the affected village and local government staff.

Functions:
- Undertake urgent epidemiological and entomological investigations.
- Provide required emergency logistical support, e.g. delivery of medical and laboratory supplies to health facilities.
- Provide on-the-spot training on case management for local health staff.
- Supervise the elimination of breeding places and application of vector control measures.
- Carry out health education activities.
- Collection of blood slides / performing Rapid diagnostic tests.

(B) Logistics:
The CMO/ DMO/ DVBDCO and the MO PHC should ensure availability of adequate buffer stock to meet the population based requirements of reagents, slides, RDTs, drugs, insecticides spray equipment etc to take care of any excess requirement during outbreak/ epidemic situation in the district and PHC respectively during the transmission season. The detailed planning of requirementss during epidemics is done as per Annexure I. A contingency plan should be in place for mobilization of resources. There should be a plan for management of severe cases; adequate number of beds should be made available in the health facilities. In case of an anticipated shortage, a plan to convert schools or Panchayat Ghars into wards should be in place.

5.5.2 Control of Malaria Epidemics

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

Step 1: Delineation Of Affected Area – Rapid Survey

Having ascertained that there is an epidemic situation in some of the villages of PHC, Medical Officer/District Malaria Officer/ DVBDCO/ RRT will make arrangements for delineation of the endemic area and to find out the extent and severity of the epidemic. Good geographic maps of the area are essential. They will also inform State Programme Officer immediately to help in the delineation of the area and implementation of containment measures on war-footing.

According to the available resources (manpower and supplies), surveys can be done with RDTs only, with microscopy only or with both. Of course, if it is expected that *Pv* is important, microscopy is necessary.

A) Rapid Fever Survey

During Rapid Fever Survey, every village in the suspected epidemic zone is covered and only fever cases or cases with history of fever are taken up and their blood smears are examined promptly. In areas where microscopy is not possible promptly rapid diagnostic test may be performed.

B) Mass Survey

As an alternative, in case the affected population is relatively small, a mass survey of the entire population shall be carried out in every village irrespective of fever status. Especially children must be included in the survey.

It is necessary to expand the area of survey centrifugally from the epicenter of the epidemic till areas with normal positivity rates are reached. Thus the size of the area involved in the epidemic zone is delineated.

To carry out the surveys, it is always advantageous to establish field laboratories by pooling Laboratory Technicians from adjoining PHCs, Districts, Zonal Office or State Headquarters laboratories and pool the peripheral staff from the PHC area to collect blood smears so as to cover the entire population as quickly as possible. This operation should be over in 7 to 10 days.

- **Blood smears collected should be examined within 24 hours or RDT should be conducted.**
- Rationalisation of use of resources during epidemics is an important consideration. In areas which are in close vicinity of PHCs and where microscopy camps can be easily established, fever cases should be preferable screened with microscopy. Far flung areas where microscopy is not readily possible, RDTs should be used for diagnosis.
- All groups should be covered, especially high risk population i.e. children, pregnant women and migrants.
- All positive cases should be given radical treatment at the recommended doses according to the slide or RDT result. If initial results indicate a positivity rate above 30% among fever cases (either blood smears or RDT), it may be considered to treat all fever cases as soon as blood sample has been collected.
- In areas where ACT has been rolled out and initial investigation reveal that the current outbreak is predominantly due to Pf., treatment of cases awaiting for result may be started with ACT
- In Pf predominant epidemics in chloroquine sensitive areas, if cases present again with infection after treatment with chloroquine, suspicion of treatment failure should be aroused. After duly eliminating non-compliance, treatment with ACT may be done

Step 2 Estimation Of Population Involved

The next step in the exercise is to calculate the population living in the epidemic areas. This can be done by taking the village-wise population from Family Register maintained by MPW (F) under NRHM or the census population of the villages identified, whichever is readily available at the PHC. This information is collected using Epidemic Proforma I, II & III.

Step 3 Measures For Liquidation Of Foci

Having ascertained the population affected and the number of households in which measures to liquidate the epidemic are to be implemented, the anti-vector and anti-parasitic measures should be planned as under:

Anti-vector Measures

i) **Space Spray**

i) Every house in all the villages of the area affected by the epidemic should be covered.
ii) Indoor space spray should be carried out for 7 to 10 consecutive days or till the residual insecticidal spray in all houses of the locality is completed.
The equipment required for space spray will be a hand operated micro-discharge fogging machine/hand operated atomizers (Flit pump).. Insecticide for indoor space spray will be pyrethrum.

j) **Indoor Residual Spray (IRS)**

i) The indoor residual insecticidal spraying operation should be started simultaneously with indoor space spray.
ii) The insecticide of choice will be the insecticide to which the local vector is susceptible according to best available information
iii) Apply the recommended dose of insecticide chosen.
iv) Cover all houses and mixed dwellings including sleeping rooms, but not exclusive cattle sheds

k) **Entomological Investigations and other vector control measures**

The Zonal Officer should depute the Zonal Entomological team to carry out vector density studies. They should report the findings to the RRT. They should point out the prolific breeding places requiring immediate action. If the epidemic is due to predominance of vector breeding in water storage tanks or in peri-domestic water collection, or in well delimited water bodies in arid areas, undertake anti-larval measures along with space spray and residual insecticidal spray. Later, entomological investigations may be carried out to update the susceptibility of the local vector(s).

d) Duration of Epidemic Control Measures

The entire exercise should be completed in a period of 7 to 10 days and in any case not exceeding a fortnight (i.e. within one extrinsic incubation period) so that secondary cases are prevented.

Step 4 Follow-up Action

To assess the impact of remedial measures, it is necessary to take the following follow-up actions:

d) Continue close surveillance for one month (twice the incubation period) after the outbreak has been contained (as demonstrated by epidemiological indices).

e) Strengthen case detection and treatment services at all levels in the vicinity by ensuring that laboratories are fully functional, the surveillance workers are deployed, the community volunteers are activated and supplies and logistics at all levels are ensured.

f) Investigate cause of epidemic by an epidemiological investigation to find out whether the epidemic was due to for example:

   i) Influx of migratory population which was not covered by routine control measures such as screening at the entry points and case management and surveillance in the project areas.
   ii) Breakdown of regular malaria control operations.
   iii) Natural calamities such as floods, heavy rains, drought with opening up of relief camps and other relief measures with temporary shelters for migratory population may be responsible for an epidemic and disruption of operations.

5.6 Reporting System for outbreak

The State Programme Officer, the Regional Director, ROH&FW and the Director, NVBDCP should be informed by MO PHC/DMO telephonically or via e-mail as soon as an epidemic is suspected.

The final epidemic containment report should contain:-

i) *Epidemic Control Proforma I to III of* and the spray completion report along with epidemiological investigation. This report will be signed by the MO-PHC/ District Malaria Officer/ RRT. It will be sent to State Programme Officer with a copy to Directorate of NVBDCP and Regional Director, ROH&FW.

ii) As soon as the epidemic is confirmed a copy of the Proforma-I giving the details of epidemic zone will be sent to State Programme Officer, Directorate of NVBDCP and Regional Office for Health & F.W.

iii) The report of follow-up action/investigation of the first and second surveys will also be sent by MO-PHC, District Malaria Officer and RRT to State Programme Officer, Directorate of NVBDCP and Regional Director, ROH&FW.

iv) An analytic summary of these reports is prepared by DMO one month after the last operations are completed. It is placed on NVBDCP's website and included in the annual reports on malaria from the District and the State

Various proforma to be used for malaria epidemic containment, field reporting and details of norms for containment measures planning are given at Annexure - I

Chapter 6

Control of Malaria in Special Groups and Situations

6.1 Introduction

The analysis of various factors responsible for the slow progress of malaria control reveals the problems and constraints in different epidemiological types of the disease. The priority areas which have been identified are forests, forest fringe areas and developmental project sites. There are also the major situations of rural, tribal and urban malaria. Situations such as natural disasters and socio-political disturbances create additional dimensions to malaria control.

6.2 Project Malaria

The project areas are those areas where construction/developmental activities are taken up and temporary tropical aggregation of labour takes place. The labour force in these projects may come from varied epidemiological backgrounds – some from malaria-endemic areas with some degree of acquired immunity, and others from non-endemic areas and completely immunologically naïve.

Whenever any major development activity like irrigation project is planned in an area, a thorough Health impact Assessment Survey is to be conducted measuring the potential increase of mosquitogenic conditions in the area. The SPO & DMO must be involved in the process. The project budget must include various components of anti-malaria unit.

As far as minor projects are concerned, where a small number of temporary labour is engaged and the labour is recruited from the adjoining localities, no separate arrangements need be made for malaria control except water management at the site of the project and health coverage can be given by the staff of the PHC. However, for major projects it is necessary that a special Project malaria organization be established. The District Malaria Officer should identify such projects, namely, industry, irrigation, mines, power plants, construction etc, as well as those which have separate townships and make necessary recommendations on malaria control activities.

The staffing pattern for malaria control in a project should include a medical officer, laboratory technician and malaria inspector. Superior field workers and field workers should be employed for antilarval work and adulticide sprays according to the size of the project population and project area. Insecticides and larvicides are to be supplied by State VBDCP and if purchased by project authorities, the scale of supplies may be calculated as per norms given in this Manual. Budget should be earmarked at the beginning of the project for vector control activities.The funding of such an organization can be decided by mutual agreement between the project authorities and State health authorities. The project malaria control organization will send regular monthly reports to the concerned District Malaria Officer and State Programme Officer.

6.2.1 Vector control

The project area and surrounding areas will be inspected covering each location every week for detecting mosquito breeding sites. Environmental measures for water management like drainage, filling and leveling of water bodies should be undertaken, wherever possible. Weekly anti-larval measures with chemical larvicides or biocides will be done where applicable. Based on the advice from the District Malaria Officer, residual insecticidal spray will be carried out with appropriate insecticide in all buildings and hutments to cover the entire transmission season.

6.2.2 Early Diagnosis and complete treatment

All incoming labour as well as their families coming from malaria endemic areas entering the project area should be screened for malaria by performing RDT and taking blood smears. Complete and effective treatment will be given to all cases tested positive for malaria. In the absence of trained health workers, volunteers from the project staff will be trained to perform RDT, collect blood smears and administer appropriate treatment. Whenever a laboratory technician is available in the project set up, the slides should be examined and reported within 24 hours. In case, institutional medical facilities are not available in the project area, a referral hospital should be identified for management of severe and complicated malaria cases.

If the project is located in a high endemic area, special attention should be paid to labour coming from non endemic areas with a high level of surveillance, adequate personal protection supplemented by vector control measures.

6.3 Malaria in Forest Areas

Forests and settlements in recently deforested areas harbour very efficient malaria vectors. These vectors are preferentially attracted to bite humans in their shelters, but return to rest in the forest vegetation, thus avoiding the effect of any residual insecticides that may have been sprayed on the walls or roofs of the shelters. Malaria transmission is therefore more intense and more difficult to control in temporary or newly established forest settlements.

In many forest areas, there are groups engaged in socio-political revolt or in a wide range of illegal activities, from smuggling to drug cultivation and trade. Although these groups are out of reach of normal governmental action, it has to be recognized that they are in more or less close contact with the more settled population and are part of the malaria epidemiological ecosystem. The possibilities of instituting antimalaria measures in these areas should be explored, no matter how indirectly.

Many international borders run across forests, often following important rivers. Economic activities across borders, legal or not, are always intense. Often forest border areas permit easy access by migrant labour to more economically active countries.

Police and army posts in forest areas are often manned by people on temporary assignment who are usually under chemoprophylaxis. They may also be implementing other measures for prevention and control of malaria such as personal protection and vector control.

6.4 Forest fringe areas.

These are often transition zones between forests and neighbouring areas where progressive advance of deforestation turns forest fringes into wide areas in which agriculture and pasturelands alternate with more or less large areas of forest. Agriculture spreads rapidly along highways and around main communication nodes, towns or government centres, leaving in between islands of forested hills and river courses. The malaria exposure is dependent on the amount of time spent on each activity, the type of shelter and camp, as well as the methods of protection used.

IRS is relatively ineffective against the highly exophilic forest vectors, not only because of their resting habits, but because the incomplete temporary shelters frequently do not have walls to be sprayed, and due to the mobility of settlements, which remain unreported and inaccessible.

It is important to:

- Sensitize the public and the local authorities about malaria in native forest populations
- Behaviour Change Communication to reach and motivate population groups reluctant to use public health services
- Ensure that malaria workers get information about new economic activities in their areas of responsibility, as well as population movements and occurrences of fever outbreaks, which requires immediate reporting and investigation
- Promote the use of ITNs and any method of personal protection that can be applied locally.

6.5 Agricultural development projects

There seems to be more potential for water management in agricultural fields, especially rice fields, where intermittent or rotational irrigation (alternate wet and dry irrigation) can be practised. Development projects may actually offer some opportunities for optimizing vector control and personal protection, for example by:

- Including vector control into the operational framework of new agricultural projects.

- Exploring with agricultural and irrigation authorities, and the farming community, environmental management methods such as source reduction, water/land management or other appropriate engineering measures to reduce the opportunities for vector breeding.

- Using the techniques of integrated pest management (IPM) and Integrated Vector Management (IVM) taught through farmer field schools.

6.6 Urban and peri-urban areas

The clearest example of this is the adaptation of *An.stephensi* to breeding in wells, cisterns, roof gutters, tanks and all kinds of containers in many Indian cities; when such conditions occur in a large crowded city it can produce a severe epidemic. Larval control is particularly indicated in urban areas, where most breeding places are man-made and can be identified, mapped and treated, and actual malaria transmission is often localized and, at least in principle, easy to control. Environmental sanitation constitutes the most effective and sustainable measure of mosquito control. Vector control in urban areas is often biased towards the control of nuisance mosquitoes in residential areas. The acceptability of IRS by the population is low. High mosquito infestation, in many urban areas often induces people to spend substantial amounts of money on domestic pest control.

It is necessary to ensure the continuous availability of professional entomological and engineering competence for the planning, execution and evaluation of sanitation projects. Domestic and peri-domestic sanitation may be an important component where individual and community cooperation is essential. It often requires legislation and enforcement, but above all public information and education.

6.7 Floods and Malaria

Floods may indirectly lead to an increase in vector-borne diseases through the expansion in the number and range of vector habitats. Standing water caused by heavy rainfall or overflow of rivers can act as breeding sites for mosquitoes, and therefore enhance the potential for exposure of the disaster-affected population and emergency workers to infections such as malaria. Flooding may initially flush out mosquito breeding, but it comes back when the waters recede. The lag time is usually around 6-8 weeks before the onset of a malaria epidemic. The risk of outbreaks is greatly increased by complicating factors, such as changes in human behaviour (increased exposure to mosquitoes while sleeping outside, a temporary pause in disease control activities, overcrowding), or changes in the habitat which promote mosquito breeding (landslide, deforestation, river damming, and rerouting).

6.8 Drought and Malaria

Drought causes drying of rivers and formation of rivulets and small pools which are condusive for breeding of mosquitoes. Animals die during the course of droughts and zoophilic mosquitoe species are diverted to human beings. These result in the built up in mosquito density and increase chances of man-mosquito contact.

6.9 Socio-civil disturbances

Conventional malaria control strategies need to be adapted to refugee situations. What can be achieved in malaria control will differ according to the phase of the emergency and local circumstances. Disease management along with personal protection and vector control interventions should be applied. The choice of vector control method will depend on local factors such as the type of shelter available, human and vector behaviour. These include:

- IRS applied on inner surfaces of tents and other accommodation is most likely the intervention achieving the fastest reduction in malaria transmission.

- ITNs are technically simple and effective in stable settings. For refugee or internally displaced populations living outdoors under tents or plastic sheeting, there are ways of hanging ITNs outdoors.

- Alternatives to ITNs particularly, insecticide impregnated tents and tarpaulins, and insecticide-treated blankets and top-sheets and Insect repellents have proved useful and may be used wherever feasible eg. In temporary camps.

6.10 Conclusion

It may be concluded that ingenuity and innovative approaches are a must to handle malaria in special groups and special situations.

Chapter 7

Training of Human Resources

NVBDCP is a constantly evolving programme with updating of *strategy* and policies, which require ongoing training and re-training of staff at different levels.

7.1 ***Learning*** *is the act or process of acquiring new knowledge or skills. It is a continuous process, which begins at birth and continuous through out life. Often programmes and institutions introduce changes in strategy and policies, which require unlearning and relearning.*

Educating Adults: NVBDCP requires training of a variety of health care staff involved in service delivery at all levels. These are personnel who have years of work experience and established work patterns. The training needs and process of such adults are influenced by such characteristics.

- Adults are *autonomous* and *self-directed.* When teaching them it is important to ensure their participation and active involvement. Instead of monotonous lectures, interactive tools like modular trainings, case studies, field exercises etc should be used. The trainers should act as facilitators, guiding participants to their own knowledge rather than supplying them with facts.
- Adults are *experienced* due to previous education and variety of responsibilities at work and home. They should be able to relate their experiences to the context of learning.
- Adults are *goal a*nd *relevance-oriented*. The goal of training should be made clear from the start. The training should be relevant to the roles and responsibilities of the trainees.
- Adults are *practical*; instructors must guide participants to see how the lessons and new skills will be useful to them on the job.
- Adults need to be treated with *respect*. They should be treated as equals and their experience acknowledged.

7.2 Training: Training is designed to acquire the necessary knowledge and develop the required skills while on the job to change the performance of people doing the jobs Training should not only strengthen technical skills but also help motivate field staff for discipline, diligence and dedication in their work. Through good planning and implementation of training activities, trainers can serve as role models in this respect. The training should be an ongoing programme with an inbuilt provision to update knowledge and skills in the light of scientific and technical advances.

Training programmes should not be conducted in a routine mundane fashion. It should rather c**reate a positive** learning climate. The participants should be treated with respect and should be allowed to provide input regarding schedules, activities and other events. Discussions should be encouraged. Hands-on work, group and individual projects, and classroom activities should be planned. Audiovisual aids, role plays and case studies should be used.

7.3 Types of Training

i) Induction training

Induction training is meant to enable newly recruited staff to become productive as quickly as possible. In NVBCD, newly recruited staff such as District VBD Consultants and Malaria Technical supervisors (MTS) will need induction training soon after they join. The following areas may be included in induction training:

ii) On-the-job training

On the job training occurs when workers learn skills whilst **working along side experienced workers** at their place of work. New workers may "shadow" or observe fellow employees to begin with supplemented by working through instruction manuals or interactive training programmes. On-the-job training should also be provided by supervisory staff **during supportive supervision visits**. Visual job aids, manuals and instructions should be used in this type of training, so that the trainee has reference material in the absence of the supervisor / trainer.

iii) In-service/ Off-the-job training

This occurs when workers are **taken away from their place of work** to be trained during a short period. This may take place at a training academy, at a PHC, if class room facilities are available, or at school premises during weekends. In-service training should always be task-oriented, interactive and participatory. The one-way, lecture format is outdated and proven to be extremely inefficient. It should be oriented as modules. Each module includes a trainer's guide and a trainee's guide.

7.4 Medical & paramedical personnel – (Regular/ Contractual) involved in anti-malaria activities in a district:

Following implementation of the Multipurpose Health Worker Scheme in 1976 the vertical staffs of the National Malaria Control Programme was integrated with the Primary Health Care Delivery System. Malaria prevention & control activities in the district are therefore the responsibility of the Chief Medical & Health Officer (CMHO). The District Malaria Officer (DMO)/ District Vector Borne Disease Control Officer (DVBCPO) is the district level nodal person in-charge of these activities and reports to the CMHO. In high malaria endemic areas additional manpower support is also provided by the programme in the form of District level Consultants and Sub-district level Malaria Technical Supervisors (MTS). Following manpower (regular or contractual) of the general healthcare system is involved in anti malarial activities in a district:

Sl. No	Designation
1	Dist. Malaria Officer/ (DMO)/ District Vector Borne Disease Control Officer (DVBCPO)
2	Zonal Malaria Officer / Entomologist
3	Asst. Dist. Malaria Officer / VBD Consultant
4	MO-CHC / PHC /Hospitals
5	Malaria Technical Supervisor
6	MPHS (M)
7	MPHS (F)
8	MPHW (M)
9	MPHW (F)
10	Lab. Technician
11	Pharmacist
12	Indoor Residual Spraying teams
13	ASHA / Village link worker / NGO volunteer

These staffs need training at the time of joining and reorientations as per the changing needs of the programmme.

7.5 Training Norms: The matrix on training needs of different categories of staff for introducing new norms presented in this manual is given in **Table 7.1**.

Table 7.1: Training norms of different categories of functionaries

Type	Whom	Where	Duration	No/ Batch	By whom
DISTRICT					
Technical	FTDs (ASHA/AWW/ CHVs, USHAs (urban areas) for Malaria	Sector/ Block	2days (No night stay).	25	MO in charge in collaboration with MTS
-do	Traditional healers/ Faith	Sector/ Block	1 day	25	MO in charge in collaboration with

	healers				MTS
-do-	MPHS/ MPHW (M&F)	Block	3days	25	MO in charge in collaboration with MTS
-do-	Lab Technician	District/ ROH&FW/ State laboratory	Induction 24 days Re-orientation 10 days once in 2-3 years	20	ROH&FW /Central Malaria Lab
-do-	MO (PHC)	District	3 days	25	Dist/Regional training centers
-do-	Physicians from district and other hospitals including private/NGO	Regional	2 day	25	Designated Medical College
-do-	Malaria Technical Supervisors	Sub-National/	10 days induction 5 day reorientation once in 2 years	25	VCRC/NIMR and field stations/ ICMR Institutes like RMRC Bhubaneshwar
STATE					
Technical	Private Doctors	District	½ day	10	DMO/ IMA/ Pvt Sector/ SPO
NATIONAL					
Technical	Zonal Entomologists	Sub-National/ State	4 weeks	15	VCRC/NIMR and field stations
Managerial	DMOs	National/Sub-national	5 days	25	Modules, Institutions dealing with management training and experts on management
-do-	VBD consultants	National / Sub-national	3 months	25	-do-
-do-	State Program Managers/ Regional Directorate/ Entomologists/ VBD /State consultants	National	5 days	20	National VBDCP in collaboration with management experts

The trainings are to be tailored to the job responsibilities of the health functionaries. Certain categories can be trained together, for example DMOs and VBDCOs or MOs and MPHWSs. The job descriptions of different staff in the district are given in Annexure A.

7.6 Planning process of training in a district:

Training of Medical Officer –of PHCs , MPWs and ASAHs would be included with the NRHM integrated trainings .However training indicated in the table given above for these health categories are programme specific trainings and need to be planned and imparted separately.

Estimation of the training load is to be done at the beginning of the year. This should consider the number of personnel sanctioned and working at different levels in the district. The existing training status of the personnel is to be noted. This would give the requirement of the number to be trained and batches of trainings to be conducted.

7.7 Monitoring and Evaluation of training

It is very essential to monitor the quality of trainings. Concurrent evaluation of the trainings could be done by independent observers. Pre and post test evaluation have to be conducted. Feedback has to be obtained from the participants as to the quality of each session. Suggestions for improvement have to be obtained.

Quarterly progress report: State Programme Officers would be required to submit the quarterly progress reprot on training as per formats given in the M& E framework. The report should reach the Dte. of NVBDCP on or before every 20th of the succeeding month of quarter ending. See Annexure K - 12 of Chapter.

Chapter 8

Intersectoral Action and Advocacy

The developmental activities undertaken by different sectors are responsible for the proliferation of mosquito breeding places and thereby dramatic increase in malaria incidence. The inter-sectoral coordination should play a key role in advocacy for the containment of malaria. Programme advocacy is used at the local, community level to convince opinion leaders about the need for local action. The programme intends to involve other sectors responsible directly or indirectly for proliferation of mosquito breeding places as well as sectors which can play effective role in malaria control. Various such sectors and their roles required for containment of malaria is indicated below:

S. No	Sector/Agency	Roles
1	Agriculture	• Pesticide Management and judicious use of pesticides • Farmer Field Schools to implement Integrated Pest and Vector Management • Popularizing the concept of Dry-Wet irrigation through extension education •
2	Water Resources Development	• Maintenance of canal system • Intermittent irrigation • Design modifications and lining of canals • Deweeding for proper flow • Creating small check-dams away from human settlements
3	Water Supply	• Repair of leakages to prevent pooling • Restoration of taps • Diversion of wastewater to pond/pit • Staggering of water supply • Mosquito proofing of water harvesting devices • Repair of sluice valves
4	Urban development	• Improved designing to avoid undue water logging • Building use permission after clearance of health department • Safe rainwater harvesting • Use mosquito proof design of dwellings
5	Industry/mining	• Improving drainage and sewerage systems • Safe disposal of used containers/solid waste • Mosquito proofing of dwellings • Safe water storage and disposal • Use of ITNs/LLINs
6	Railways	• Proper excavations • Maintenance of yards and dumps and antilarval activities in areas within their jurisdiction • Housing for health safeguards • Promotion of use of ITN/LLIN amongst the railway employee
7	Environment/Forest	• Pesticide management policies • Environment management policies • Reclamation of swampy areas • Social forestry
8	Fisheries	• Institutional help • Training in mass production of larvivorous fishes • Promotion of composite fish farming schemes at

S. No	Sector/Agency	Roles
		community level
9	Road and building sector	• Proper planning • Merging pits by breaking bunds • Excavations in line with natural slope/gradient • Making way for water to flow into natural depression/pond/river • Follow up action after excavations
10	Remote sensing	• Technical help and training in mapping environmental changes and malaria risk using GIS
11	Education	• Vector control teaching in educational curriculum. • Issuing directions for monthly drive on cleaning of school premises, cleanliness of surroundings and checking water containers for mosquito breeding. • Incorporation of vector control activities in the training curriculum of ICDS functionaries under the Department of Women & Child Development as well as their involvement in vector control activities.
12	Mass media	• IEC activities • Advocacy
13	Local self government (Panchayati Raj Institutions)	• Monitoring of surveillance & interventions. • Advocacy on vector control. • Community education and awareness. • Motivating community for acceptance of Indoor Residual Spraying (IRS). • Promotion of larvivorous fishes in permanent water bodies. • Jawahar Rojgar Yojna funds to be used in improving drainage and sanitation programme.
	Village councils	• Overall cooperation in the ongoing malaria programme like IRS, ITN • Ensuring public participation as and when needed
14	Local Governments/ Corporations/ Municipality.	• Coordinated action for preventive vector control in urban areas.
15	Health (NRHM)	• Promoting ITNs/LLINs through Health and Family Welfare services, IMCI, IMNCI
	Village Health and Sanitation Committee	• Coordinated action for preventive vector control in villages by utilizing untied funds of Rs 10,000/-
	Rogi Kalyan Sammittee (Block)	• Improved referral services by providing transport facilities for complicated cases • Coordinated action for malaria control activities by utilizing funds under flexi pool.
	IMCI, IMNCI	• Promoting ITNs/LLINs through Health and Family Welfare services, IMCI, IMNCI
16	ICMR / Medical colleges	• Need based operational Research
17	NGOs/ FBOs/CBOs	• Community mobilization • Promotion of programme activities • Village level training • Distribution of IEC material • Monitoring and evaluation • Feedback on achievements

.

Chapter 9

Community Participation and Behavior Change Communication

9.1 Background

Information, Education and Communication (IEC) is supportive strategy and an integral part of malaria control programme. The ultimate goal of communication is to bring the behavioural change through information and empowerment of people to encourage community participation.

9.2 Objectives

The specific objectives of the BCC are as under:

- Enhance awareness regarding source and transmission risk reduction, treatment, availability of services at different levels
- Promote attitudinal and value changes among target audiences leading to informed decisions, modified behaviour, desirable practices at individual and societal level
- Stimulate increased and sustained demand for quality prevention and care services and optimal utilization of available health care services
- Build support for the programme across inter-sectoral partner organizations, influential sectors of society (corporate houses, political representatives, social activists, media, civil society organizations, etc.) and health care service providers and elicit commitment for action
- Ensure utilization of services.

9.3 The scope and framework for the community to participate and own the program

The malaria control program offers considerable scope for communities to participate in and own the program within overall umbrella of NRHM. An illustrative list of actions that communities can take is provided in Table 9.1.

Table 9.1 Scope for Community Participation in the malaria control program

Program Component	Scope for community support to specific components	Scope for community monitoring of specific components
Early diagnosis and complete treatment	• Determining the appropriate person to play the role of the local volunteer • Spreading the word about the availability of RDT and ACT with the ASHA or other local person / volunteer, and about back-up facility when this provider is absent • Spreading the word about the need to get tested early in the course of illness • Spreading the word about the reliability of RDT and ACT for falciparum • Spreading the word about the advisability to save on costs by first resorting to the local malaria care provider	• Demanding and ensuring one or more trained providers within realistic access of every habitation • Alerting authorities about non-availability or non-functioning of provider • Alerting authorities about stock-outs of tests or medicines Alerting local providers and higher authorities about outbreaks

	• Supporting the provider in record keeping, as needed Facilitating quick transport of slides to the laboratory	
Referral care	• Ensuring early transport of patients of severe malaria to the correct referral institution • Helping the family avail of government schemes supporting costs of transportation and treatment*	• Demanding and ensuring immediate care for cases of severe malaria at institutions • Ensuring that untied funds at village and subcenter levels under NRHM are made available in a timely manner for poor families needing referral.
Insecticide Residual Spray	• Determining dates of spraying in partnership with district / PHC • Spreading the word about dates • Informing communities about necessity of IRS • Accompanying spray teams to houses on day of spraying, convincing people about the necessity	• Monitoring whether actual spray operations are conducted as per norms and plans • Providing feedback about perceived effectiveness of insecticide spray
Bed net distribution	• Determining the mode of distribution in partnership with district / PHC malaria authorities • Supporting educational efforts related to consistent and correct use of bed nets, particularly among small communities not frequented by health workers	• Ensuring equitable distribution in selected habitations, as per norms • Minimizing sale of bed nets by recipients, particularly the poorer households • Alerting appropriate authorities regarding any malpractices
Bed net impregnation with insecticide	• Determining mutually convenient dates with the MPHW or ASHA who leads the impregnation work • Providing labor for impregnation	• Ensuring that assigned volunteers or health workers conduct impregnation of bed nets as scheduled • Providing feedback about perceived effectiveness of impregnated bed nets
Larval control	• Supporting source reduction efforts, using local labor and funds* as feasible • Spreading word about steps families can take to eliminate breeding places	• Monitoring whether actual field work for source reduction has been undertaken as per norms and plans

*Such as untied health funds available to CHC, PHC, Subcenters and Village Health Committees.

9.4 A strategy for behaviour change

The principles underlying a behaviour change strategy, according to current behaviour change theory and experience, may be summarized as follows:

- Analysis of Health behaviour is a necessary step before formulating and communicating messages.
- The most relevant messages for potential audience.
- Interpersonal communication or counselling (IPC) is the preferred primary approach
- Clear messages, communicated through different, credible channels are most likely to bring about change.

- In a typical public health situation, many sources of information already exist for a given health problem or solution. These sources are often not in agreement, either on content or emphasis. An ideal BCC strategy will include plans to build consensus and harmonize the information coming from different sources.
- Every intervention must be periodically evaluated for effect and reasons for success or failure. This should lead to minor or major revisions to strategies and plans.

9.5 BCC in the malaria control program: the goals, and a practical approach

The goal of BCC in malaria control is to increase coverage of BCC in the population at risk. The practical approach will be to translate the central protypes into different local languages and use various methods in pursuance to achieve the goal. The suggested messages for use at different program levels are given below:

Table 9.2: Suggested messages for use at different program levels for a basic, start-up communications plan

Provider / Level	Basic messages
ASHA / Community level volunteer	To community at large: - Fever could be malaria - Malaria can be dangerous, so should be treated in time - I can test and tell you immediately if you have dangerous malaria or not - I have free medicines which are very effective against dangerous malaria - Come to me immediately when you have fever, anytime, without losing time - Make sure you sleep under bed nets treated with insecticide. They keep malaria-causing mosquitoes away. It is particularly important to make sure that pregnant women and children sleep under the net To patients (family) with a positive RDT: - You have malaria of the dangerous kind - Taking these tablets (ACT) in the correct dose will cure you - Let me know if you still have fever after you complete treatment - If you develop drowsiness, severe vomiting, or convulsions, you need to rush to (specified) hospital. You will get free admission and treatment there. To patients with a negative RDT for PF: - You do not have malaria of dangerous kind, but it could still be malaria - I will send your slide for testing and let you know the result - You can take these tablets (paracetamol) to bring down the fever for a few hours after each dose, but these tablets cannot cure the cause of fever - If you think you are getting worse, go and consult a doctor While distributing bed nets: - (Demonstrate how to put up a bed net indoors and outdoors) - Wash this net as infrequently as possible, so that its effect lasts longer - (ITN:) Bring this net back to me every six months, I will dip it in insecticide for you. - (LLIN:) This is a special and expensive bed net. If you wash

	this infrequently (once every few months), the effect of the net will last … years. Selling this net is not allowed. You may be punished if caught. Before and during the IRS round: - Make sure you are available when the spray teams come on (date) - The actual spraying will last only a few minutes - The sprayed insecticide will not harm you, but it is best to wash utensils before use for cooking or eating - Make sure all rooms are sprayed, especially rooms that you sleep in - Do not wipe off the insecticide from the walls. - Do not put mud plaster or paint on the sprayed wall
MPHW (M, F)	As above, particularly in the main subcenter village (residence of ANM). Plus: - (Name of volunteer) in your village is trained to use blood tests for malaria and to treat malaria – go to her whenever you have fever. What she offers is the fastest test and most effective medicine available, better than what is used by private doctors, and free of cost. - If many of you get fever at a time, let me or the PHC know immediately, this is the phone number ….
PHC/MO	To patients (family) with a positive RDT/Microscopy - You have malaria of the dangerous kind - Taking these tablets (ACT/CQ) in the correct dose will cure you - Let me know if you still have fever after you complete treatment - If you develop drowsiness, severe vomiting, or convulsions, you need to rush to (specified) hospital. You will get free admission and treatment there.

During monsoon and post monsoon months, the risk of malaria increase manifold on account of increases breeding of vector mosquitoes, responsible for spreading malaria and other vector borne disease. The month of June is therefore, observed as Anti Malaria Month (AMM), before the onset of monsoon prior to the transmission season. The details on organization of Anti Malaria Month are given in **Annexure M**.

Chapter 10
Public - Private Partnership for Malaria Control

10.1 Introduction

The implementation of appropriate measures for prevention and case management of malaria cases can be achieved by making the facilities accessible, awareness initiatives and pro-active behavioural changes in the community. Public Private Partnership (PPP) with Non-Governmental Organizations (NGOs), Industries, Faith Based Organizations (FBOs), Community Based Organizations (CBOs) and Local self-government (*Panchayat*) is envisaged under NVBDCP towards achieving this aim. The objective is to provide uniformity in diagnosis, treatment and monitoring through a wider programme base to maximize access to anti-malaria treatment and appropriate and locally applicable vector control measures. NGOs, FBOs, CBOs and *Panchayat* would complement and supplement the government efforts to make a significant dent in the malaria burden and bring about betterment of overall health and economic condition of the population in the endemic areas for malaria.

10.2 Categories of Public Private Partnership

Category 1: With Local self-government *(Panchayat)* or *Panchayat* level NGO/FBO/ CBO (population coverage - minimum of 5000 population).
Category 2: Block level NGO/FBO or any NGO/FBO having block level service delivery structure (population coverage - minimum of 1,00,000 population)

Non-Governmental Organization (NGO)

The NGO could be an organization, charitable company, public trust, cooperative or professional body having legal status by registration under the appropriate Act. It should have an established base at Block level having a population base of at least 100,000 and a minimum of three-year experience in the social sector particularly in health or related field in the area of operation. The NGO will submit the details of geographical coverage and network organizations at the time of signing of Memorandum of Understanding (MoU). The NGO will also provide details of projects undertaken during the last five years.

The NGO must have strong credible links with the community and may effectively integrate malaria control activities with its ongoing programmes. The names, full addresses of the organizations as well as names, addresses, qualifications and experiences of head of organizations and personnel who would participate in the Project must be clearly mentioned in the project proposal.

The NGO will have clean audit reports relating to the past activities of the organization. It should not have been blacklisted by any government agency. The organization must not be involved in litigation on any socially sensitive, religious, financial or any other issue.

The project proposal should be accompanied with the following documents:

1. Copy of the registration certificate
2. Bye laws and Memorandum of Association
3. Annual report of the last three years
4. Non-Governmental Organization's Self-Assessment Report, Projects/Activities carried out in the last three years
5. Audited statement of accounts for of the last three years

6. Organogram of the NGO with details of executive members
7. Details of medical and non-medical personnel available
8. Certificate from the NGO stating that it is not receiving funds for the activity mentioned in the proposal from any other national or international donor agencies or State Government.
9. Copy of an affidavit mentioning that the organization has/is not involved in litigation on any socially sensitive, religious, financial or any other issue.

Industries

Large scale for profit industrial establishments like TISCO, SAIL, ISPAT, Tea estates etc. are responsible for the health and welfare of their employees. They can play useful role in the prevention and control of malaria in their employees and local population of the area. Industries which have well known track record of being gainfully involved in local health projects are to be involved for the purpose.

Faith Based Organization (FBO)

Faith Based Organizations (FBOs) are civil society organizations such as, Sri Ramakrishna Mission, Bharat Sevashram Sangh, Christian Church Associations, etc. In case the FBO is registered and having an established base at block level with at least 100,000 population, the definition and details as mentioned above for an NGO will be valid. In all other cases, the FBO will provide documentary proof regarding affiliation to registered body / organization / local self-government. It will have an established base at village level for at least 1 year and should be able to implement the project in an area with a population base of at least 5000.

Local self-government *(Panchayat)lPanchayat* level CBO

The p*anchayat* will be a duly elected local self – government with a s*arpanch* and 5 members covering a minimum of 5000 population. The *panchayat* level CBO will have a duly elected body and an established base at village level for at least 1 year and should be able to implement the project in an area with a population base of at least 5000. The organization must be involved in social development activities.

10.3 PPP Schemes

This is an opportunity to involve NGOs and other sectors in programme. It has been observed that there is intense need to enlist participation from sectors other than government. All state should campaign about these schemes in order to popularize for better participation in these schemes.

A. Provision of early diagnosis and prompt treatment (EDPT)

Scheme 1: Provision of outreach services

Scheme 2: Provision of microscopy and treatment services

Scheme 3: Hospital based treatment and care of severe and complicated malaria cases

B. Integrated vector control

Scheme 4: Promotion of insecticide treated bed nets, insecticide treatment of community owned bed nets and distribution of insecticide treated bed nets in selected areas

Scheme 5: Promotion of larvivorous fish

Scheme 6: Indoor Residual Spraying (IRS)

All these schemes will be implemented in high malaria burden areas as per the policies and guidelines of NVBDCP. Awareness generation / Behaviour Change Communication will be integral part of all the above-mentioned schemes. Apart from the grant-in-aid, the NVBDCP provides technical support for surveys, training and guidance, literature, drugs, diagnostics, consumables, bednets, insecticides for impregnation of bednets etc., as appropriate to the scheme.

Scheme – 1: Provision of early diagnosis and complete treatment

Early diagnosis and complete treatment of malaria cases is available at all government health centres with a vast network of health workers and community volunteers. However, augmentation of this strategy is envisaged through PPP. Preference shall be given to those areas where there is a shortage of MPWs (M), areas which are at least 5 km away from a PHC or any other Government health infrastructure and areas from where deaths have been reported. One organization will cover a minimum of 5000 population. No charges will be levied on patients for any service rendered.

Scheme - 2: Malaria Microscopy and Treatment Centre

Correct diagnosis of the type of malaria through RDT/microscopy is highly recommended for complete treatment with correct doses of anti-malarial drugs in accordance with the National drug policy. Dispensaries and mobile clinics already run by organizations can provide malaria microscopy and treatment facilities free of charge in remote areas which are at least 5 km away from any government health centre with similar facilities. The population to be covered under the Project will be at least 25,000. Each will have at least one trained Laboratory Technician (LT) to examine blood smears and a qualified medical practitioner, preferably trained under NVBDCP.

Scheme - 3: Hospital based treatment and care of severe and complicated malaria cases

The organizations running hospitals will provide hospital-based treatment and care to severe and complicated malaria cases as per NVBDCP guidelines and follow-up of patients on treatment. Such hospitals will also ensure early diagnosis and complete and effective treatment to outdoor fever cases. The population to be covered under the project will be at least 100,000.

Main activities to be carried out under Schemes 1 -3

Scheme 1	Scheme 2	Scheme 3
Survey of the area including enumeration of households for demography and KAP on EDPT	Identification of individuals for training in malaria microscopy; one LT will examine 50 blood slides per day and communicate results within 24 hours. Quality assurance of malaria microscopy Use of RDT in remote areas identified by the programme	Treat free of charge severe and complicated malaria cases Undertake passive collection of blood smear and provide the results within 24 hours Use of RDT in remote areas, as identified by the programme
Identification of staff or volunteers or centre @ 1 per 1000 population for RDT, slide collection and transportation of slides to laboratory and take back report, treatment	Provide complete treatment for all positive cases Records of diagnosis, treatment and logistics will be maintained and report submitted to MOPHC/DMO/DVBDCS on a fortnightly basis	The organization having mobile vans/ambulances will take care of transportation of the severe and complicated cases. Detailed reports of malaria deaths

Maintenance of records as per NVBDCP formats and timely reporting to MOPHC/DMO/DVBDCS.
Identification of staff or volunteers or centre @ 1 per 1000 population for RDT, slide collection and transportation of slides to laboratory and take back report, treatment
Informing programme staff (MO-PHC / DMO) if there is unusual increase in fever cases suspected to be due to malaria or if a death due to malaria or suspected malaria
Timely referral of severe and complicated malaria cases
Promotion of ITN/LLIN use by impregnation of ITNs and distribution of ITNs/LLINs in selected areas
Promotion of larvivorous fish in selected sites
BCC for making patients/community aware about early diagnosis and treatment as well as preventive measures and initiate community mobilization; it will be done utilizing inter-personal communication forum, advocacy sessions with local opinion leaders, teachers, private health service provider, religious leader, ANM, *Anganwadi* worker, traditional birth attendants, folk media, etc. as well as through locally appropriate print and other media.

Scheme - 4: Insecticide treatment and distribution of bed nets

The organization will promote regular use of ITNs in the community. They will motivate the community for annual treatment of bed nets already in use with insecticide and collaborate with the district health authorities in organizing camps for the exercise during pre-transmission season. The organization will undertake distribution of bed nets in selected areas. Limited supply of bed nets for use by the BPL households with limited capacity to buy such nets from the commercial outlets is included in the strategies under NVBDCP. The organization will cover a minimum of 5000 population.

Scheme - 5: Promotion of use of larvivorous fish for vector control

The organization will promote and supervise the use of larvivorous fish as biological vector control measure. They will enlist the water bodies that are potential breeding grounds of mosquitoes in their catchment area and undertake seeding of large perennial water bodies, unused wells in collaboration with the DMO/DVBDCS. The organization will construct and maintain hatcheries. These will be positioned according to the need, epidemiological necessity and lack of existence of State/district/block/PHC level hatcheries. The organization will cover a minimum of 5000 population.

Scheme - 6: Indoor Residual Spraying for vector control

The organization will undertake indoor residual spraying (IRS) for vector control in coordination with DMO. Under the Scheme, it is envisaged that NGOs/CBOs/FBOs/*Panchayats* will cover at least five villages with minimum 5000 population. Selection of villages for IRS will be done by the DMO/DVBDCS as per Guidelines of NVBDCP.

Main activities carried out under schemes 4 – 6

Scheme 4	Scheme 5	Scheme 6
Conduct survey for bednet use and KAP and prepare action plan	Conduct survey for assessing the number of water bodies and prepare action plan	Preparation of microplan (areas to be covered under IRS, manpower, insecticides and equipments, spray programme)
Identification of staff or volunteers for training		
BCC on bednet use, other preventive measures, diagnosis and treatment and initiation of community mobilization	BCC on larvivorous fishes, other preventive measures, diagnosis and treatment and initiation of community mobilization	BCC for community compliance of IRS, other preventive measures diagnosis and treatment and initiation of community mobilization.
Involve self-help groups and women's organizations in BCC activities		
Organize camps for bed net treatment. Distribute bed nets as per policy, in areas selected by NVBDCP	Obtain larvivorous fish from mother hatchery at PHC/ District level and release them in identified water bodies.	Formation of spray squads. Transportation and storage of insecticides
Post-distribution, will undertake monthly visits to check bed net use in randomly selected 5% of households		Maintenance of equipment and proper disposal of insecticide remnants after the spray Daily summary of spray operations to include number of households covered and completeness of coverage
Maintenance of records and reporting to MO-PHC / DMO		

10.4 Project proposal

The Project Proposal will be on any one or more of the schemes. The proposal should briefly comment on the existing infrastructure, personnel and financial capabilities of the organization and enclose the requisite supporting documents. The proposal must specify clear, qualitative and quantitative output indicators, consistent with the project objective(s).

The proposal must clearly specify the objectives and needs of the project; these should be appropriate to the scale and the nature of the problem it seeks to address. The project activities should be consistent with the NVBDCP priorities and strategies. The project should integrate project implementation in respect of malaria control with its ongoing activities.

The organization will have minimum staff for implementation of the project. Any additional personnel, if required, will be listed in the proposal. However, the sanction and appointment of additional staff will be at the sole discretion of the Technical Advisory Committee (TAC) for Public-Private Partnership.

The work plan should give detailed descriptions of the services to be provided; dates for completion of various tasks, place of performance for different tasks, specific tasks. The project duration will be for a minimum of one year and maximum of three years. The proposal should have a calendar of activities for each month.

The budget lines should be clearly laid out. The overall financial expenditure proposed should be in accordance with NVBDCP Guidelines with a flexibility of 10%. The role of each staff projected in the budget should be justified. The recurring expenses as remuneration, reimbursables and miscellaneous expenses (communication cost – phone, record-keeping, report preparation, etc.) should be clearly delineated per activity.

The proposal will be submitted to the Medical Officer of PHC (MOPHC) for onward transmission to the District Malaria Officer (DMO) or directly to the DMO.

Scrutinization of proposals

All the proposals received will be placed before the TAC at the District level comprising the following:

1. Chief District Medical Officer (CDMO) or District Medical & Health Officer (DMHO) as Chairperson
2. DMO as Member Secretary
3. Block Development Officer
4. A member of State Vector Borne Diseases Control Society (SVBDCS)
5. One NGO member of the District Vector Borne Diseases Control Society (DVBDCS)
6. One member of DVBDCS from Government Departments.
7. Two officers representing:
   a. District Rural Development Department
   b. District Fisheries Department
8. Representative of one registered NGO/FBO involved in social development activities, which is not participating in the project and not part of DVBDCS

The TAC will scrutinize new proposals with reference to the activities specified in the respective State Action Plan. After the scrutiny, the TAC may come to one of the following recommendations:

- Approve the new proposal in *toto* and recommend it
- Recommend modification of the proposal in terms of the strategies and methodologies
- Reject the proposal after recording the specific reasons

The TAC will also review the progress of the ongoing projects and recommend continuation.

The organizations whose proposals are recommended by the TAC for modification will be informed of the decision and invited to participate in a one-day Orientation Training Programme (OTP) conducted by the DMO, who will train the organization on proposal development and all aspects of project implementation.

Thereafter, the identified organization will be asked to formulate proposals for their respective catchment areas and submit to MOPHC/DMO which will be considered by the TAC. The proposals approved by

the TAC will be taken up for field inspection by a Joint Appraisal Team (JAT) consisting of one member of SVBDCS, who will be designated as Zonal Officer for specific districts and one member of TAC and the respective MO in-Charge of the block level PHC/CHC. The JAT will also make efforts to find out the credibility of the organization in the local community. The field inspection report of the JAT, along with the recommendation of the TAC will be placed before the scheduled meeting of the Executive Council (EC) of SVBDCS, chaired by the State Health Secretary for consideration and decision.

Those organizations whose proposals are rejected by the TAC, JAT or EC will be informed in writing stating briefly the reasons for rejection.

10.5 Release of funds

The organizations whose proposals are approved by the EC will enter into a MoU with the DMO/DVBDCS; thereafter the funds will be disbursed to the organizations by DMO/DVBDCS following administrative approval and expenditure sanction from SVBDCS in the following pattern:

- DMO/DVBDCS shall work out the requirement for funds for public-private partnership for malaria control (NGO services) and send to SVBDCS along with quarterly District Action Plan. The concerned SVBDCS shall examine the requirements on the basis of (a) Annual Action Plan of the DVBDCS, (b) actual expenditure in the previous quarter of DVBDCS, (c) future action to be taken by DVBDCS in the next quarter and (d) receipt of quarterly statement of expenditure of DVBDCS duly approved and signed by its Member Secretary and Chairperson. The SVBDCS shall release funds for all approved project proposals. The DMO/DVBDCS will withdraw funds for releasing to a organization through cheque.
- The amount sanctioned will be released in two six monthly installments in the first year. The first installment would comprise the entire non-recurring expenditure of the project plus 50% recurring expenditure earmarked for the first six months. The second installment will be released after (i) receipt of Statement of expenditure (SOE) and Utilization certificate (UC) from the NGO/FBO/CBO/Panchayat by DMO/DVBDCS and (ii) approval of Inception/Progress report by the TAC. Any unspent balance is to be carried forward to Year two, provided continuation of the project has been approved by the TAC. There will be a flexibility of up to 10% reallocation of funds among budget heads.
- The Block level NGO/FBO will have at least Rs. 1,00,000/- balance in bank account and submit a bank guarantee of 10% of the MoU amount within one month of signing of MoU. The block level NGO/FBO will also agree to invest 10% of the MoU amount in kind in the form of infrastructure, staff etc. to implement the proposed scheme.
- The SVBDCS will release 100% of the sanctioned budget for public-private partnership (NGO services) to DMO/DVBDCS for one year as per NVBDCP Guidelines. The DMO/DVBDCS will keep the funds in a separate Bank account for release to NGO/FBO/CBO/*Panchayat* in two installments under intimation and approval of SVBDCS.

The Directorate of NVBDCP will release funds to SVBDCS for public-private partnership (NGO services) subsequent to review of budget estimate submitted by state and administrative approval and expenditure sanction by MOH&FW.

10.6 Performance appraisal

Retention of grant and release of funds will be based on performance of the organization. The performance appraisal will be on the organization performing the following:

- Meeting the identified terms of reference, tasks to be carried out, reporting requirements and review processes, output indicators
- Evaluation of progress of project as per schedule
- Demonstrate qualitative and quantitative improvement in meeting the needs of the community at the end of each year.
- If the achievements are below 50% at the end of year one, the TAC would reconsider the project for continuation. In case the achievements are below 75% at the end of year two, the TAC may recommend termination of the project.

10.7 Reporting requirements

The organization will submit reports (including financial and performance details) to MOPHC/DMO/DVBDCS as per following reporting requirements along with duly certified statement of expenditure and utilization certificate:

- Inception Report in the 7th month of the commencement of the project
- Progress Report at the end of Year one
- Progress Report at the end of Year two
- Full and Final Project Report at the end of Year three

The TAC will forward above-mentioned reports to SVBDCS for information, which in turn, will forward copies to the Directorate of NVBDCP.

In addition, monthly records must be maintained by the organization regarding expenditure, logistics in stock and relevant activities as per the tasks mentioned under the Schemes for review by the MO PHC/TAC/DMO/DVBDCS/SVBDCS at any point of time.

10.8 Termination of project

The project may be terminated by not less than thirty (30) days' written notice of termination, to be given after the occurrence of any of the events specified below:

- If the organization does not remedy a failure in the performance of their obligations under the MoU, within thirty (30) days of receipt after being notified or within such further period as the TAC may have subsequently approved in writing;
- If the organization, in the judgment of the MOPHC/DMO/DVBDCS/TAC has engaged in corrupt or fraudulent practices while submitting the project proposal or in executing the MoU.
- If the DVBDCS/TAC/SVBDCS in its sole discretion and for any reason whatsoever, decides to terminate the contract.
- Either party shall have the right to terminate the MoU at any time with thirty days' notice in writing indicating reasons for the same to the other party.
- If the other party wishes to continue the contract, it must respond in writing within 30 days of receipt of termination notice.
- If a resolution between the two parties is not possible at the level of TAC, then DVBDCS/SVBDCS (in that order) shall attempt to resolve the dispute. A final decision on this

matter will be made, if necessary, by the State Director of Health Services/State Health Secretary or his/her designee.

10.9 Monitoring and evaluation

Monitoring and evaluation of the activities of *Panchayat*/*Panchayat* level CBO (covering at least 5000 population) on a monthly basis will be the responsibility of respective MOPHC. Based on the performance and fulfillment of reporting requirements, the MOPHC will recommend sanction of further support/assistance to DMO/DVBDCS.

In case of block level NGOs/FBOs (covering at least 100,000 population), bi-monthly monitoring will be done by block level medical officer, who will recommend the case to the DMO, as per the laid down benchmarks, output indicators, reporting requirements in the MoU. The DMO will undertake random visits to assess the activities of the organizations as per the benchmarks in at least 10% of coverage area, apart from quarterly visits to the villages.

10.10 Role of the DMO / DVBDCS and MO-PHC

The DMO in coordination with SPO and MO PHC will carefully prioritize problem areas for PPP according to the epidemiological indicators, inaccessibility, manpower constraints, poor health care infrastructure and inadequate facilities.

The DMO/DVBDCS will:

- Coordinate with the organization for project formulation;
- Provide requisite orientation and training, technical assistance;
- Enter into MoU with a NGO/FBO/CBO/*Panchayat*
- Coordinate organization of surveys, IEC activities, distribution of appropriate & available literature relevant to specific NGO Schemes;
- Ensure quality control of laboratory services in the microscopy and treatment centres, mobile dispensaries/clinics, hospitals;
- Organize camps for insecticide treatment of bed nets during pre-transmission season,
- Monitor reporting of malaria cases, logistics, number of bed nets treated with insecticide, number of ITNs distributed, use of ITNs by the beneficiaries, cataloguing of perennial water bodies, number of water bodies seeded with larvivorous fish, number of hatcheries constructed and maintained, number of houses sprayed, etc. (consecutive physical verification will be done while monitoring) ;
- Select areas for IRS (village will be the unit for spray operation) as per Guidelines of NVBDCP, provide requisite equipment support and undertake consecutive supervision of IRS in coordination with MOPHC and representative of SPO/SVBDCS;
- Ensure proper financial management practices as per the approved procedures; receive/monitor use of funds; arrange timely release of funds and their proper accounting as per the Guidelines; withdraw funds for releasing to a organization through cheque.
- Maintain all vouchers/receipts/SOEs/ Utilization Certificates along with all supporting approvals/bills/papers for audit purpose in safe custody
- Prepare and send biannual reports on implementation of public-private partnership (NGO services) in coordination with MO PHC to SVBDCS for onwards submission to the Directorate of NVBDCP

- Undertake any other activity that may be necessary to further the objectives of public-private partnership in malaria control, with prior approval of TAC/DVBDCS.
- Receive the consignment of anti malarial drugs, laboratory consumables, bed nets and insecticide for treatment of bed nets and IRS for onward distribution to the organizations as per the set norms under NVBDCP. Monitoring and supervision will be done by physical verification.

MO PHC will

- Submit bimonthly reports on implementation of public-private partnership (NGO services) to TAC/DMO/DVBDCS on bimonthly basis.
- Recommend sanction of further release of assistance to the organization to TAC/DMO/DVBDCS. Arrange for assistance/support for the scheme within three months of requisition in coordination with DMO/DVBBCS.
- Ensure timely submission of SOEs and Utilization Certificates by the organizations to DMO/DVBCS.
- Conduct concurrent supervision of IRS in at least 10% of houses in a village and join the DMO/DVBDCS for consecutive supervision as well.

10.11 Role of SPO / SVBDCS

The SPO/SVBDCS will

- Endorse the identified problem areas for malaria and implementation of Schemes
- Recommend project proposals on various Schemes in consultation with districts
- Provide necessary technical information and guidance
- Monitor and supervise the overall performance of organizations on a six monthly basis
- Ensure timely release of funds to the organizations
- Submit SOEs and Utilization Certificates to the Directorate of NVBCP.
- Endorse the microscopy and treatment center, mobile dispensary/clinic.
- Give concurrence for provision of microscopes if excess stocks are available or will monitor procurement by organizations and advise DMO/DVBDCS to reimburse payment to the organization following purchase from registered dealers.
- Assess the requirements of bed nets, insecticide for impregnation of nets and IRS, etc. and allocate strictly as per guidelines of NVBDCP
- Ensure high coverage of treatment and distribution of bed nets.

The State will agree to impact evaluation studies by an independent agency (to be hired as per set norms of the funding organization if any) that will include monitoring of fever cases and confirmed cases of malaria and monitoring of vector densities subsequent to distribution of insecticide treated bed nets in the targeted areas, behaviour change in the community regarding use of ITNs, larvivorous fish, etc.

10.12 Role of Regional Director

The concerned Regional Director, Regional Office for Health and Family Welfare will facilitate implementation of public-private partnership for malaria control by providing any required assistance to the SPO/SVBDCS. He/she will undertake review of activities on quarterly basis in coordination with the state health authorities and the Directorate of NVBDCP. He/she will submit independent report on biannual basis on implementation of public-private partnership in malaria control.

10.13 Role of Directorate of NVBDCP

The Directorate will endorse the identified problem areas for malaria and requirement of interventions in those areas and provide necessary technical information, guidance. The Directorate of NVBDCP will review on quarterly basis the involvement of NGOs/FBOs/CBOs/*Panchayats* in malaria control in relation to number of proposals received, scrutinized, approved; funds released; activities accomplished; reports submitted as per reporting requirements; as well as problems encountered, if any, in implementation of the strategy and specific schemes. The Directorate will ensure timely release of funds to SVBDCS for expenditure regarding public-private partnership as per the Action Plan.

Monitoring and evaluation of Schemes and proposed activities as per the set indicators and impact evaluation will be done by an independent agency recommended by the Directorate of NVBDCP at the end of Year Two of the project. The Terms of Reference for the agency and selection will be approved by the MOH&FW and External Funding Agency, if any.

Chapter 11

Monitoring and Evaluation, Malaria Surveillance

11.1 Introduction

Ever since the inception of Anti-malaria programme in 1953, the programme has regularly collected epidemiological data and compiled indicators, which have been the basis of impact assessment and future planning. The programme has over the years adapted to the ever changing needs on Monitoring & Evaluation, which today is one of the most important aspect of programme implementation and management. The concept of programme monitoring has now evolved from mere monitoring of impact and disease burden to close follow up of processes, outputs and outcomes.

Traditionally the programme has compiled epidemiological data through a system of sixteen manual reporting formats which are exhaustive in reporting. In the past few years the anti-malaria programme has undergone significant policy changes. Newer diagnostics like Rapid Diagnostics Tests (RDTs) have been introduced, at the peripheral level and Bed-nets have been distributed which will be scaled up rapidly in the coming years. In view of this, mechanisms to generate accountability for these expensive resources have to be developed. Until now MPWs were involved in active case detection by house to house visit. Over the years shortage of these MPWs has lead to poor surveillance activity in the programme. The integration with NRHM and induction of Accredited Social Health Activist (ASHA), as the first point of contact with the health care delivery, has called for further modification of reporting requirements.

There is a need for strengthening the monitoring of Programme management in NVBDCP. Programme monitoring enables continuous follow up of processes and outputs to identify problems at local level and help decision making where it is most needed. New cadre of M&E staff in the form of Malaria Technical Supervisor (MTS) is being appointed at sub-district level. It becomes imperative to utilize these personnel not only in routine monitoring of activities but also in assessment of quality of service delivery and for obtaining reliable data on programme management to assist in programme planning. The NVBDCP envisages to implement Lot Quality Assurance Sampling (LQAS) based system of annual/ biannual/ quarterly surveys to obtain quality data on availability of diagnosis & treatment within 24 hours, on utilization of bed-nets and quality of IRS coverage and reasons for non-acceptance. This data will be reported through Programme Management Monitoring Reports (PMMRs) which will also report trainings, field visits, logistics etc.

A system also needs to be developed to continuously report inpatients with severe malaria and deaths on account of malaria. For the purpose a network of sentinel sites is required to provide data on trends of severe malaria and deaths due to malaria. NVBDCP now foresees establishing 1-2 sentinel sites in each high endemic district being covered under World Bank Project to begin with, for effective system of computerized data entry for speedy transmission and analysis of this data.

As cash grant is being released to states for various activities, which necessitates stringent monitoring of finances in the programme. This component is being strengthened for more effective use of resources.

In-depth reviews are conducted by involving various institutions and agencies which have contributed to assessment of programme implementation as well as its impact. It is now planned to conduct surveys at more regular intervals to obtain information on utilization of services by beneficiaries and behavioral aspects related to malaria, prevention and control for formulating area-specific control strategies.

11.2 Terminology

11.2.1 Surveillance

Surveillance has been defined as continuous scrutiny of the factors that determine the occurrence and distribution of disease. Surveillance is essential for effective control and prevention, and includes the collection, analysis, interpretation and dissemination of relevant information for action. In the programme Active Surveillance is carried out by Multi Purpose Worker through domiciliary visit while passive

surveillance is carried out by the facilities like ASHAs, Subcentres, PHCs, Malaria Clinics etc where the patient come for diagnosis and treatment.

Not all aspects of the disease can be captured in through a case-management-based system alone. Related indicators, such as drug resistance in malarial parasites and insecticide resistance in vectors is tracked in a few carefully chosen sites spread across the country, called *sentinel surveillance* sites. Similarly, a few carefully chosen hospitals will serve as sentinel sites for tracking incidence and outcomes of severe malaria.

11.2.2 Monitoring

Monitoring encompasses on-going follow-up of the planned program activities / processes to examine whether the program is being implemented as planned and whether it is on track to reach stated goals. Planning, implementation and monitoring can be thought of as a sequence of cyclical processes, where monitoring provides the information and feedback needed to plan corrective action as and where necessary.

11.2.3 Evaluation

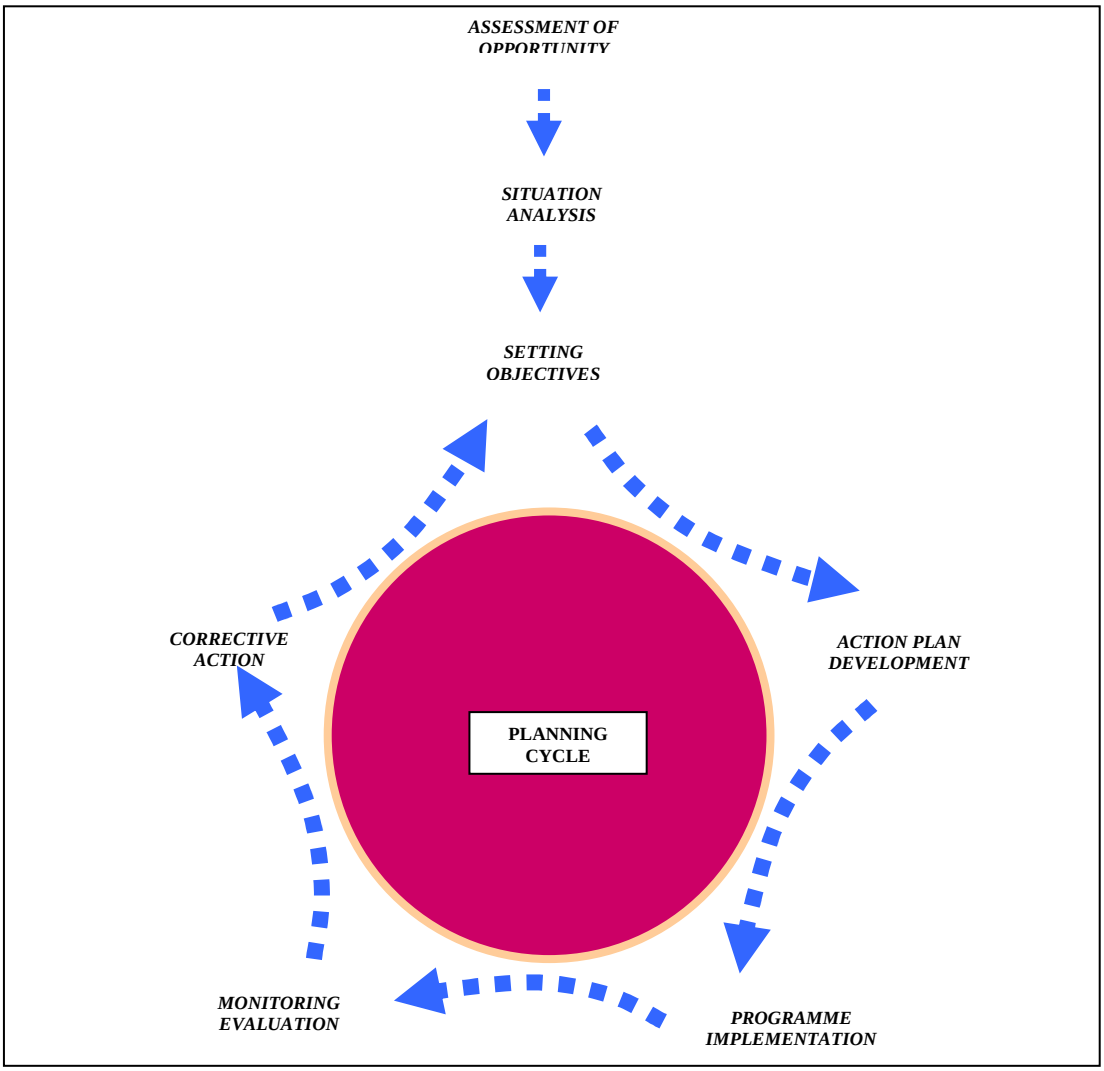
Evaluation tells the program whether it has achieved stated goals in defined time-periods, and why it may have succeeded or failed. Evaluations are expected to lead to modification of Program Design and Policies. The performance of the program is evaluated by independently conducted periodic surveys and qualitative assessments which provide measurements of a set of predetermined indicators. These include indicators like proportaion of cases receiving timely case management, the correct use of bed nets and indoor residual spray, the incidence of severe malaria and malaria mortality.

11.2.4 Planning

Planning means the rational use of relevant epidemiological data to make the most effective possible utilization of program resources, based on the best understanding of cause-effect relationships, leading to the achievement of program goals. Planning is a necessary element of program management.

Planning is a cyclical process which is initiated with the identification of opportunities for change and improvement. This is supported by situation analysis to assess the baseline information on disease burden, epidemiological determinants and behavioural factors influencing prevention and control. Once the disease burden is ascertained the potential for change is estimated and objectives are set. The Objectives are set keeping in mind the feasibility aspects, it is therefore always recommended to formulate SMART objectives i.e. specific, measurable, achievable, realistic and time-bound. Following which resources are identified and a costed plan is developed for execution to achieve the set objectives. Programme implementation is begun and it is constantly monitored to assess whether activities are progressing as planned. Programme evaluation is done at periodic intervals and based on their findings midcourse corrections are done. Final programme evaluations assist in impact assessment and reframing of programme policies. Fig 11.1 illustrates the sequence to be followed in a Planning cycle.

Figure 11.1. Planning Cycle



In the malaria program, routine planning is an annual feature at block, district and higher levels, usually undertaken by core malaria program staff. Typically, surveillance and other program monitoring data is used to plan for insecticide spray, identification of areas for distribution of bednets, in planning for outbreak preparedness and planning for supplies & trainings related to case detection and management.

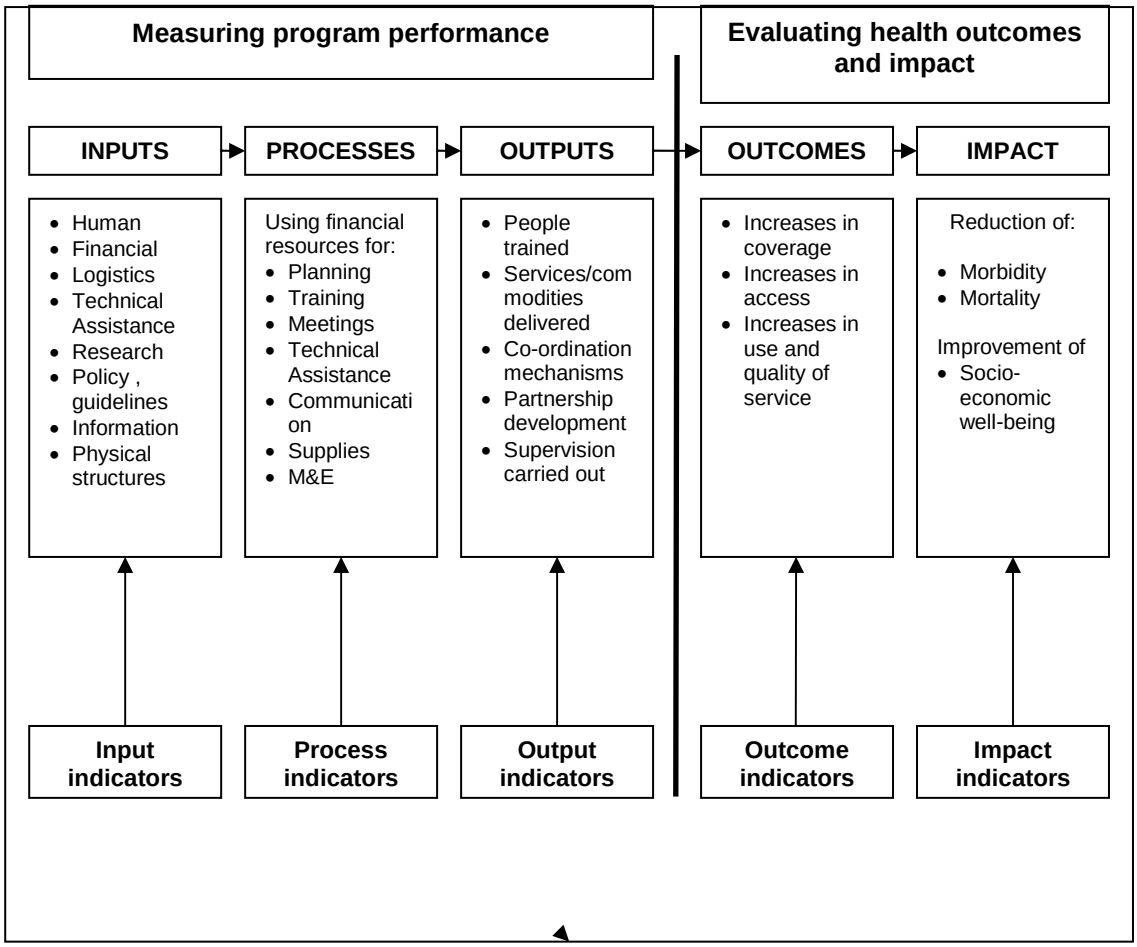
11.2.5 Indicators and Types of indicators used for surveillance, monitoring and evaluation

11.2.5.1 Indicators

Indicators are specific, well-defined parameters, to represent some aspect of the disease or the program. As described later, indicators typically describe inputs, processes, outputs, outcomes or impact of the program in a manner that makes comparisons possible over time or between two or more groups. They help define and measure distinct elements of the program. Eg. Annual Parasite Incidence (API) is an indicator of disease burden and programme impact. Fig 11.2 below illustrates the relationship between different stages of programme implementation and M&E Framework.

Requirement of indicators, at each level of health care delivery, is very specific. At the lower levels like PHCs and Districts indicators are utilized for local decision making while at the National level they are more relevant for policy making and assessing the overall progress.

Figure 11.2. Monitoring & Evaluation Basic Framework



11.2.5.2 Input Indicator

Input indicators tell us what the program is investing. Besides financial resources, the timely procurement of equipment and supplies, recruitments of staff and training provided to all functionaries are program inputs. Input indicators include, for instance, the achievement of targets for numbers of health workers or volunteers trained, achievement of procurement targets for specified supplies, etc.

11.2.5.3 Process Indicator

Process indicators tell us whether specified program activities are happening as planned, in quantity and quality. Quality of training or the quality of supplies provided are processes that are often measured. Similarly, review and planning meetings held, plans made, supervisory visits made, contracts awarded, are all processes. The quality control of data is itself a process, and whether specified data quality assurance processes have been established is an indicator of the process.

11.2.5.4 Output Indicator

Output indictors tell us what the immediate results of the inputs and processes were. Typically, what health workers do are outputs, which have come about as a result of many inputs and processes. The distribution of bed nets, the detection of fever cases, the achievement of insecticide spray targets are all outputs.

11.2.5.5 Outcome Indicator

Outcome indicators tell us whether the program interventions are having desired effects. Timely case management, the correct use of bed nets, reduction in vector density are all outcomes. These can be thought of as indicators of the status of the immediate causes of disease. From the best available current knowledge of the disease, one would predict that, if these indicators improved, disease burden should decrease.

11.2.5.6 Impact Indicator

Impact indicators tell us whether we have reached. In the context of malaria, these are indicators of the burden of disease: the incidence of malaria, the incidence of severe malaria and the death rates from malaria.

The categorization of a given indicator as input or process or output is often subjective and a matter of convenience. This categorization should not be considered rigid, but should be utilized as a convenient framework to facilitate communication and planning within the program.

11.3 Definitions

Definitions in malaria control are to be applied to diseases management as well as selection criteria of Target Population for Vector control. Standard case definitions are required to bring about uniformity in management of cases as well as their reporting, which enables comparability within the same reporting unit over a period of time and across different reporting units. These case definitions are to be used at all levels in the programme.

11.3.1 Case Definitions

Table 11.1 provides case definitions for use in conjunction with indicators related to case detection and management.

Table 11.1: Case definitions used in NVBDCP

	Terms	Definitions
1	**Suspected Malaria**	A patient with fever in endemic* area during transmission season, or who has recently visited an endemic area, without any other obvious cause of fever like: 10. Cough and other signs of respiratory infection 11. Running nose and other signs of cold 12. Diarrhoea 13. Pelvic inflammation indicated by severe low back ache, with or without vaginal discharge and urinary symptoms 14. Skin rash suggestive of eruptive illness 15. Burning micturition 16. Skin infections e.g. boils, abscess, infected wounds 17. Painful swelling of joints 18. Ear discharge **However, none of these symptoms exclude malaria with certainty. Only an experienced health functionary can exclude other "obvious causes of fever".**
2	**Clinical Malaria**	A patient with fever in endemic area during transmission season, or who has recently visited an endemic area, without any other obvious cause of fever will be considered as a case of clinical malaria if diagnosis cannot be established within 24 hours and treated accordingly. For ruling out other causes of fever, the following should

	Terms	Definitions
		be looked for. 1. Cough and other signs of respiratory infection 2. Running nose and other signs of cold 3. Diarrhoea 4. Pelvic inflammation indicated by severe low back ache, with or without vaginal discharge and urinary symptoms 5. Skin rash suggestive of eruptive illness 6. Burning micturition 7. Skin infections e.g. boils, abscess, infected wounds 8. Painful swelling of joints 9. Ear discharge **However, none of these symptoms exclude malaria with certainty. Only an experienced health functionary can exclude other "obvious causes of fever".**
3	**Uncomplicated malaria (confirmed)**	A patient with fever without any other obvious cause and diagnosis confirmed by microscopy showing asexual malaria parasites in the blood and/or positive rapid diagnostic test (RDT) and not having complications. These cases are recorded as either *Pf* or *Pv*; a case of mixed infection is recorded as *Pf.*
4	**Severe malaria**	A patient, who presents with symptoms and/or signs of severe malaria with laboratory confirmation of diagnosis. Severe malaria is clinically characterized by confusion or drowsiness with extreme weakness (prostration). In addition, the following may develop: cerebral malaria; generalized convulsions; pulmonary oedema; severe anaemia; renal failure; hypoglycaemia; metabolic acidosis; circulatory collapse/ shock; spontaneous bleeding; laboratory evidence of DIC; macroscopic haemoglobinuria; hyperthermia; hyperparasitaemia.
5	**Malaria Death**	Death of a patient with severe malaria, defined according to the above criteria. A death can only be medically certified as due to malaria if blood smear and/or RDT have been positive for *P.falciparum*.

Notes:
1. As per the revised Drug Policy (2008) all fever cases suspected for malaria should be investigated by microscopy or RDT. Therefore all efforts should be made to diagnose a suspected case. With the availability of RDTs in remote areas it is possible to confirm diagnosis in the remotest area. Only in exceptional circumstances where diagnosis by microscopy or RDK is not possible, cases with fever without any other obvious cause should be considered as 'clinical malaria' and treated.

*2. Recent literature points to the possibility of severe malaria in patients with Plasmodium vivax. Although this is very rare, it should be recognized, so cases with only P.vivax may also be recorded as severe, **if they fulfill the clinical criteria**.*

3. If the slide is positive for P.vivax only, death can only be certified as due to malaria by a tertiary level or higher facility, and a case report must be submitted to the State VBDCP for detailed death investigation.

** Constant presence of a disease in a given geopgraphical area without importation from outside i.e presence of local transmission.*

11.3.2 Integrated Vector Control

As per the modified Plan of Operation (MPO) areas recording more than 2 API taking Sub-centre as unit are eligible for Indoor Residual Spray with appropriate insecticide. The Expert Committee (1995) further devised high risk criteria taking village as unit for identification of areas to be sprayed. However, for judicious use of resources and focused intervention the Technical Advisory Committee (2002) on Malaria has rationalized the criteria for selection of villages for undertaking indoor residual spraying as indicated in the table below.

At present Indoor Residual Spray (IRS) and Bed-nets (ITNs/ LLINs) are the two key vector control interventions used in malaria control. Programme experience, drawn from years of operational problems encountered, has taught that IRS is a cost as well as labour intensive activity. In-depth review conducted by NIMR in the year 2006 also indicates the low coverage rates of IRS. Studies conducted across the globe in malaria endemic regions have shown that the average annual cost of bed-nets is much less than the cost of IRS; however, the use of bed nets requires continuous measures to improve community utilization. The NVBDCP has therefore taken the conscious decision to use either IRS or Bed-nets in a given area which means areas chosen for one method will usually not be covered by the second method of vector control. Therefore the criteria for selection of Target Populations for either method are laid in Table 11.2.

Table 11.2: Selection criteria for Target Population for Vector Control

	Vector Control Method	**Target Population**
1	**IRS**	**Areas with API more than 2 are classified as high risk.** The Technical Advisory Committee on Malaria in its meeting held on 30.05.2002 has rationalized the criteria for undertaking indoor residual spraying. These criteria are as follows: • To spray on priority basis all areas taking village/ sub-centre as a unit, with more than 5 API with suitable insecticides where ABER is 10% or more. • To spray on priority basis with suitable insecticide all areas reporting more than 5% SPR (based on passive collection of blood slides), if the ABER is below 10% • Due priority be accorded for spray if Pf proportion is more than 50%. • To accord priority for IRS in areas with less than API 5 / SPR 5% in case of drug resistant foci, project areas with population migration and aggregation or other vulnerable factors including peri-cantonment area. • To make provision for insecticidal spraying in epidemic situations. • Rotation of insecticides may be done so as to prolong their effectiveness. • Other parameters including entomological, ecological parameters etc., may also be considered while prioritizing areas for spraying. The population must be defined in terms of its size, as well as the no of households. It should be estimated annually **village wise**. It should also be mapped at the beginning of each year.

	Vector Control Method	Target Population
2	**Bed-nets (ITNs/ LLINs)**	The High risk area requiring vector intervention and 1. difficult for conducting spray operations and supervision of spray activities (remote, inaccessible areas, hilly terrain, forested area etc.) Or 2. areas where bednet usage and acceptability is high, would be covered with ITNs/ LLINs. The unit of area for coverage will be village.

11.4 Monitoring & Evaluation System

The system for monitoring and evaluation of malaria in the country comprises of

1. Routine Health Management Information System (HMIS)
2. Supportive Supervision and Data Quality Assurance
3. Malaria Surveillance including Sentinel Surveillance of severe cases and deaths
4. House and Health Facility Survey
5. Evaluations

The above components provide data on case management, Vector control, programme management, coverage and utilization of services. In addition very specific monitoring for Pf Resistance, Entomological aspects and Quality assurance are carried out. These are however, specialized issues and are beyond the scope of this document. For detailed information following documents may be referred 1. WHO Guidelines For Assessment and Monitoring of Antimalarial During Efficacy for the Treatment Of Uncomplicated *Pf* Malaria 2. Entomological Monitoring including Vector Succeptibility to Insecticides by adopting WHO approved Protocol 3. SOP for Quality Assurance of Malaria Microscopy

11.4.1 Management Information System (MIS)

The Management Information System (MIS) is a series of recording and reporting formats to be maintained and transmitted by different tiers of the health care delivery system. The records and reports are to be maintained in such a way that high quality reliable data is generated from them. This data is the treasure house of information from which a series of indicators are derived at different levels.

11.4.1.1 Recording and Reporting

Integration of all Public Health Programmes and concerted service delivery under the umbrella of NRHM along with changing data and information needs of NVBDCP have prompted the revision and simplification of the HMIS. New interventions like RDTs, ACT, ITNs which have been recently introduced, are expensive inputs into the programme and it becomes important to closely monitor their utilization. Reporting on training activities, field visits, logistics & LQAS are to be done as part of Programme management Monitoring. For the purpose of routine recording and reporting the following M1 to M4 Formats and VC1 to VC 12 Formats and Programme Management Monitoring Report are used.

1. Case Detection and Management
   - M1 : Report of Surveillance by ASHA/ MPW/ Health facility
   - M2 : Laboratory Request for Slide Examination
   - M3 : Record of slide Examination in PHC Laboratory
   - M4: Fortnightly Report of Cases From Subcentre/ PHC/ District/ State

2. Integrated vector Control
   - VC1: Primary record of IRS
   - VC1S: Wall Stencil
   - VC2: District IRS output Form
   - VC3: Primary record of bednet delivery and impregnation
   - VC 4: Bednet Delivery and Impregnation form
   - VC 5: District Annual Stock report on vector control supplies
   - VC-6. IVM Plan - Block level

3. Programme management Monitoring Report

An overview of these records and reports is provided below:

11.4.2 Case Detection and Management

Forms M1, M2 M3 and M4 of the HMIS are concerned with case-management data and are given in **Annexure K 1-4.**

1. Fortnightly Surveillance Report of Fever Cases by ASHA/ MPW/ Health facility (M1)

This is the primary case record for all suspected malaria cases i.e it is actually a line list of all fever cases. This form is to be filled by any health facility/ worker which are directly involved in case detection and treatment. Therefore an ASHA or any other Community Volunteer, MPW and MO would maintain case record in this format. In M1, each row corresponds with one patient record. Serial No is filled in column 1 which is started fresh each month.

- Details of village, village code, name of fever case and Head of Family are entered in Col 2 to 5. Each village and provider will be assigned a code which is to be retained once and for all. In exceptional cases where a fever case is a visitor to the village, 991/ 992 is filled in the respective Col.
- Whether collection is through Active / Passive case detection is filled as A or P in Col 6. For all purposes the ASHA/ CHV/ MO PHC will be passive agencies. Therefore in these cases the entry in Col 6 will be always P. It is only an MPW who can be involved in both types of collections. Fever cases coming to the MPW on their own will be entered as P while fever cases detected actively will be entered as A.
- Age is entered in Years/ months. Sex is to be entered as M for Male or F for Female. Duration of fever, date of RDT/ BSC, Slide No, sending and receipt of slides, result of examination of slides and RDTs, date of start of treatment, Nos of Tablets, referral and deaths if any are to be sequentially entered in the form.
- If the RDT is positive, the blood slide need not be sent for examination and therefore Col 14 to 18 are to be skipped and are simply slashed (/).Treatment in such cases is started immediately for Pf.
- In cases where RDT is negative blood slide is sent for examination. The result of RDT or slide should be entered by ASHA/ Health Worker/ MO in column 13, 17 & 18 of M1. Any positive test result is to be marked in red with a tick (√).
- Slide No is started fresh at the beginning of each year and continued over the subsequent months. In areas where RDTs are not supplied and RDTs have not been done column 13 is simply marked with a cross (X).
- In case of Blood slide the date of dispatch of slide and receipt of result are entered in column 15 and16. This will indicate the time lapse between the date of slide collection and receipt of results. During supervisory visits the time lag between slide collection or RDT and initiation of treatment should be identified.
- Col 18 denotes whether a women in reproductive age group is pregnant. If the answer is in affirmative it is to be marked with a tick (√).
- Depending upon the species, ASHA/ Health worker/ MO will decide the anti-malarials to be administered. The date of starting treatment will be entered in column 20. Suppose ACT has been selected then Number of Tablets/ blisters will be entered in column 21 while in columns 22 to 27 a cross (X) is put.

- The lower part of the form consists of record of logistics. Opening balance at the beginning of the month, stock received, utilization and closing balance should be entered by ASHA or other service providers after physical verification of stocks.
- The ASHA/ CHV will fill M1 in duplicate and at the end of the fortnight, after allowing for 7 days for completion of patient records of the last few days of the reporting fortnight will forward the form to the Subcentre.
- In the middle of M1, the MPW will enter the summary of cases.
- The MPW will compile M4-SC by compiling the M1 of all ASHAs and adding his/ her own M1.

All deaths due to malaria should be investigated in detail by an officer no lesser in rank than the DMO/ DVBDCO or MO-PHC. The proforma prescribed for the detailed investigation of malaria death and important epidemiological considerations are given in **Annexure K 25**.

2. Laboratory Request Form for Slide Examination (M2)

Fever cases are diagnosed using RDT and/ or Blood Slide. In areas where RDTs are supplied, RDT and Blood slide are done at the same time. However, only if the RDT is negative, the blood slide is forwarded to Lab for further examination. Areas where RDTs are not supplied also rely on microscopy for diagnosis. M2 ie the Laboratory Request Form for Slide Examiantion, is filled in duplicate by ASHA/ CHV/ MPW whenever blood slides need to be sent to the Lab. In this form Col 1 to 7 are filled from M1 by ASHA/ CHV/ MPW. It is to be sent to PHC lab whenever required. Eg if 2 slides collected by an ASHA in a day, need to be examined, they are entered into M2 and sent to PHC Lab. The result of microscopy and feed back on smear quality are filled by the LT. All efforts should be made by LT to examine the slides on the day of receipt or the following day and send the results back to ASHA/ CHV/ MPW on the same day as examination of blood slides. The results obtained are entered into M1 by ASHA/ CHV/ MPW.

3. Record of slide Examination in PHC Laboratory (M3)

M3 is the Subcentre wise record, of slides examined in the PHC Lab. Slides reach the lab from the ASHA/ CHV/ MPW of the SC area. Slides will also be collected and examined for suspected malaria cases referred from the PHC OPD. Therefore at the beginning of each year, the M3 register is divided into sections for different subcentres as well as PHC OPD. In each subcentre section Serial Nos are started fresh at the beginning of each year. Record of slides sent along with M2 is entered serially into M3. As soon as M2 is received Col 3 to 10 are entered from M2 followed by the date of receipt. The date on which the slides are examined is entered in Col 2. The slide results are entered in Col 13, 14. The remarks column can indicate the quality of smear and other information like reasons of delay in examination.

2. Fortnightly Report of Cases – Subcentre/ PHC/ District/ State (M4) is a village-wise/ provider-wise / subcentre wise monthly consolidation of all M1 forms belonging to a subcenter/ PHC area. The M1 is received by the MPW from ASHAs/ CHVs after 7 days of completion of the reporting fortnight. The MPW then compiles all M1s of his subcentre area into M4. During compilation the Subcentre MPW will fill out aggregates of each health care provider in Subcentre area in one row and in the last row enter the compilation of his own M1. The report is made in triplicate and 2 copies are forwarded to PHC. The timeline for submission of the report by different levels is mentioned in **Table 6**. The district is required to enter Subcentre wise data from M4 of PHCs into NAMMIS as soon as the reports are received to avoid delay in transmission of reports.

Historically weekly fever surveillance was conducted through the mechanism of the weekly telegram also refrred to as MF3. This has now been integratd with IDSP. The MO PHC is required to furnish this to the Nodal Officer of IDSP in the district. The DMO/ DVBDCO will coordinate with IDSP for obtaining relevant information in this regard.

11.4.3 Monitoring Indicators in Surveillance and Case Detection

The data collected through the system of HMIS consists of volumes of information but this is of little use, unless it is converted to relevant information through the application of intelligence. Indicators are therefore derived from this data and are used as variables that indicate a particular condition or situation. These indicators point towards programme performance in different areas and help identify problem areas to enable corrective action. The monitoring indicators that are used in the programme for the purpose of Surveillance and Case detection are given in **Table 3**. Each level of health care delivery is to be encouraged to analyse data based on these recommendations on a regular basis.

Table 3: MONITORING INDICATORS USED IN DISEASE SURVEILLANCE AND CASE DETECTION

S. No.	Area	Indicator	Definition	Frequency	Source of Indicator
1	Disease burden & impact	Fever Cases Malaria Cases Pf Cases Deaths due to Malaria	• Total Fever Cases • Total Malaria Cases • Total Pf Cases • Total deaths due to malaria	Monthly, Cumulative for the year	M1, M4-SC, M4-PHC
2	Surveillance/ case finding	Monthlyl Blood Examination Rate (MBER) (should be more than 1%of population during the transmission season)	{(Number of blood smears examined + RDTs positive in a Month) ÷ Total Population} X 100	Monthly	M4-PHC
3	Surveillance/ case finding	Annual Blood Examination Rate (ABER) (expected to be more than 10%of population)	{(Number of blood smears examined + RDTs positive in a year) ÷ Total Population} X 100	Annual	M4-PHC
4	Disease burden & impact	Annual Parasite Incidence (API)	{(Total No. of positive blood smears positive for malaria parasite + RDTs positive for malaria Parasite in a year) ÷ Total Population} X 1000	Annual	M4-PHC
5	Disease burden & impact	Annual Falciparum Incidence (AFI)	{(Total No. of blood smears positive for Pf malaria parasite + RDTs positive for Pf malaria Parasite in a year) ÷ Total Population} X 1000	Annual	M4-PHC
6	Disease burden & impact	Test Positivity rate (TPR) (Test = Slide+RDT) Is independent of surveillance activity, therefore a better indicator for impact assessment	{(Total No. of blood smears positive for malaria parasite + RDTs positive for malaria Parasite) ÷ (Total No. of blood smears examined + positive RDTs)} X100	Monthly, Cumulative for the year	M4-PHC

7	Disease burden & impact	Test falciparum Rate (TfR) It is independent of surveillance and indicates Pf preponderance	{(Total No. of blood smears positive for Pf malaria parasite + RDTs found Positive for ***P.falciparum)*** ÷ **(**Total No. of blood smears examined + positive RDTs)} X 100	Monthly, Cumulative for the year	M4-PHC
8	Disease burden & impact	Pf Percentage (Pf %) Indicates trends in proportion of cases due to Pf out of total cases	{(Total No. of blood smears positive for Pf malaria parasite + RDTs found Positive for ***P.falciparum)*** ÷ (Total No. of positive blood smears + positive RDTs for malaria parasite)} X 100	Monthly, Cumulative for the year	M4-PHC
9	Process	% of Community level facilities equipped with RDT in the last reporting period	(ASHA/ other community volunteers equipped with RDT ÷ Total ASHA / other community volunteers) X 100	Quarterly, Annual	PMMR
10	Output	Utilization of ACT	No of Pf cases treated with ACT	Monthly, Annual	M4-PHC
11	Output	Utilization of ACT	No of severe cases treated with inj arte-ether	Monthly, Annual	M4-PHC

11.4.4 Integrated Vector Control

The Vector Control Formats (**Annexure K 5-10**) are to be utilized for the purpose of reporting of Vector Control activities undertaken during the transmission season.

1. Primary Record of IRS (VC 1)

This record is to be maintained by the Spray supervisor/ Superior Field Worker (SFW) and is a house wise record of spray activity undertaken in the village. One such record is maintained for each Village in each round. VC 1 is submitted to MPW within one week of completion of the respective IRS round as per schedule. The details on village name, village code, date of spray, Round, Spray squad No, Spray supervisor are to be entered in the left upper corner of the format. Similarly summary of the coverage is given in the right upper corner of the format. The lower part consists of the house wise log of room coverage. As soon as IRS is completed in the village VC1 format is submitted by the Superior Field Worker (SFW) to the PHC-MO where a village and subcentre wise compilation is done by PHC-MO with assistance from the Health Supervisor.

2. Wall stencil (VC 1S)

Wall stencil (VC 1S) is to be written by SFW on each house after the house has been sprayed. Date, round, insecticide and Squad No. are written as applicable. In SR/ TR the No of rooms sprayed/ Total no of rooms, is entered.

3. IRS Output Form (VC2)

The IRS Output Form (VC 2) is the IRS report to be generated by the PHC & District. It is a village/ Subcentre/ PHC wise compilation of VC1 formats received from the SFWs. As soon as the VC 1 of a village is received, the entire information is transferred into VC 2. It is to be filled in duplicate. Once the spray is completed in the PHC area all the VC1s should be entered into VC2. The PHC-MO shall submit one copy of VC 2 within 15 days of completion of spray in the PHC area to the district and the second copy is retained by the PHC. The DMO shall do a similar PHC wise compilation at the district

and send the report within 15 days to the State. The state level report should reach NVBDCP within 45 days of completion of the Round.

4. Primary record of bed net delivery and impregnation (VC3)

The Primary record of bed net delivery and impregnation (VC3) is village level record of bednets available in the households and the details of house wise distribution and impregnation of nets. Prior to the onset of the transmission season the MPW (M) with assistance from ASHA/ AWW/ CHVs will undertake a survey in villages of his subcentre area to enumerate the no. of nets available at the household level. The top left corner of the form pertains to information on the dates of survey, impregnation & distribution of bed nets, village name, SC etc. The house wise details of activities are listed in the middle part. The total requirement of bednets in each household is listed in Col. 4. House wise enumeration of ITNs and LLINs available at the beginning of the current year is done in Col. 5 & 6. This information is filled based on the information available from village survey undertaken by MPW (M). Col 7 & 8 pertain to the actual no. of ITNs/ LLINs distributed in the village in the current year. The total no. of ITNs (available in Col. 5 & 7) in each house impregnated in the current year is entered in col. 9. Based on the no. of bed nets available, distributed and impregnated the no. of effective bed nets in each house hold is estimated in col. 10. The top right corner is a summary of bed net coverage in which % houses with at least two effective nets is entered. The stock status of synthetic pyrethriods is summarized in the lower part of this form.

5. Bednet Output Form (VC 4)

Bednet Output Form (VC 4) is a village/ subcentre/ PHC wise compilation of Bednet impregnation and distribution activities. The village level VC3 is submitted by MPW (M) to the PHC at the completion of bed net distribution and impregnation activities. As soon as VC3 from a village is received it is entered in VC 4. VC4 is filled in duplicate. Once the activities are completed in the entire PHC area and VC4 format has been filled it is sent to the DMO within 15 days of completion of all activity. One copy is retained at the PHC for its own record. The DMO consolidates these reports in next 15 days and sends it to the state. The State should compile and forward the report to NVBDCP. The state report on Bednet Delivery and Impregnation should reach NVBDCP within 45 days of completion all activity in the state.

6. District Annual Stock report on Insecticides (VC 5)

The district should furnish the detailed PHC wise stock report on insecticide usage during the year in VC 5. The report corresponds with the Calendar year (1st January to 31st December). The columns are self explanatory. The report should be compiled by the district from PHC stock registers within 15 days of completion of the reporting year. The state should compile and forward the report within 30 days of completion of reporting year to NVBDCP. Eg The Annual Stock Report on Insecticides for the year 2008 should reach NVBDCP by 31st January of 2009.

7. District LLIN Log (VC 6)

Data on annual distribution of LLINs is entered into District LLIN Log (VC6) at the end of each year from VC4. For the annual planning, the cumulated number of LLINs is calculated from VC6. For LLINs with an expected effective life of 3 years sum the numbers distributed over the last 2 years is taken. Eg. when planning for 2011, the numbers distributed in 2009 and 2010 should be used (LLINS distributed in 2008 will expire during 2011 and must be replaced). For LLINs with an expected effective life of 5 years sum of the numbers distributed over the last 4 years is taken. Eg. when planning for 2011, the number distributed in 2007-2010 are added. LLINs delivered through ANC must also be included. If LLINs with two different durations are included, use two separate forms for keeping log. Besides when planning for LLIN distribution, the village level bednet surveys undertaken to enumerate the nos existing in each village also needs to be undertaken.

11.4.5 Monitoring Indicators in Integrated Vector Management

The indicators used for monitoring integrated vector control are described in **Table 4**. The indicator definition, periodicity of its use and the source format are given in detail.

Table 4: MONITORING INDICATORS USED IN INTEGRATED VECTOR MANAGEMENT					
S. No.	**Area**	**Indicator**	**Definition**	**Frequency**	**Source of Indicator**
1	Process	% of spray Equipment in working condition	(No of Spray Equipment in Working Condition÷ No of Spray Equipment Present) X 100	Annual (Pretransmission)	VC 2
2	Process	% of Spray squads engaged	(No of Spray squads engaged ÷ No of Spray squads required) X 100	Annual (Pretransmission)	VC 2
3	Output	Bed Nets distributed	Number of nets distributed	Quarterly, Annual	VC-4
4	Output	Bed Nets treated	Number of nets treated	Quarterly, Annual	VC -4
5	Output	Insecticide use Average insecticide per bednet	• Volume of Insecticide used for treatment of Bednets • Volume of insecticide used for bednet treatment/ No of bednets treated • Volume of insecticide used for IRS	Annual	PMMR
6	Outcome	% of Eligible population Covered by ITN Should be 80% or more	(Number of households with at least 2 effective bed nets ÷ Eligible households) X 100	Annual	VC 4 versus Annual Plan
7	Outcome	% of Targeted population Covered by ITN Should be 80% or more	(Number of households with at least 2 effective bed nets ÷ Targeted households) X 100	Annual	VC 4
7	Outcome	% of Eligible villages with more than 80 % population Coverage with ITNs	(Number of Eligible villages with more than 80% coverage with ITNs ÷ No of Eligible villages) X 100	Round wise, Annual	VC 4
8	Outcome	IRS Coverage – Eligible Population (%) Should be 80% or more	(Population covered with IRS ÷ Total Eligible population) X 100	Round wise during transmission season	VC 2 versus Annual Plan
9	Outcome	IRS Coverage – targeted Population (%) Should be 80% or more	(Population covered with IRS ÷ Total Targeted population) X 100	Round wise during transmission season	VC 2
10	Outcome	IRS Coverage –	(Rooms sprayed	Round wise	VC 2

		Targeted Rooms % Should be 80% or more	completely in houses Covered÷ Total no of Rooms Targeted) X 100	during transmission season	

11.4.6 Programme Management Monitoring Report (PMMR)

This report is to monitor progress made on different programme processes and other management issues. Update on Training status of the staff as well as the trainings conducted, field visits & reviews conducted and reviews undertaken as well as situation of logistics & stock outs are to be provided on a quarterly basis. The report is given in **Annexure K-12.** It has the following three sections:

Part A: Field visits & reviews
Part B: Quality of service delivery
Part C: Training Activity
Part D: BCC Activity for Malaria Control
Part E: Status of Logistics

In future this report will also contain data collected by Malaria Technical supervisors through Lot Quality Assurance Sampling (LQAS) based surveys. The report is generated by the district at quarter ending and sent to the State by the 15th of the month following the quarter. The Quarterly State level report should be compiled and should reach NVBDCP by the 21st of the month following. E.g. for the 1st Quarter 2009 (1st Jan – 31st Mar 09) the district should forward the report to the state by 15th April 09 and the state should send its report to NVBDCP by 21st of April 09.

11.4.7 Monitoring Indicators in Programme Management

Programme management indicators help assess the effectiveness of programme implementation. These indicators usually focus on interim aspects like % staff in position, % staff trained, % of facilities reporting stock outs, Nos of BCC activities conducted etc which enable translation of inputs into outcomes and ultimately impact. The programme management indictors to be applied in malaria control are in **Table 5**.

Table 5: MONITORING INDICATORS USED IN PROGRAMME MANAGEMENT					
S. No.	**Area**	**Indicator**	**Definition**	**Frequency**	**Source of Indicator**
1	Input	Nos of RDTs & ACTs Planned versus Received & used	• Number of RDTs Planned to be used • Number of RDTs received • Number of RDTs used • Number of ACTs Planned to be used • Number of ACTs received • Number of ACTs used • Number of functional microscopes	Annual	M1, M4-SC, M4-PHC PMMR
2	Input	% of Staff in Place (ASHA, MPW, MTS, LT, DVBD Consultant)	(No of Staff In place÷ Total no of Staff Sanctioned) X 100	Quarterly, Annual	PMMR
3	Process	% of MPHW/ASHA/other volunteers trained for use of RDT / ACT (calculated separately for different staff)	(Total No of MPW/ ASHA/ other volunteers trained for use of RDTor ACT ÷ Total No of MPW/ ASHA/ other volunteers) X 100	Quarterly, Annual	PMMR
4	Process	% of Diagnostic facilities functional with microscopy/RDT in the last reporting period	(Total No of PHCs/ Pvt Sector Centres with functional microscopy ÷ Total No of PHCs/ Pvt Sector Centres) X 100	Quarterly, Annual	PMMR
5	Process	% of facilities (SC and PHC) / village level functionaries (ASHA, AWW) reporting stock-out of antimalarials during the fortnight	(No of Health facilities reporting Stock outs in the previous fortnight ÷ No of Health facilities) X 100	Fortnightly	M4-SC, M4-PHC
6	Process	BCC Activities	No of BCC/ IEC Activities eg meetings, rallys, exhibitions, street plays, miking, posters/ pamphlets, wall paintings, etc.	Quarterly, Annual	PMMR
7	Outcome	% of fever cases with access to complete diagnosis & treatment	(Fever cases who were tested for malaria by microscopy or RDT with a positive test result and were started on treatment no later than the next day with ACT÷ Total no of fever cases who were tested for malaria by microscopy or RDT with a positive test) X 100	Quarterly/ half yearly	PMMR Based on LQAS
8	Outcome	% households adequately protected by personal protection	(House holds in which beneficiaries reported having slept under ITNs or	Quarterly/ half yearly	PMMR Based on LQAS

		methods	LLINs previous night÷ Total No of houses with bednets surveyed) X 100		
9	Outcome	% of PHCs with acceptable level of utilization of ITNs/ LLINs	(PHC sampled in which utilization of ITNs/ LLINs was more than 80%÷ Total No of PHCs sampled for utilization) X100	Quarterly/ half yearly	PMMR Based on LQAS

11.4.8 Flow of Information

The flow of reports in the HMIS and their feedback paths are given in the Fig 11.3. Various records maintained at different levels are compiled to generate different programme reports. The flow of reports in the system is given below.

A. Surveillance/ Case detection & Management

The **Report of Surveillance by ASHA/ MPW/ Health facility** (M1) is maintained at every level diagnosing and treating cases like ASHAS/ AWWs/ CHVs at village level, MPWs at Subcentre level and MO-PHCs. The M1 is submitted to the Subcentre fortnightly, where it is compiled village/ health care provider wise into **Fortnightly Report of Cases (**M4) by MPW(M) or in his absence by MPW (F). Subcentre M4 is submitted by MPW to the MO-PHC. At the PHC the report is further compiled for all the subcentres in the PHC area, the PHC data is further added to it. PHC level M4 is sent to the district where data is entered in the Web-based HMIS i.e. NAMMIS which if not possible sent manually to state. **Laboratory Request Form for Slide Examination (M2)** is the sent along with slides transported to lab for examination. All slides sent to lab for examination are entered in the **Record of slide Examination in PHC Laboratory** (M3) and result is transmitted back (indicated by dashed line) in the M2. The feedback pathways are shown by blue Dotted arrows.

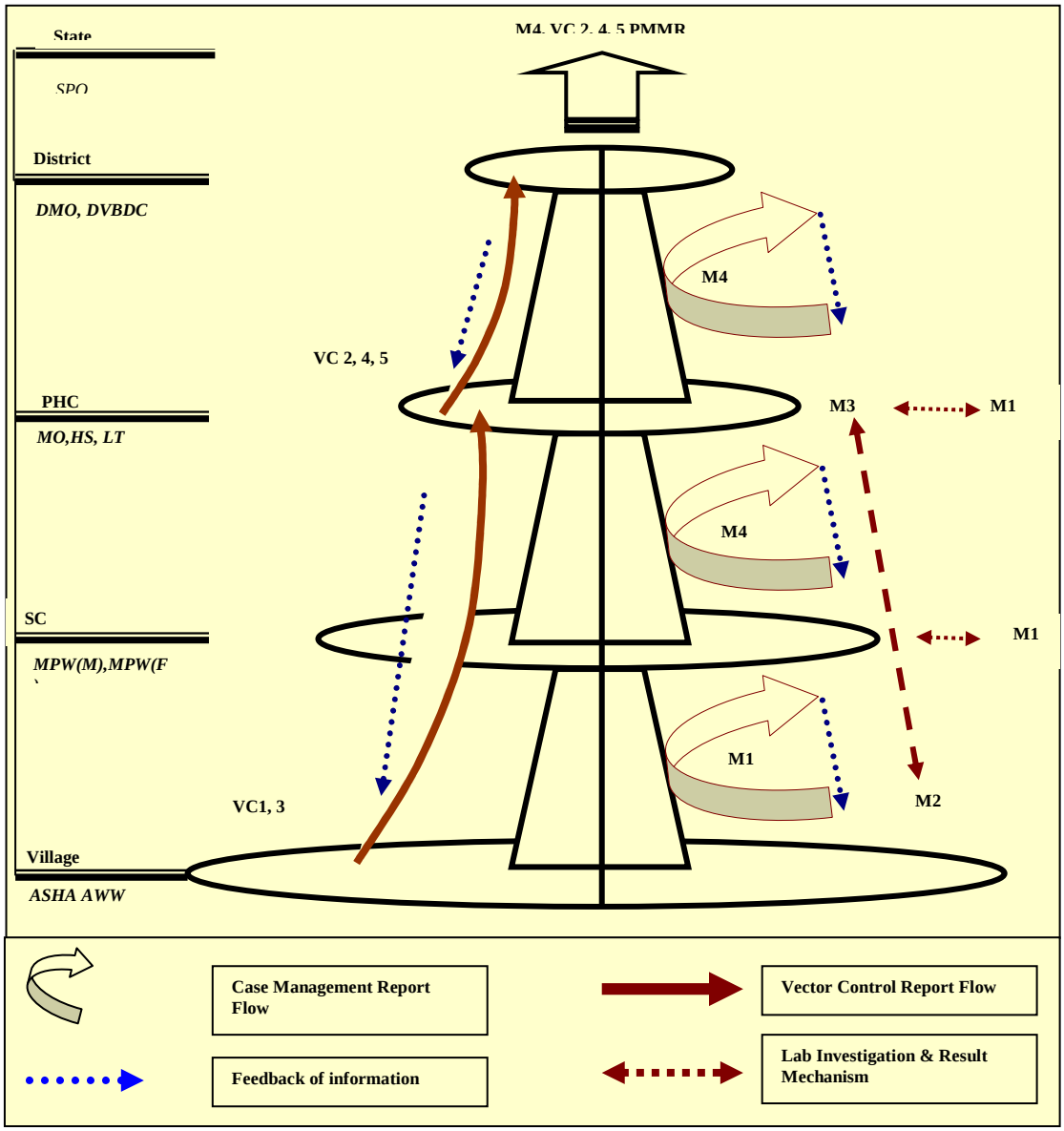
B. Integrated Vector Control

Primary Record of IRS (VC 1) and **Primary record of bed net delivery and impregnation** (VC3) are the village level record of activities conducted. VC 1 is maintained by Superior Field Worker (SFW) and submitted to MO-PHC. Similarly VC 3 is filled by MPW with assistance from ASHAs/ AWWs/ CHVs and submitted to MO-PHC. At the PHC, VC1 is compiled subcentre wise into **IRS Output Form** (VC2) and VC3 is compiled into VC4. PHC level Output reports are sent to district where they are entered into the Web-based system of data entry. In case NAMMIS is not functional the district level report should be sent manually to the state.

C. Programme Management Monitoring Report

This report is compiled quarterly by the district and sent to state. When NAMMIS is operational this may be directly entered into the web-based system.

Fig 11.3: Flow of Information in malaria HMIS



11.4.9 Role of Health Care Staff in Monitoring & Evaluation

I) Village Level

i) ASHAs/ AWW/ CHV

These peripheral level workers form the first point of contact with fever cases and are the primary source of large proportion of data related to case detection and treatment. Therefore the scope of their work involves the following:

- To maintain the record of all fever cases in M1 and provide fortnightly report of the same to the MPW by 21st of the month for the Ist Fortnight and the 7th of following month for the IInd Fortnight.

- To enter slides of RDT negative cases which are to be sent to lab for examination in M2 and arrange for their transportation the same day. To lab. On receipt of results in the completed M2 from lab, to enter the dates and results against respective fever cases in M1.

- To determine and analyse simple indicators given in table below. These indicators should be displayed in front the ASHAs or AWWs or CHVs house/ Panchayat ghar. Each month the surveillance / case finding indicators of the current and previous fortnight should be updated. Any

significant increase over the previous fortnight should be brought to the notice of the MPW and MO-PHC.

VILLAGE LEVEL INDICATORS	
Surveillance/ case finding	- No of Fever cases **(M1)** - No of Total Malaria cases **(M1)** - No of Pf cases **(M1)** **-** No of Deaths **(M1)**
Integrated Vector control	- No of houses completely sprayed **(VC 1)** **-** No of bednets impregnated **(VC 4)** **-** No of houses with at least two bednets **(VC 4)**
Others	- No of houses assisted in acceptance of spray operations

- To assist the MPW (M) in undertaking the annual bednet survey in the village during the pre-transmission season to enumerate bednets available in the households in VC 4. To assist in the impregnation and distribution of bednets and the filling up of VC 4 format.

II) Subcentre Level

i) MPW (M)

MPW (M) or in his absence MPW (F) is the principle supervisor of the subcentre area and is also the person who would conduct the annual bednet survey with assistance from ASHAs/ AWWs/ CHVs. Following roles are therefore envisaged from them:

- Compilation of all M1 forms received at the end of the fortnight and prepare the Subcentre's Fortnightly Report of Cases in M4 and submit it to the MO-PHC by the 25th of the month for the first fortnight and 10th of following month for the second fortnight.

- To undertake the annual household bednet surveys in the eligible villages of the subcentre during the pre-transmission season to ascertain the bednet requirement and enumerate bednets available in the households to and enter the details in VC 4. Send copy of this form to MO-PHC for use in district level planning.

- To conduct impregnation and distribution of bednets in all the targeted villages and fill the VC 4 format. To submit the VC 4 at the completion of village level activity to MO-PHC.

- To determine and analyse simple indicators given in table below. The surveillance / case finding indicators should be charted every 15 days, village wise, for the current and previous fortnight. Any significant increase over the previous fortnight should be brought to the notice of MO-PHC. The vector control interventions should be charted for each village of the subcentre at the completion of the activities.

SUBCENTRE LEVEL INDICATORS	
Surveillance/ case finding	- No of Fever cases **(M4-SC)** - No of Malaria cases **(M4-SC)** - No of Pf cases **(M4-SC)** - No of Deaths **(M4-SC)** - No of RDTs received & used **(M4-SC)** - No of ACT Blister Packs received & used **(M4-SC)**
Integrated Vector Control	- No of ITNs/ LLINs distributed **(VC 4)** - Bednets Treated **(VC 4)** - No of houses with at least two bednets **(VC 4)**

	- IRS Coverage – Population (%) **(VC 1)** - IRS Coverage – Rooms (%) **(VC 1)**
Others	- Outbreaks Reported **Yes/ No**

III) PHC Level

i) MO-PHC

MO-PHC is the person in-charge of all malaria prevention and control activities in the area of PHC. He holds a position of immense responsibility as he is the signing authority for all reports to be furnished by the PHC. He has the following roles in reporting.

- Compilation of all reports received at the end of the fortnight from subcentres and prepare the PHC's Fortnightly Report of Cases in M4 and submit it to the DMO by the 28th of the month for the first fortnight and 13th of following month for the second fortnight.

- To compile VC 1 received from the SFWs into the VC 2 and send the IRS Output Report to DMO within 15 days of completion of all IRS activities in the PHC area.

- The MO-PHC facilitates the conduction of bednet survey by MPW (M)/ ASHAs for enumeration of bednets in households in VC3 during the pre-transmission season. He provides full cooperation to the DMO and furnishes all relevant information to the DMO.

- To compile VC 3 received from the MPWs into the VC 4 and send this Bednet Output Report to DMO within 15 days of completion of all activities.

- The surveillance / case finding indicators should be charted every 15 days, at least subcentre wise and compared with the corresponding fortnight of the previous year.Comparison of occurrence of cases in the year with the corresponding period of the previous year. Subcentre wise tabulation of all Vector control indicators should done during the transmission season at the completion of the activity. The list of indicators to be applied is given in table below.

PHC LEVEL INDICATORS	
Surveillance/ case finding/ Disease Burden	- Monthly Blood Examination Rate (ABER) **(M4-PHC)** - Annual Blood Examination Rate (ABER) **(M4-PHC)** - No of Fever cases **(M4-PHC)** - No of Malaria cases **(M4-PHC)** - No of Pf cases **(M4-PHC)** **-** No of deaths due to Malaria **(M4-PHC)** - Annual Parasite Incidence (API) **(M4-PHC)** - Annual Falciparum Incidence (AFI) **(M4-PHC)** - Test Positivity rate (TPR) **(M4-PHC)** - Test falciparum Rate (TfR) **(M4-PHC)** - Pf Percentage (Pf %) **(M4-PHC)**
Integrated Vector Control	- Insecticide use **(VC 2, VC 5)** - No of ITNs/ LLINs distributed **(VC 4)** - IRS Coverage (Eligible) – Population (%) **(VC 2)** - IRS Coverage (Targeted) – Population (%) **(VC 2)** - IRS Coverage – Rooms (%) **(VC 2)** - % of Eligible population Covered by ITN **(VC 4)** - % of Targeted population Covered by ITN **(VC 4)** - % of Eligible villages with more than 80 % population Coverage with ITNs- Bednets Treated **(VC 4)** - % of house holds in which beneficiaries reported having slept under ITNs/ LLINs previous night **(PMMR)**

	- % of fever cases who were tested for malaria by microscopy/ RDT with a positive test result for RDT and were started on treatment no later than the next day with ACT **(PMMR)**
Others	- No of RDTs received & used **(M4-PHC)** - No of ACT Blister Packs received & used **(M4-PHC)** **- Outbreaks Reported (M4-PHC) Yes/ No** - % of MPHW/ASHA/other volunteers trained for use of RDT / ACT **(PMMR)** - % of Diagnostic facilities functional with microscopy/RDT in the last reporting period **(PMMR)** - No of BCC Activities **(PMMR)**

ii) Health Supervisor/ Malaria Inspector

Health Supervisor/ Malaria Inspector assist the MO-PHC in all malaria control activities. He therefore is the second in guard in the PHC area and is responsible in assisting in all reporting responsibilities

- To assist in the compilation of all reports received at the end of the fortnight from subcentres and prepare the PHC's Fortnightly Report of Cases in M4.

- To assist in the compilation of VC 1 received from the SFWs into the VC 2.

- To assist in the compilation of all VC 3 received from the MPWs into the VC 4.

- To assist in the analysis of reports generated.

iii) Lab Technician

Lab Technician is responsible for malaria microscopy and its reporting at the PHC Laboratory. He has the following roles in malaria diagnosis:

- To receive the M2 format along with the slides sent for examination by the peripheral workers like ASHAs/ AWWs/ CHVs and also from the PHC OPD.

- To enter all slides received from the periphery or PHC-OPD in M3.

- To examine all the sides received preferable on the same day. Enter the results in M3 correctly and arrange for transportation of results back to the fieldworker on the following day for timely initiation of treatment.

- To maintain the M3 up to date and to prevent back backlog of slides.

- To assist the MO-PHC in the compilation of M4.

III) District Level

i) District Malaria Officer (DMO)

DMO is the person in-charge of all malaria prevention and control activities the District. For recording and reporting he has the following responsibilities which he will execute with help from District Vector Borne Disease Consultant (DVBDC) and Assistant Malaria Officer (AMO), if present.

- Compilation of all reports received at the end of the fortnight from PHC's and preparation of District Fortnightly Report of Cases in M4 and timely submission to the state by the 30th of the month for the first fortnight and 15th of following month for the second fortnight.

- To compile VC 2 received from PHCs into a district level IRS Output Report and send it to state within 30 days of completion of all IRS activities in the PHC area.

- The DMO should coordinate with MO-PHC to ensure undertaking of bednet survey by MPW (M)/ ASHAs for enumeration of bednets in households in VC3 during the pre-transmission season. He should also ensure that this information is duly collected from the MO-PHC so that it is available for the development of Annual District Action Plans.

- To compile VC 4 received from the PHCs into district level Bednet Output Report and send it to the state within 15 days of completion of all activities.

- The DMO should compile District Annual Stock Report on Insecticides in VC5 based on PHC stock registers within 15 days of completion of the reporting year and send to the state.

- The DMO should oversee the maintenance of a yearly log of LLINs distributed in VC6.

- The Programme Management Monitoring Report is compiled at the end of each quarter and sent to the state no later than the 15th day of the following month.

- To analyze and tabulate preferably subcentre wise fortnightly surveillance/ case finding indicators and compare with the corresponding fortnight of the previous year as well as comparison of occurrence of cases in the year with the corresponding period of the previous year. Vector control indicators should be charted during the transmission season at the completion of the activity for all subcentres. The following indicators should be used for analysis.

DISTRICT LEVEL INDICATORS	
Surveillance/ case finding/ Disease Burden	- Monthly Blood Examination Rate (ABER) **(M3)** - Annual Blood Examination Rate (ABER) **(M3)** - No of Fever cases **(M4)** - No of Malaria cases **(M4)** - No of Pf cases **(M4)** **-** No of deaths due to Malaria **(M4)** - Annual Parasite Incidence (API) **(M4)** - Annual Falciparum Incidence (AFI) **(M4)** - Test Positivity rate (TPR) **(M4)** - Test falciparum Rate (TfR) **(M4)** - Pf Percentage (Pf %) **(M4)** - % of fever cases who were tested for malaria by microscopy/ RDT with a positive test result for RDT and were started on treatment no later than the next day with ACT **(PMMR)**
Integrated Vector Control	- % of spray Equipment in working condition (**VC 2**) - % of Spray workers trained (**VC 2**) - Insecticide use (**VC 2, VC 6**) - No of ITNs/ LLINs distributed **(VC 4)** - IRS Coverage (Eligible) – Population (%) **(VC 2)** - IRS Coverage (Targeted) – Population (%) **(VC 2)** - IRS Coverage – Rooms (%) **(VC 2)** - % of Eligible population Covered by ITN **(VC 4)** - % of Targeted population Covered by ITN **(VC 4)** - % of Eligible villages with more than 80 % population Coverage with ITNs- Bednets Treated **(VC 4)** - % of house holds in which beneficiaries reported having slept under ITNs/ LLINs previous night **(PMMR)** - % of PHC sampled in which utilization of ITNs/ LLINs was more than 80% **(PMMR)**

III) State Level	Others	- Full Time DVBDCO/ DMO **Yes/ No** - No of RDTs Planned versus received & used **(M4)** - Outbreaks Reported **Yes/ No** - No of ACT Blister Packs Planned versus received & used **(M4)** -% of facilities (SC and PHC) / village level functionaries (ASHA, AWW) reporting stock-out of antimalarials lasting more than 15 days during the quarter **(PMMR)** - % of Staff in Place (ASHA, MPW,MTS, LT, DVBD Consultant) **(PMMR)** - % of MPHW/ASHA/other volunteers trained for use of RDT / ACT **(PMMR)** - % of Diagnostic facilities functional with microscopy/RDT in the last reporting period **(PMMR)** - No of BCC Activities (**PMMR)**

i) State Programme Officer (SPO)

At the state level the State Programme Officer is responsible for all reporting requirements to be furnished to the National Vector Borne Disease Control Programme, Delhi.

- Compilation of all District Fortnightly Report of Cases in M4 received from districts and preparation of State level report and timely submission to the state by the 5th of the following month for the first fortnight and 20th of following month for the second fortnight.

- To compile District level VC 2 received, into State IRS Output Report and send it to NVBDCP, Delhi within 45 days of completion of all IRS activities in the districts.

- To compile District Bednet Output Reports (VC 4) received, into State level Bednet Output Report and send it to NVBDCP, Delhi within 15 days of completion of all activities.

- The State should compile District Annual Stock Report on Insecticides in (VC5) and send it to the centre no later than 30 days of completion of the reporting year.

- The District the Programme Management Monitoring Reports received by the state is compiled at the end of each quarter and sent to the centre no later than the 21st day of the following month.

- To analyze and tabulate at least district wise fortnightly surveillance/ case finding indicators and compare with the corresponding fortnight of the previous year. Comparison of cumulative occurrence of cases in the year with the corresponding period of the previous year should be done. Vector control indicators should be charted during the transmission season at the completion of all activity. The following indicators should be used for analysis at the state level.

STATE LEVEL INDICATORS	
Surveillance/ case finding/ Disease Burden	- Annual Blood Examination Rate (ABER) **(M3)** - No of Fever cases **(M4)** - No of Malaria cases **(M4)** - No of Pf cases **(M4)** **-** No of deaths due to Malaria **(M4)** - Annual Parasite Incidence (API) **(M4)** - Annual Falciparum Incidence (AFI) **(M4)** - Test Positivity rate (TPR) **(M4)** - Test falciparum Rate (TfR) **(M4)** - Pf Percentage (Pf %) **(M4)** - % of fever cases who were tested for malaria by

	microscopy/ RDT with a positive test result for RDT and were started on treatment no later than the next day with ACT **(PMMR)**
Integrated Vector Control	- % of spray Equipment in working condition (**VC 2**) - % of Spray workers trained (VC 3) - Insecticide use (**VC 2, VC 6**) - No of ITNs/ LLINs distributed **(VC 4)** - IRS Coverage (Eligible) – Population (%) **(VC 2)** - IRS Coverage (Targeted) – Population (%) **(VC 2)** - IRS Coverage – Rooms (%) **(VC 2)** - % of Eligible population Covered by ITN **(VC 4)** - % of Targeted population Covered by ITN **(VC 4)** - % of Eligible villages with more than 80 % population Coverage with ITNs- Bednets Treated **(VC 4)** - % of house holds in which beneficiaries reported having slept under ITNs/ LLINs previous night **(PMMR)** - % of PHC sampled in which utilization of ITNs/ LLINs was more than 80% **(PMMR)**
Others	- Full Time SPO **Yes/ No** - No of RDTs Planned versus received & used **(M4)** - No of ACT Blister Packs Planned versus received & used **(M4)** **-** Outbreaks Reported **Yes/ No** -% of facilities (SC and PHC) / village level functionaries (ASHA, AWW) reporting stock-out of antimalarials lasting more than 15 days during the quarter **(PMMR)** - % of Staff in Place (ASHA, MPW,MTS, LT, DVBD Consultant) **(PMMR)** - % of MPHW/ASHA/other volunteers trained for use of RDT / ACT **(PMMR)** - % of Diagnostic facilities functional with microscopy/RDT in the last reporting period **(PMMR)** - No of BCC Activities (**PMMR**)

IV) National Level

NVBDCP, Delhi has the overall responsibility of compilation of all State level reports on case management, integrated vector control and programme management. The national level is required to analyze this data and provide feedback to states on key observations. The following indicators are required to be determined at the National Level.

NATIONAL LEVEL INDICATORS	
Policy and strategy development,	- Sites to monitor post-purchase quality of RDTs, drugs and insecticides recommended for use by national policy - Each of the established drug resistance monitoring sites completes at least one successful study every second year - Independent external evaluations carried out at least twice during project implementation - All endemic districts have quality-controlled data on incidence of vector-borne diseases segregated by age-group and gender
Surveillance/ case finding/ Disease Burden	- Annual Blood Examination Rate (ABER) **(M3)** - No of Fever cases **(M4)** - No of Malaria cases **(M4)** - No of Pf cases **(M4)** **-** No of deaths due to Malaria **(M4)** - Annual Parasite Incidence (API) **(M4)** - Annual Falciparum Incidence (AFI) **(M4)** - Test Positivity rate (TPR) **(M4)** - Test falciparum Rate (TfR) **(M4)** - Pf Percentage (Pf %) **(M4)** - % of fever cases who were tested for malaria by microscopy/ RDT with a positive test result for RDT and were started on treatment no later than the next day with ACT **(PMMR)**
Integrated Vector Control	- % of spray Equipment in working condition (**VC 2**) - % of Spray workers trained (VC 3) - Insecticide use (**VC 2, VC 6**) - No of ITNs/ LLINs distributed **(VC 4)** - IRS Coverage (Eligible) – Population (%) **(VC 2)** - IRS Coverage (Targeted) – Population (%) **(VC 2)** - IRS Coverage – Rooms (%) **(VC 2)** - % of Eligible population Covered by ITN **(VC 4)** - % of Targeted population Covered by ITN **(VC 4)** - % of Eligible villages with more than 80 % population Coverage with ITNs- Bednets Treated **(VC 4)** - % of house holds in which beneficiaries reported having slept under ITNs/ LLINs previous night **(PMMR)** - % of PHC sampled in which utilization of ITNs/ LLINs was more than 80% **(PMMR)**
Others	- No of Full Time SPO - Full Time DVBDCO/ DMO **Yes/ No** - No of RDTs Planned versus received & used **(M4)** - No of ACT Blister Packs Planned versus received & used **(M4)** **-** Outbreaks reported **Yes/ No** -% of facilities (SC and PHC) / village level functionaries (ASHA, AWW) reporting stock-out of antimalarials lasting more than 15 days during the quarter **(PMMR)** - % of Staff in Place (ASHA, MPW,MTS, LT, DVBD Consultant) **(PMMR)** - % of MPHW/ASHA/other volunteers trained for use of RDT / ACT **(PMMR)** - % of Diagnostic facilities functional with microscopy/RDT in the last reporting period **(PMMR)** - No of BCC Activities (**PMMR**)

11.5 Supportive Supervision

Supportive supervision is a continuous process which aims to increase the knowledge, develop the skills, improve the attitude and enhance the motivation of the health care functionaries. Supportive supervision is not an instrument for fault finding but aids in identification of problems, solving them and improving performance. It provides an opportunity to the supervisor and health workers to identify and address weaknesses together, thus preventing poor practices from becoming routine. It is also an effective tool for checking and maintaining quality of data at the peripheral level by regular onsite visits. Progression from traditional to supportive supervision may require changes in attitudes, practices and perceptions on the part of supervisors.

The protocol of supervision for each level of staff is given in **Table 11.5**.

Table 11.5: Supervisory protocol for staff under NVBDCP

Level	Staff	Frequency
Sub Centre	MPHW (F); MPHW(F)	Visit 1 ASHA per village during their visit & 2 patients treated by her in the last one month (checked from her record) Supervise IRS rounds in their villages as per Supervisory Schedule for IRS
PHC	MPHS (F); MPHS(M)	As per their supervisory schedule visit all subcentres in the PHC During visit to subcentres, try to visit remote villages and interview ASHA and 2 patients treated by ASHA in the last one month (checked from her records) Supervise IRS rounds in their villages as per Supervisory Schedule for IRS
	MO	Visit all subcenters in the PHC once a month During visit to subcentres, try to visit remote villages and interview ASHA and 2 patients treated by ASHA in the last one month (checked from her records) Supervise IRS rounds in their villages as per Supervisory Schedule for IRS
Block PHC CHC/FRU/Sub Dist. Hosp.	MPHS (F); MPHS(M); MO	As described above
	MO	Visit all PHCs & microscopy centres in the area of Block BHC once a month Monitor sentinel sites once a month Visit all Subcentres once in 2-3 months During visit to subcentres, try to visit remote villages and interview ASHA and 2 patients treated by ASHA in the last one month (checked

Level	Staff	Frequency
		from her records) Supervision of IRS rounds in the area of Block PHC
	Malaria Technical Supervisor (where deployed)	Visit all PHCs and microscopy centres in the Malaria Unit (MU)once a month Visit all sentinel sites in the MU once a month Visit all subcentres once in 2 months; visit all villages once in 6 months During visit to subcentres, try to visit remote villages and interview ASHA and 2 patients treated by ASHA in the last one month (checked from her records) Supervise IRS rounds in the area of MU, especially the remote and operationally difficult areas Further details are given in the Training Module of Malaria Technical Supervisor (MTS), The Checklist to be used by the MTS is given in Appendix 4
District	District Malaria officer	Visit all PHCs and microscopy centres in the district once in 2-3 months. During each such visit, 2-3 subcentres are to be visited in each PHC area. Visit all sentinel sites in the district once a month. Check laboratory function in each visit of microscopy centre & sentinel site. During visit to subcentres, try to visit remote villages and interview ASHA and 2 patients treated by ASHA in the last one month (checked from her records) Supervise IRS rounds in the district, especially the remote and operationally difficult areas
	VBD consultant	Visit all PHCs and microscopy centres in the district once in 2-3 months Visit all sentinel sites in the district once a month Visit all subcentres once in 6 months During visit to subcentres, try to visit remote villages and interview ASHA and 2 patients treated by ASHA in the last one month (checked

Level	Staff	Frequency
		from her records) To cover all PHCs of the district during spray inspection/supervision in each round of spray. To visit and observe at least 5 to 10 villages every week to check the quality of spray.
State	SPO/ Officer from SPO Officer	1 - 3 districts to be visited every month. All districts to be covered once in a year.
Regional Offices	RD/ Officers from RD Office	1 district to be visited every month

I) To Establish Supportive Supervision

A. Improve performance

- Use a protocol/standard operating procedure including a supervisory checklist for each type of unit supervised. **(Eg. Checklist of MTS at Annexure K 20)**
- Conduct supportive supervisory visits also **within** health care facilities you are in charge of.
- Provide staff with updates on policies or new recommended practices. Undertake on-the-job training see above supported by guidelines, manuals, visual aids.
- Plan supervision schedule in advance and communicate it to all those, who need to know. Lesser performing health facilities should receive extra or lengthier visits, so make sure that the initially planned schedule has slack time for this.
- Plan these visits as much as possible, when it is possible to observe the staff and interview patients. Talk to patients about the quality of services, preferably away from the health facility.
- Plan to spend sufficient time (from several hours, to a full day or more) to conduct the supervisory visit to each unit. Rushed visit with no time for dialogue are inefficient.
- Follow up on recommendations made during previous visits. Discuss progress with the health facility
- Check the stocks and the condition of equipment. Compare stocks with records. Are storage conditions correct? If not, help find solutions. Carry materials, and supplies for the health facility according to requests made or needs identified at previous visit.
- Review health facility records and provide feedback to the staff as well as MO in charge.
- Check the various records like M1 of ASHAs, M3 of Lab and reports like M4 for completeness, consistency, and accuracy. Mark columns which were expected to be entered but have not been filled. Try to compare the case detection with the use of logistics. Eg the numbers of fever cases in which RDTs were used for diagnosis (col 12) of M1 with the utilization in the lower part of the record in the same month.
- Analyse programme indicators for the health facility to make the performance objective and measurable.
- Involve the community in the evaluation process. Ask community members how they are treated when they visit the facility. Talk to community leaders during the visit to get their feedback and identify jointly, what the community can do.
- Find out, if the relationship between community and health workers is good; if not, find out what is wrong and remedy the situation.
- Discuss strengths and weaknesses, and actions to be taken (by whom and by when).
- Identify gaps and solve problems in positive ways
- Praise health workers in public for good performance and for practices that meet quality. Correct performance only through person-to-person contacts.
- Work with other health programmes to coordinate supervisory activities in a spirit of mutual support.

- Schedule a return visit before leaving the site.

B. Maintain and enhance motivation

- Give praise and recognition to health workers for what they are doing right.
- Involve health workers in planning and encourage health facility supervisors to work together with their staff.
- Take part in staff meetings if possible. Talk to staff about their work situation, needs and ambitions.
- Act on feedback from the health workers, health workers will feel valued that they have an impact. Show that you trust them (as much as you actually do)
- Establish monthly meetings with all health facilities within a district. This provides an opportunity for health workers to learn new approaches and strategies used in different health facilities and to receive continuing education. It can also be a forum to acknowledge their achievements.

C. Build sustainability

- Collect data on positive results gained from supportive supervision, such improved performance of health workers, improved coverage of IRS, better treatment etc.
- Develop a team approach to increase supportive supervision at the health facility and make it a routine procedure, with or without frequent visits from the central or district level.
- Health facility staff can develop supervision plans that fit their structures and conduct regular self-assessments to monitor their performance.

11.6 Data Quality

Under the programme it is important to ensure that the data collected through reports should be complete, accurate and consistent. This is possible only when records are maintained immaculately on a regular basis and a system of verification of reports exists. Therefore, the quality of data is the responsibility of the supervisory staff and the Officer Incharge/ signing authority of the reports. It is necessary to verify data during onsite visits of villages, subcentres and districts. During field visits the supervisory staff like MTS, DVBDC consultants, DMO and other PHC/ District /State/ Centre level personnel should make an effort to crosscheck M1 for the individual patient records and visit patients diagnosed and treated in the previous month. Similarly a sample of reports should also be reworked from the records to check for their validity e.g. the BMO should recheck the compliation of M4 of all Subcentres into M4 at PHC each month. The reports should also be tracked for timeliness and complete each time they are received. The time schedule for each report is mentioned in **Table below**.

S. No.	Report	Time Schedule
1	Fortnightly Report by ASHA/ Community Health Volunteer/ MPW/ PHC (M1)	Ist Fortnight- 21st of the month IInd Fortnight- 7th of following month
2	Fortnightly Report of cases (M4-SC)	Ist Fortnight- 25th of the month IInd Fortnight- 10th of following month
3	Fortnightly Report of cases (M4 PHC)	Ist Fortnight- 28th of the month IInd Fortnight- 13th of following month
4	Fortnightly Report of cases (District)	Ist Fortnight- 30th of the months

		IInd Fortnight- 15th of following month
5	Fortnightly Report of cases (State)	Ist Fortnight- 5th of the following month IInd Fortnight- 20th of following month
6	IRS output (VC2) – Round wise	PHC – 15 days of completion of Spray District – 30 days of completion of spray State - 45 days of completion of Spray
7	Bednet Delivery and Impregnation form (VC 4)	PHC – 15 days of completion of activity District – 30 days of completion of activity State - 45 days of completion of activity
8	District Programme Management Monitoring Report (PMMR)	15th day of the following quarter
9	State Programme Management Monitoring Report (PMMR)	21st day of the following quarter

11.7 Feedback Mechanisms, Data sharing and Transparency

There should be a two way flow of information in any system of data management. Therefore, a system of preliminary tracking of reports for data timeliness, completeness and consistency should be in place and a system for prompt feedback on such discrepancies observed should be established at all levels. Beside this there should be timely review of all reports received on epidemiological and programme management aspects. Any unusual deviation in various monitoring parameters should be communicated to the reporting units. The Centre/ State/ District / PHC should establish this system through regular letters and e-mails, with their respective reporting units to notify the observations made. The reporting unit should respond within one week to such correspondence with required clarifications.

The centre/ district and state should also come up with Annual reports for the reporting units which should be widely disseminated.

11.9 Programme Review

Regular review of program by authorities is a way of taking stock of programme progress as well as it provides opportunity of interacting with the implementing partners to address administrative issues. It is imperative that such reviews are organized at regular interval which reflects commitment of the highest order. The norms for such review are as follows:

S. No	Level	Type of review	Time schedule
1	Centre	Biannual review of States by Centre	1 per 6 months
2	State	Quarterly review of District by State (in First month of the following quarter)	1 Per Quarter
3	District	Monthly review of NVBDCP under chairmanship of District collector	1 Per month per District

4	District	Monthly review of NVBDCP by DMO/ DVBDCO with his staff	1 Per month per District

The participation of highest level administrative officials should be ensured in programme monitoring. Wherever possible the Health Secretary should be involved in such programme reviews at State level. The District collector should also review the programme as per the prescribed norm especially in the transmission season. Microplanning of IRS as well as continuous monitoring of its implementation should be a District Collector driven initiative. The checklists to be used by Health Secretary and District Collector in such reviews are given in **Annexure K-13, 14**.

11.10 Surveillance in Malaria

Surveillance is defined as the ongoing and systematic collection, analysis, interpretation, and dissemination of data about cases of a disease and is used as a basis for planning, implementing, and evaluating disease prevention and control activities.

Malaria surveillance in India was traditionally a system based mainly on slide results, which has been refined over many years. It relied on surveillance of fever cases in the community by means of active fortnightly case detection conducted mainly by the MPW (M). Active case detection implies that the MPW (M) would visit all villages within the Subcentre area once every fortnight and look for occurrence of fever cases between the current and previous visit. Slides of such fever cases were collected and sent to laboratory for examination along with administration of fever presumptive treatment with chloroquine. A target of Annual Blood Examination Rate (ABER) of 10% of population was kept in order to adequately find fever cases. Active case detection by MPW (M) formed the backbone for all the disease burden indicators. With over half a century of programme implementation it has been realized that shortage of MPWs resulted in decline in this activity. Poor surveillance resulted in inability of the system to generate timely information on fever alerts and response.

The programme now envisages a change in programme strategy from active to passive case detection. It will be conducted through the agency of ASHAs/ CHVs/ AWWs at village level. For the purpose of strengthening village level passive case detection these functionaries are to be equipped with Rapid Diagnostic Tests (RDTs) in areas with poor access to malaria microscopy. Passive case detection will thus be the crux of routine surveillance activities in the programme and active case detection through weekly visits by MPW (MP) will be restricted for use in areas where such functionaries are not present.
Fortnightly reports of case detection generated in M1 formats and consolidated in M4 format will provide the necessary data for continuous surveillance of disease situation.

11.10.1 Interpretation of Indicators

The main disease incidence indicators listed in Table 3 can be calculated from the data available from M4 for virtually any level, from village to national level. All suspected cases of malaria in the country (or district or village) are captured in M1 and consolidated correctly into M4; the resultant indicator values for API, TPR etc. are then calculated based on the formula described. All surveillance and disease burden indicators should be assessed for an increase or decrease from the corresponding period of the previous year. API of More than 5%, TPR of more than 5%, Pf% more than 50% should always raise an alarm. These indicators are also used to identify high risk areas and identify areas to be focused on priorty. Sudden increase of fever incidence in community, OPD fever rate and malaria incidence along with rise in TPR above 5% may indicate an impending outbreak. When assessing IRS or ITN for universal coverage, 100% coverage is considered optimal and at least 80 % utilization by targeted population should be the acceptable cut off. Service delivery or utilization below this should be considered inadequate. Table 11.6 provides the cut offs for various indicators and interpretation deviations from the expected norms.

11.10.2 Sentinel Surveillance for Malaria

Malaria surveillance conducted through routine MIS provides reliable data on trends of cases and deaths reported in the Public health care system, but does not provide relevant information on severe and uncomplicated malaria. Large number of cases seek health care from the Private sector and are also not counted in the programme statistics. The data made available from the routine HMIS therefore is to be seconded by a more exhaustive but high quality information system to be provided by sentinel surveillance that acts as a close watch dog on disease severity, delay in referral and mortality rates.

11.10.2.1 Purpose of sentinel surveillance for malaria control

Very little data is available on severe cases of malaria, their management and on malaria deaths in India. Timely referral of cases to PHCs/ District Hospitals/ Tertiary centers and their proper management in these centers limits mortality associated with malaria. Therefore, to monitor case referral and practices in in-patient case management it is important that this data is collected, compiled and analyzed. Furthermore, improvements in malaria case management (especially rapid diagnostic tests and artemisinin-based combination therapy (ACT) for falciparum malaria, which will be introduced in India on a large scale, may well lead to short-term increases in the annual parasite incidence (API) because more patients may be attracted to primary level services. However, these improvements should lead to a decrease in the incidence of severe malaria and malaria deaths. Thus, monitoring of these latter events becomes essential for assessing impact. Aside from this, high or increasing numbers of in-patients from specific peripheral areas in a district may be a warning sign of a deficiency of primary level services or impending outbreaks.

Analysis of data on such cases can provide important additional information, for example: If severe malaria is very frequent in pregnant women, additional efforts must be made to prevent malaria in this particular group. Age trends may be informative; if for example, a large proportion of cases occur in young children, transmission is probably taking place in villages, but if most cases are in young men, it probably does not. If people of a certain tribe are often hospitalized with malaria, they must be at high risk; if they never get hospitalized for malaria, there may be some kind of barrier.

Since the health infrastructure in the country has limited capacity to manage voluminous data, it is not feasible, at least at this point in time, to collect detailed information on in-patients from all PHCs. To obtain reliable, representative information on severe cases of malaria, Sentinel Sites will be selected in each district. These sites will act as watch dogs and providing detailed information on indoor patient admissions. This data when analyzed over a period of time would thus represent the trends in malaria related mortality and incidence of severe malaria.

11.10.2.2 Norms for establishing Sentinel Sites

A minimum of two sentinel sites will be established in each district. As this is a new activity and quality is paramount, districts should normally start with only two sites and consider expansion later. Hospitals with large OPDs and inpatient case loads should be chosen. Therefore, the district hospital will automatically qualify as one such site. Other sites are selected amongst the PHCs/ CHCs /private/faith-based hospitals. It is desirable to have sentinel sites in the private/faith-based sector as many patients seek care there and this data is most often not reflected in the HMIS. Districts which have Medical Colleges should establish a site in these tertiary care centers, if they habitually admit many malaria cases.

The Sentinel Sites should be adequately staffed and Medical Officers and laboratory technicians (LTs) should be trained. A nodal Medical Officer (SSMO) should be in charge of all activities regarding malaria in the sentinel sites. There should be a laboratory with a qualified laboratory technician in charge, where malaria microscopy is quality controlled according to new NVBDCP standards. At each sentinel site, the LT (SSLT) working under the supervision of the SSMO will be responsible for the quality of the malaria laboratory results and for data compilation. A central register for fever cases without any other obvious cause (suspected malaria) should be maintained at each Sentinel Site called Sentinel Site-Malaria Register (SSMR). (**Annexure K-15**). Each day the SSLT will record information of all suspected malaria cases from the Lab Register of the Sentinel Site into the SSMR. Information of all fever cases from

different OPDs and on in-patients is entered on the same form to avoid double-counting and difficulties in patient identification. After entering the data, SSLT notes elements, which need to be re-checked and obtains necessary clarifications on the same day from the OPDs. The record for inpatients is completed from the respective case sheets and the final outcome cured & discharged/ died/ referred or left without discharge is carefully recorded. Every SSMR, which has not been completed with in-patient information, is taken to the relevant in-patient department weekly until it has been completed. The paper based SSMP are filed in the health facility, where they have been generated. At the end of each fortnight the Sentinel Site Report (**Annexure K-16**) is generated from the Sentinel Site –Malaria Register by the SSLT.

11.10.2.3 Recording Reporting and Use

A. Data entry

A standard database with a data entry portal corresponding to the SSMR will be entered in NAMMIS and the entry portal will include a check on errors.

At the end of each fortnight, the line list of suspected Malaria cases will be entered into NAMMIS. After becoming proficient in this, SSLT may delegate this work to a clerk.

In addition, SSLT collects data at the end of each month on total number of out-patients, total number of in-patients and total number of in-patient deaths, all separated by gender and below 5 years/ 5 years and above. These data are entered in a relational database, so that they can be used as denominator.

Outputs, reports, interpretation and use

B. At each SS

Every Fortnight: Fortnightly output of the below indicators with their breakdowns. Graph showing fortnightly trend over current calendar year of indicators 1-4 (without breakdown).

Every month: Corresponding monthly output.

SSMO is responsible for scrutinizing weekly and monthly outputs and to alert BMO to any finding, which requires urgent attention.

Fortnightly and monthly outputs are submitted to Block Medical Officer (BMO).

C. Block Medical Officer

Monthly output is submitted by BMO with narrative interpretation and comments to DVBDCO, in particular on findings which require attention or action. Initiates relevant action, if any data suggest an emergency problem.

Every year: Corresponding annual output, and additional computer analyses as requested by SSMO/BMO/DVBDCO

D. DVBDCO

Annual outputs from all SSs are sent by DVBDCO with narrative interpretation and comments to State NVBDCO as part of the annual malaria report. An annual summary is prepared by State VBDCO as part of annual malaria report.

The routine outputs are generated by NAMMIS. This means that once the data have been entered, the routine outputs are generated by a few clicks by the SSLTs. SSLTs and district data managers will be trained to generate additional analyses requested.

11.10.2.4 Main indicators

The data from sentinel sites will give information on age specific morbidity & mortality due to malaria, especially under 5 morbidity and proportional mortality rate due to malaria. The following indicators are to be derived from the data obtained from M5.

Table 6: Interpretation of Indicators

S. No.	Indicator	Description	Breakdown (with percentages)
1	Number of out-patient cases of malaria	Self-evident	Clinical/confirmed, under 5/ 5yrs and above, M/F, Pv/Pf, sub-centre area
2	Number of in-patient cases of malaria	-"-	-"-
3	Number of cases of severe malaria	-"-	Clinical/confirmed, under 5/ 5yrs and above, M/F, sub-centre area
4	Number of malaria deaths	-"-	Clinical/confirmed, under 5/ 5yrs and above, M/F, sub-centre area
5	% OPD cases attributed to malaria	Total no. of cases of OPD malaria/Total OPD X 100	Under 5/ 5yrs and above
6	% in-patient cases attributed to malaria	Total no. of cases of in-patient malaria/Total inpatients X 100	
7	Proportional mortality due to malaria	Total no. of deaths due to malaria in hospital admissions / Total no of deaths in hospital admissions X 100	
8	Case fatality rate of falciparum malaria	Total no. of confirmed malaria deaths/total no. of falciparum malaria cases X 100	
9	Case fatality rate of confirmed severe malaria	Total no. of confirmed malaria deaths/total no. of confirmed severe malaria cases X100	

11.11 Special Surveys

The surveillance and program monitoring on the basis of data reported through the routine system and sentinel sites provides a fairly comprehensive picture of the progress of the program towards its objectives. However, this is not sufficiently objective, because it consists of data or reports generated within the program. Any shortcomings inherent to the system are therefore inadvertently incorporated into the picture drawn by them. This system also does not cover the patients seeking care from the private sector (other than a few sentinel sites). The programme indicators thus obtained from the routine and sentinel surveillance system are not true estimates, therefore, to plug such gaps, and to lend more objectivity to program monitoring and evaluation, assessments independent of the HMIS will be periodically carried out.

Two types of surveys are to be conducted in the programme:

A. Small scale Quarterly or Half yearly Surveys based on Lot Quality Assurance Sampling (LQAS)

Lot Quality Assurance Sampling (LQAS) is sampling method originally used in the early twentieth century by industries to test quality of batches of products in an assembly line. The requirement in that context was a sample just sufficient to determine if there was more than a certain acceptable proportion of faulty products per batch. Using binomial probabilities, it was demonstrated that a small sample was sufficient to "pass" or "fail" a given batch or lot of the product in question. This principle has been put to use in public health program settings, particularly for child health but also for a number of other contexts, to provide reasonable results, since more than twenty years globally. This method has not yet been used widely in the Indian public health programs, but holds considerable promise in contexts where it is possible to periodically conduct such small sample surveys.

In essence, the LQAS sampling method comprises of collecting survey data from small but perfectly random samples drawn from a well-defined universe, typically called a supervisory area, such as a sector or block. A commonly used sample size for each such area is 19, such as 19 households or 19 individuals. The survey tools consist of the usual, standard questions used in sample surveys, such as questions related to utilization of bednets or to prompt diagnosis and treatment of fever, but the answers are always coded and analyzed as dichotomous variables (each question has two possible answers: "yes" or "no"). While this sample of 19 cannot provide a reliable point estimate for an indicator, it can reliably tell whether the sampled area has exceeded a "target" prevalence for the indicator. For instance, if the question is whether or not 80% of individuals in a block PHC area sleep under bednets, a random sample of 19 individuals from this universe can reliably tell whether this is true. In this case, a statistically computed cut-off of 13 is used: if in the survey, 13 or more out of 19 individuals say they slept under the bednet on the night before the survey, one may say with 92% confidence that 80% or more people in the block sleep under bednets. The sample size of 19 is the smallest that can give results with acceptable reliability, and therefore is commonly used. Increasing the sample size does not significantly increase the reliability in making such a decision.

In the malaria control program, it has been proposed that the LQAS method will be used for generating information about the coverage of important process and outcome indicators at the sub-district (block PHC) levels. The MTS will be trained to collect and tabulate data from a sample of 19 households or individuals in each block PHC that they cover. Each round of data collection will yield a result for each block – whether or not the block has exceeded a certain pre-determined target coverage. Only a small number of questions will be used, to maintain feasibility of data collection within program settings. Several rounds of data collection can take place during a year, depending upon the need and feasibility, and will provide a sense of how each block is progressing. For each round of data, district level coverage of the indicators will be computed by cumulating the samples of 19 from all the blocks, and adjusting for relative population size. Similar weighted estimates for the state level will be generated by pooling data from all districts. The use of periodic small surveys in this manner is expected to provide valuable information to help program monitoring, planning and implementation at all levels – to PHC MO and team, the DMO and team, and the state directorate and ministry.

The sample of 19 in a block is typically spread over 19 villages. Thus, one household or individual each is sampled from 19 villages. Such a widely spread sample is expensive for a survey investigator to collect, but surveys using LQAS cost very little because the data is collected as a part of the routine field visits of supervisors. It is expected that the MTS will visit up to 2-3 villages a day on his/her motorcycle, and collect this data in prescribed forms along with conducting the rest of his/her supervisory duties in the village, such as interacting with the ASHA, examining records and stocks, meeting people, etc. This will make the use of this method feasible. It should also be noted that the questions required to elicit information to generate estimates of key indicators are also the same questions that the MTS must ask to perform the supervisory role. In this sense, the data collection effort is not an addition to the envisaged job of the MTS.

The number of rounds of data collection per year and the number of blocks covered in each round will depend on the need and feasibility, and if all blocks cannot be covered in each round, a statistical sample of blocks will need to be drawn, repeating some blocks in each subsequent round. This method, also called Large Country LQAS (LC-LQAS) may have to be applied in some settings.

Since this is the first time this method is being used in the Indian health program context, the experience will be reviewed periodically and refined until it is well-established. It has been suggested that, in the Indian context LQAS may be renamed as “Local Quality Assurance Surveys”, to emphasize the role of a program monitoring tool.

B. Large scale Surveys

The surveys are designed to capture the main outcome indicators of the programme and other data. Such house hold level surveys are conducted every 2-3 years by an Independent agency. Expertise of WHO, NIMR is also sought to support the planning and implementation of these surveys and to participate in the evaluation exercise together with NVBDCP and selected Indian institutions. The methodologies of these surveys are developed in consultations held with the Independent agency hired for the purpose.

The programme also undertakes in-depth review of programme implementation through Joint Monitoring Missions organized together with its partners in malaria control like NIMR, WHO and World Bank. Such reviews bring to light programme short comings in the area of policy and implementation and enable improvements in programme design.

11.12 Evaluation

Periodic large scale evaluations of Programme are carried out by independent observers. NVBDCP may call for an independent agency to undertake such reviews which comprise of an indepth assessment of all programme aspects like case diagnosis & management, treatment seeking behaviour of the community, coverage of vector control interventions and community acceptance, impact of BCC activities on community awareness and practices. NVBDCP also undertakes special Joint Monitoring Missions (JMM) along its partners in malaria control like WHO and World Bank. These large scale evaluations are conducted usually at 5 yearly intervals, to allow for passage of sufficient time for impact to become evident.

Besides this the programme undertakes annual evaluation of programme implementation in high risk areas. This activity is outlined in following paragraphs.

11.12.1 Central Evaluation

Central level Evaluation is now routinely conducted each year, twice during the transmission season, coinciding with the two rounds of spray. During this period teams are sent to the selected highest endemic districts of the country comprising of members from Dte NVBDCP, ICMR/ NIMR Institutes, Regional Offices, State Offices & Districts.

A. Objectives

The objectives of the Evaluation are as follows:

A. To evaluate the preparatory activities for IRS in the selected districts and estimate IRS coverage
B. To assess the status of programme implementation in the district with particular focus on activities of ASHAs and utilization of RDTs,
C. To assess distribution of Bednets and estimate utilization of bednets by beneficiaries

B. Methodology

At the beginning of the transmission season the Centre selects the highest endemic districts of the country on the basis of ABER, API and Pf % of the previous year. Central teams visit these districts twice during the transmission season, once in each round of IRS. In the selected high endemic districts two high burden and high risk PHCs are selected based on ABER, API and Pf%. In each PHC area 2 subcentres are to be selected for evaluation of Indoor Residual Residual Spray (IRS), followed by selection of 2 villages in each Subcentre area. Selection of villages is done in such a manner so that in one village concurrent evaluation of IRS is possible on the day of visit; the selection of 2nd village is done

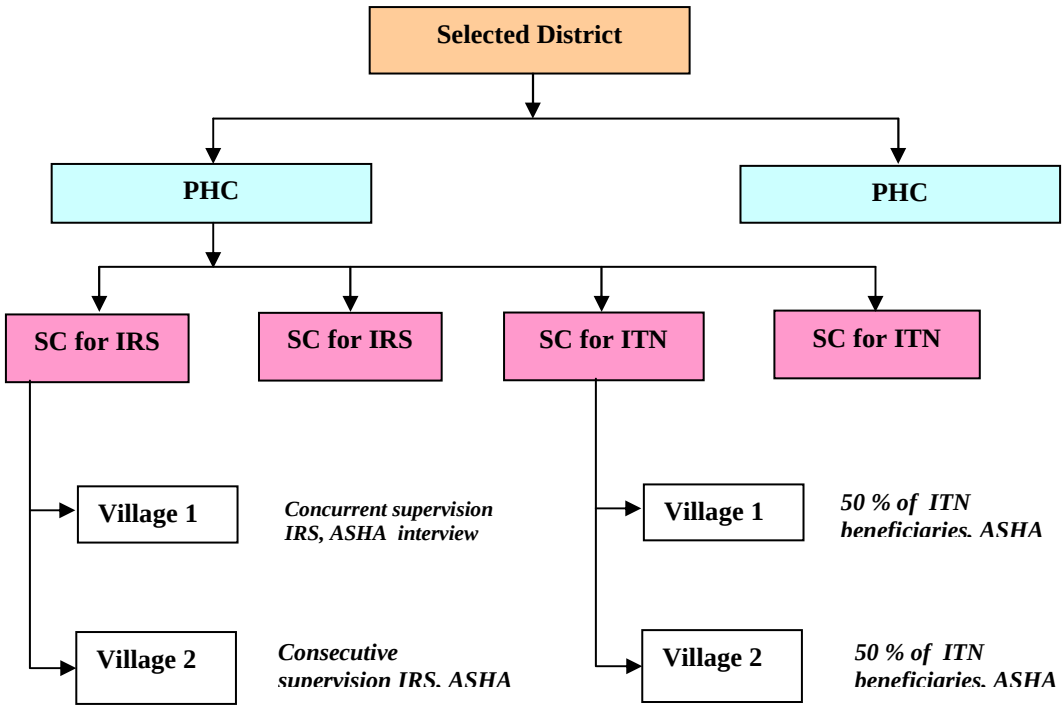
such that IRS is completed and consecutive evaluation is possible. The ASHAs of each selected village are also interviewed.

In each of the selected PHCs ,2 more Subcentres are selected in which maximum numbers of bednets were distributed in the season. If bednets were not distributed in the selected areas, other PHCs may be selected for the purpose. In each subcentre, villages in which most number of bednets was distributed in the season are selected. In each of these villages 50 % of benificiaries are selected on a random basis from the records and assessed for utilization of bednets. The ASHAs of each selected village are also interviewed.

The evaluation is conducted with the aid of prescribed checklists and indicators are determined. The checklist to be used for the purpose by the central teams is given in **Annexure K-17, K-18, K-19**. The diagrammatic representation of the methodology is given in **Fig 11.4.**

The reports of the teams are submitted to NVBDCB, where compilation and review of programme implementation is done. The state may devise similar system of evaluation of its own to strengthen the system of regular monitoring.

Fig 11.4. Methodology of Conducting Annual Central Evaluation



Chapter 12
Annual Planning

Each year NVBDCP prepares an Annual Action Plan for malaria under Government of India. In the Annual Plan central assistance is provided to the states in the form of anti malaria drugs, insecticides (DDT and Syn. Pyrethroids liquid) and larvicides under the National Vector Borne Disease Control Programme. The programme is implemented and monitored by the state health authorities and the operational costs, including the wages for contract labour for the indoor residual spray are borne by the state governments. The central government however, provides full cash assistance for spray wages to NE States and Union Terrorities. For control of malaria during epidemics, Malathion technical is also provided by centre. Malathion 25% and Syn. Pyrethroids WDP are decentralized items as per programme policy and states procure them in areas where malaria vector is resistant to DDT. Primaquine and Quinine Sulphate have been decentralized for procurement by states from 2009. The list of items for Centralized and Decentralized procurement is given in Chapter 14.

NVBDCP has now been integrated under the umbrella of National Rural Health Mission (NRHM) which is an endeavor of Govt of India to uplift rural health. At the onset of the year all the States/ districts undertake the annual process to plan out prevention and control activities in malaria control to be executed in the Plan year. The states combine all the district level plans to prepare a State level Annual Action Plan. This plan should be based on epidemiological parameters related to malaria, programme guidelines & eligibility criteria and availability of resources. These Plans are discussed technically at NVBDCP in the month of December or January. These discussions are followed by similar discussions under NRHM and the finalized Plan is approved under Plan expenditure. Cash is released to the states based on the balance available with the states.

Malaria is characterized by local and focal occurrence and pockets of high risk areas should be identified for eligible populations for programme interventions. Once the eligible populations are identified the estimates of requirements are determined. These estimates are actual requirements for universal coverage of various interventions irrespective of availability of resources. Eg bednets required to cover the entire population eligible. These maximum estimates are then matched with the resources allocated by the centre and eligible areas are prioritized and selected based on epidemiological importance. Selected areas are then targeted with the resources available.

High risk areas are identified and prioritized based on criteria defined earlier chapters. Every annual plan should be based on the experience of the previous year. Thus, it is important that a review report of the status of the disease situation and the program precede the formulation of the next annual plan. The last fortnight of the year can be devoted by the district malaria staff to this work, which will involve a close review of all available relevant information and analysis. The planning should involve all important stakeholders in the district, particularly health program staff.

As has been pointed out that annual planning should be a bottom-up process. It should begin at the district level and it's principally the responsibility of the DMO/ DVBDC Officer. The DMO should try and elicit the participation of PHC Medical Officers. The MO PHC should facilitate by providing all necessary data for the PHC area. For planning of programme activities like RDT distribution, ACT distribution, IRS and bednet distribution detailed micro-planning is required whereby list of eligible villages is drawn for each programme intervention. Villages eligible for RDT, ACT, IRS or bednet distribution are identified based on programme criteria already described.

The annual planning should begin with the assessment of requirements and distribution plan for the entire population eligible for a particular intervention. This means that the initial plan is drawn based on estimation of the true requirement for complete coverage irrespective of the availability of resources. However, in all public health settings there is always a limitation in the resources available. Hence before actual implementation the plan is curtailed down as per the resources made available. From amongst all the eligible areas and populations, prioritization is done to select the likely beneficiaries in the given year. Eg. In a given district 2.5 lakh populations may be eligible for bednet distribution but the programme is able to supply only 50,000 nets in the year, which is sufficient to cover 1.25 lakh populations. The DMO should then try selecting areas which are operationally really difficult for IRS and

the community has a good acceptance of bednets. The remaining population can be targeted in the next annual plan.

The Directorate of NVBDCP suggests the use of the Action Plan Proforma given in the next page. All annual planning should ideally be initiated at the district level and compilation of all District Plans should be done at the State level. The Annual Plan consists of following descriptions:

A. Population
B. Status of Health Facilities
C. Human Resource
D. District wise Epidemiological Situation, Identification of high risk areas and populations
E. Status of GIS mapping
F. Information on outbreaks in the previous year
G. Estimation of requirement of RDTs and plan for distribution of allocated RDT in the current year. Estimation of requirement for the next plan year.
H. Estimation of requirement of ACT in the current year. Estimation of requirement for the next plan year.
I. Planning for bednet distribution and impregnation.
J. Microplanning for IRS
K. Training Activities
L. BCC Activities
M. Commodity Requirement
N. Cash Assistance
O. SWOT – Strength, Weakness, Opportunity, Analysis

The District level detailed planning for RDTs, ACTs, IRS and bednets is to be based on Annual Planning Formats (AP) given in **Annexure K-21,22,23** Microplanning for IRS should be based on the Formats at **Annexure K-24.**

NATIONAL VECTOR BORNE DISEASE CONTROL PROGRAMME
State Annual Action Plan
Year:_____

A. Population:_____

B. Status of Health facilities

S. No	Health facility	No
1	District Hospital	
2	Block PHC/ CHC	
3	Add PHC/ Mini PHC	
4	Sub centre	
5	Villages	
6	Rapid response team	

C. Human Resource

S. No	Health facility	Sanctioned	In Place	Trained as per new Malaria guidelines	Required to be Trained
		a	b	c	d= (b-c)
1	DMO (Full Time)				
2	DVBDC Consultant				
3	AMO				
4	Block PHC/ CHC-MO				
5	PHC-MO				
6	Other MO				
7	Lab Technician				
8	Lab Technician (contractual)*				
9	Health Supervisors (M)				
10	Health Supervisors (F)				
11	MPW (M)				
12	MPW (M) (contractual)#				
13	MPW (F)				
14	Malaria Technical Supervisor (contractual)*				
15	ASHA				
16	Other (Project specific staff)				

* GFATM/World Bank (till project is implemented)
# Applicable to states that have been sanctioned.

Based on training need (column D) no of batches to be trained :

D. District wise Epidemiological Situation: a brief analysis on the following parameters to assess performance (ABER- Surveillance) & impact (API, cases, deaths etc) may be given so as to identify gaps and areas requiring improvement

D1. The States are to hold meetings for development of district wise Action Plan by analyzing the data on following parameters.

District Name	Year	Population	BSC/BSE	ABER	Total Malaria Cases	Pf. Cases	API	SPR	SFR	Deaths due to malaria
District 1	2004									
	2005									
	2006									
	2007									
	2008									
District 2	2004									
	2005									
	2006									
	2007									
	2008									
District 3	2004									
	2005									
	2006									
	2007									
	2008									
State Total	2004									
	2005									
	2006									
	2007									
	2008									

NB. The districts are to hold similar meetings for development of PHC wise Plan

D2. High Risk Areas: Based on the epidemiological data in the above table identify the high risk areas according to definition in Malaria Action Programme (As per MAP 1995) for the prioritization criteria developed by expert committee 2002 (enclosed)

S. No	District	High risk PHCs (No)	High risk Sub centre (no)	High risk Village (no)	High risk Population (no)	Tribal Population (no)
1	District 1					
2	District 2					
State Total						

D3. Classify the areas as per following API ranges

S. No	API	District (No)	PHCs (No)	Sub centre (No)	Villages (No)	Population @ Village (No)	% Population @ villages
1	**<1**						
2	**1 – 2**						
3	**2 – 5**						
4	**5 – 10**						
5	**> 10**						
Total							

E. GIS mapping ***(Based on epidemiological data for the years 200_ for identified high endemic districts) List Attached***

- Status of Village wise data entry of the district for 200_ in GIS format for identified high endemic districts: ……..

F. Outbreak: Yes/ no if yes;

- No of outbreaks
- Area affected
- Period of outbreak
- No of Cases & deaths reported during outbreak
- Reasons for outbreak
- Containment measures taken
- Outbreak Containment Report(s) submitted by State to Centre? Yes/ No

G. Specific activities:

a)RD Kits (selected Pf endemic districts only)

A. of Rapid Diagnostic Kits for the plan year based on epidemiological and operational data

S.No.	District	No. PHCs where RDTs are to be used in emergency hours	No. sub-centre areas with Pf > 30% & SFR>1% and no microscopy result within 24h	No. blood examinations in those sub-centre/ PHC areas last year (A)	Expected RDT requirement in remoote high Pf areas and PHCs [Ax 1.25] (B)	RDTs for buffer stock and distribution to other areas: [B x 0.20] (C)	Total annual RDT supply [B+C]	Nos to be distributed in prioritised areas
1								
2								
3								
4								
5								
Total								

* Planning for RDTs is based on annual blood examinations in areas and health facilities, where it is not possible to obtain a microscopy result within 24 hours (no later than day after slide is taken and where the risk of P. falciparum rate is >2%.

* Villages planned to be equipped with RDTs should have trained ASHA/ CHVs (including A W W)
* In the above, sub-centre area means the sub-centre and the villages under it, while PHC means the PHC health facility, e.g. " PHC (new). The distinction is made, because in some cases, the PHC has microscopy, but many of the sub-centre areas under it do not.

* In general, it should be assured that as a mininmum . RDTs are supplied to cover all blood examinations in the eligible PHCs and sub-centre areas. The number of blood examinatios is estimate by adding 25% to the number of blood examinations during the last complete calendar year, because RDTs may attract additional patients.

B.	**Requirement of Rapid Diagnostic Kits based on epidemiological data for next Plan Year**					
S. No.	**Details**	**Slide Collection**	**Sub centre (no)**	**Village (no)**	**Total Population**	**Tribal Population**
1	Areas with high Pf %					
2	Of the above prioritized to be equipped with RDT during the year					
3	No of RDTs Required for Next Plan Year					

* If possible, a buffer stock of approximately 20% , depending on the availability of supplies is added, to cover needs in other areas and health facilities, where individual patients may be considered highly suspect of falciparum malaria on account of symptoms or travel history , or where microscopy may be temporarily unavailable and to provide a reserve for supplies to the eligible areas.

b) Areas for supply of ACT

A. Allocation of ACTs and quinine for a plan year based on epidemiological and operational data						
Data latest complete year				**Allocation for plan year**		
Details	**Name of district or block/ district**	**Total Population**	**Pf cases reported in previous year**	**ACT Blister for Adults,**	**ACT Blister for Children**	**Pregnant Women**
					AS Tabs	**Quinine Tablets**
				Please see calculation norms given at Annexure-H		
District identified for roll out of ACT	1					
	2					
	3					
	4					
	5					
Cluster of PHCs (Blocks) around Pf resistance foci	1					
	2					
	3					
	4					
	5					
Total						

* Planning for ACTs is based on the number of falciparum cases found in eligible areas in previous year. Like for RDTs, 25% is added to account for RDTs, 25% is added to account for increaing patient -loads resulting from more attractive services and an extra buffer quantity of approximately 20-25%. This leads to the multiplication factor, 1.5

* The additional multiplication factors for non-pregnant adults and children are based on the number of tablets required for different age-groups and the age-distribution in the general rural populations.

- The additional multiplication factors for quinine tablets for pregnant women are based on the assumption that 2% of all
- cases occur in pregnant women, and that each of these cases required 21 tablets of quinine suplhate 650 mg

B. Allocation of ACTs and quinine for Next Plan Year

Data latest complete year				**Allocation for Next plan year**		
S. No.	**District/ PHC Clusters identified for roll out of ACT**	**Total Population**	**Pf cases reported in previous year**	**ACT Blister for Adults,**	**Children**	**Pregnant Women**
					AS Tabs	**Quinine Tablets**
				Please see calculation norms given at Annexure-H		

c) Bednets

All planning should be based on enumeration of bednets in households by Bednet Survey.
(Use the IVM Annual Plan Format for detailed planning)

A.	**Planning for distribution of Bednets**											
S. No.	**District Name**	**Eligible Sub centre (nos)**	**Eligible villages (no)**	**Eligible Population**	**Tribal population**	**Total Bednet required (no)**	**Number of bed nets available in household survey (no)**		**Required in the Current Year (no)**	**Total Planned to be distributed in the year (no) as per allocation**		**Total planned to be treated (no)**
							ITNs	**LLINs**				
						A	**B**	**C**	**D=A-(B+C)**	**ITNs**	**LLINs**	**G=B+E**
										E	**F**	
1												
2												
3												
Total												

NB: 2 nets per household; Avg size of household to be taken as 5

***d)Planning for IRS*:** Please specify criteria for selection of areas for IRS:-

(Specify whether the unit of planning is village / sub centre. Mention the cut off used for API, Pf% deaths for selection of areas; whether MAP criteria has been applied)

_____

_____

_____

(Base the planning for IRS on epidemiological data)

S. No	District/ PHC Selected for IRS	PHCs (No) Selected for IRS	Sub centre selected (no)	Village selected (no)	Total Population selected	Tribal Population	Spray squads required (no)	Trainings batches of spray squads (no)	Equipment required (no)	Name of insecticide	Insecticide required (MTs)		
											DDT	Malathion	SP
1	District 1												
2	District 2												
Total													

N.B. Details of Micro planning for Spray squads to be done as per tables in Annexure 22 and summated above

e) Associated activities for IRS:

- Specify what IEC activity will be carried out for sensitization & mobilization of community for Spray also in also in advance information regarding spray dates operations:_____

  _____
- Supervision Plan: within the PHC and from district level (Sub centre/ village wise) Supervision Plan with village level date of spray and SC/PHC district level supervision(Yes/No)
- Selection of sites for dumping insecticides completed? Yes/no
- Whether safeguards for storage & handling of insecticides ensured? Yes/ no
- Certification on functional status of equipment by DMO by day/ mth/ yr.
- Spare parts of spray equipments like lance available Yes/No
- Provision of protective gear for spray workers present Yes/No
- No of functional stirrup pumps?_____No required_____
- No required to be repaired_____
- Certification by panchayat for coverage of IRS - planned or not

f) Innovations

S. No.	Innovations	Describe details	Fund Allocated (Rs)
1	Patient referral e.g. Like use of NRHM/ RKS flexi funds for transport of severe cases		
2	Transportation of slides E g. Use of Public transport system		
3	NGO/ CBO involvement Refer to PPP guidelines on www.nvbdcp.gov.in		
4	Community mobilization eg. Mobilizing using street plays, puppet plays, self help groups		

g) Commodity Requirement

Item	Previous year's utilizatior (no)	Requirement for current year (no)	Balance Available (no)	Net requireme (2-3)
	1	*2*	*3*	*4*
Choloroquine Tab. (no)				
Combi Blister Pack (CQ+PQ) nos				
Primaquine 2.5 mg Tab. (no.)				
Primaquine 7.5 mg Tab. (no.)				
ACT Comb. (Artemisinine+SP (no.)				
Artesunate Tab. (no.)				
Arteether Inj (no.)				
Quinine Sulphate Tab. (no.)				
Quinine Injection (no.)				
S+P Comb. Tab. (no.)				
R.D. Kits (no.)				
DDT 50% (in Kg)				

Malathion 25% wdp (in ltrs.)				
Malathion Technical (in ltrs)				
Temephos 50% (in ltrs.)				
Pyrethrum Extt. 2% (in ltrs.)				
Primiphos methyl (in ltrs)				
Synthetic Pyrethroid for IRS wdp (in Kg)				
Synthetic Pyrethroid for ITNs (Liquid in ltrs.)				
ITNs (no)				
LLINs (no)				
Micro Slides (No.)				
Stirrup Pumps (No.)				

h) Training: mention number of batches to be trained

S. No	Trainings	Cost per Batch	Trained in Previous year (no)	To be Trained in Current year					
				Q1 (no)	Q2 (no)	Q3 (no)	Q4 (no)	Total (no)	Total Cost (Rs)
1	Medical specialists at District Hospital								
2	Medical Officers								
3	Laboratory Technicians (induction)								
4	Laboratory Technicians (reorientation)								
5	Health Supervisors (M)								
6	Health Supervisors (F)								
7	Health Workers (M)								
8	Health Workers (F)								
9	ASHA								
10	Community								

	Volunteers other than ASHA								
11	Others specify								
Total									

i) BCC/ IEC: mention number of each

S. No	**Activities**	**Unit Cost (Rs)**	**Previous year (no)**	**Current year**					
				Q1 (no)	Q2 (no)	Q3 (no)	Q4 (no)	Total (no)	Total Cost (Rs)
A.	**Print Media**								
1	Posters								
2	Hoardings								
3	Newspaper advertisement								
B.	**Electronic Media**								
4	TV campaigns								
5	Radio campaigns								
C.	**Community level**								
6	Health camps								
7	Village level awareness camps for IRS								
8	Others (specify)								
Total									

j) PPP involvement

S. No.	**Schemes**	**Previous year (no)**	**Planned in Current year (no)**	**Cost**
1	Scheme I			
2	Scheme II			
3	Scheme III			
4	Scheme IV			
5	Scheme V			
Total				

k) Larvivorous Fish

S. No.	District	Hatcheries	Seasonal water bodies	Perennial water bodies	Water bodies released with fish previous year (no)	Planned in Current year (no)	Cost
1	District 1						
2	District 2						
3							
4							
5							
Total							

l) Others: Specify any other planning to be untaken

m) Do a SWOT analysis of the district as below

Strengths	**Actions to be Taken**
Weakness	
Opportunities	
Threats	

n) Proforma for Urban Malaria Scheme

Status of hatcheries/ up-scaling of Larvivorous fish in the States:-

S. No	Name of states/UTs.	No. of hatcheries at District level	No.of hatcheries at Block/PHC/ Village level	No. of water bodies seeded

MONTH-WISE EPIDEMIOLOGICAL REPORT FOR THE YEAR 2008

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Population												
No. of BSC/BSE												
No. of Pv												
No. of Pf												
No. of total positives												
SPR												
SFR												
ABER												
RT given												
Deaths												

Chapter 13

Financial Management

1. ANNUAL ACTION PLAN :

The action plan for the year shall be submitted by the districts to the state. Annual Action Plan which shall consist of the activities with the tentative date of implementation. There after state shall submit the consolidated action plan for a year to the Directorate of NVBDCP with the tentative calendar of the activity when the shall be executed. The responsibility for the preparation of the action plan shall be of the state. The tentative budget shall be the part of the Action Plan. After examination of the State Action Plan by NVBDCP and approved by MOH&FW.

Important Dates for Submission and Approval of Annual Work Plan

Activity	**Date**
Last date of submission by state/UT to GoI	31st December of the previous financial year
Last date for approval by GoI	28th February of the previous financial year

2. RELEASE OF FUNDS TO STATE HEALTH SOCIETIES (SHS) :

On the basis of the Approved Action Plan by MOH&FW. NVBDCP shall release the funds in 2 installments. Taking into consideration the unspent balance on the last day of the financial year, the release shall be made by the GOI to the State Health Societies (SHS). 1st Installment shall be 50 % of the approved action plan considering the unspent balance.

Condition for release of 1st installment

- Audited report along with Utilization Certificate (UC in the prescribe format GFR19A**) to be submitted for the preceding year (e.g for 1st release of 2009-10 audited report of 2007-08)
- Statement of Expenditure for the previous year (e.g for 1st release of 2009-10 SOE of 2008-09)
- Bank/Cash balance as on 1st April of the year (e.g for 1st release of 2009-10 balance as on 1st April 2009)

Condition for release of 2nd installment :-

- Audited report along with Utilization Certificate (UC in the prescribe format GFR19A**) is submitted by the state for the previous year (e.g for 2nd release of 2009-10 audited report of 2008-09)
- Statement of Expenditure for the current financial year

****FORM No. GFR-19A**

_____ (NAME OF SOCIETY)

UTILISATION CERTIFICATE For the year _____

S. No.	Sanction No & Date	Amount

1. Certified that out of Rs. _____ of grant in aid sanctioned during the year _____in favour of the _____(NAME OF SOCIETY) under the Ministry of Health and Family Welfare vide sanction numbers given hereunder and Rs. _____on account of unspent balance of the previous year, and amount of Rs. _____on account of miscellaneous receipts (including interest received on bank account) totaling to Rs _____, out of which an amount of Rs _____has been has been utilized for the purpose for which it was sanctioned and the balance of Rs. _____remaining unutilized at the end of the year has been surrendered to Government (vide D.D. No. _____dated _____)/ will be adjusted towards the grants-in-aid payable during the next year_____.

2.Certified that the conditions on which the grant in aid was sanctioned have been fulfilled and that I have exercised the following checks to see that the money was actually utilized for the purpose of which it was sanctioned.

i. All expenditures incurred are in accordance with the rules and regulations of SVBDCS / and with in the frame work of the GOI guidelines.
ii. The expenditure incurred is related to the programme activities.
iii. The expenditure is incurred with the proper resolution of the Society.
iv. The expenditure incurred on the purchase of fixed assets or consumable good has been verified from the relevant stock register.
v. No amount of the Grant in Aid or any receipt of the funds from other sources is deposited for gain or to generate income by way of interest other than bank interest.
vi. Funds have been released to the NGO after their proper scrutiny and verification and strictly in conformity with the NGO guidelines formulated by the Directorate of National Vector Disease Control Programme.

Member Secretary Chairperson

_____
(Chartered Accountant) Seal

3. MONITORING AND EVALUATION :

Statement of Expenditure will be submitted on monthly basis by District Societies to SHS (State Health Society) which in turn after consolidating expenditure statement send it to Directorate of NVBDCP by the 20th of the following month Performa of Statement of Expenditure is enclosed in Annexure – II . Books of Accounts and satisfactorily working of Financial Management System of state societies shall be reviewed / Monitored by visits of Finance Personnel of this Directorate frequently.

4. BOOKS OF ACCOUNTS TO BE MAINTAINED AT SHS / DHS:-

The following books are to be maintained at the state level and district level.

- Cash Book (Double Column)
- Journal Book
- Ledger
- Budget Control Register
- Advance Register
- Fixed Assets Register

Cash book must be closed on daily basis even if no transaction has been executed in that particular day.

5. QUATERLY UNSPENT POSITION :

State Society shall furnish consolidate quarterly fund position of state covering fund position of the District Societies to the Directorate of NVBDCP within 10th of the close of the quarter to enable the Directorate to consider further release of funds in a timely manner.

6. AUDIT OF ACCOUNTS OF STATE HEALTH SOCIETIES : -

The accounts shall be audited annually by the firm of Chartered Accountants empanelled by Comptroller and Auditor General of India. The books of accounts and related records shall be kept updated regularly by the State Society / District Society so that consolidated Annual Audit Report of the state Society incorporating audited accounts of District Societies may be sent to this Directorate.

Important Activities and Dates for External Audit (as per NRHM)

	Activity	**Date**	**Remarks**
1.	**List of Chartered Accountant Firms from GOI to States/UTs**	By 31st December of the year for which audit is to be done	
2.	**Contacting the Firms from the list provided by GOI**	By 31st January of the year for which audit is to be done	1. The firms will be contacted by sending Request for Proposal – including Letters of Invitation & TOR) by Registered Post with Acknowledgement. 2. It should be made clear in the Invitation Letter that only 'Technical bids' will be accepted in a sealed envelop. No financial bid is to be provided by the CA Firms. 3. It should also be made clear at this stage that only the firm found most suitable in the evaluation of technical bid will be awarded the audit work. 4. The dates for opening the 'technical bid' will be clearly

	Activity	Date	Remarks
			mentioned in the invitation letter. 5. It will also be mentioned in the invitation letter that the 'technical bid' will be opened in the presence of representatives of the willing Chartered Accountant firms who have applied. 6. A copy of the Term of Reference (TOR) should be given to each firm.
3.	**Last date for accepting the Technical Bids**	By 28/29th February of the year for which audit is to be done	
4.	**Date for opening the Technical bids**	Same date as of accepting the Technical Bids	Within 7 days of last day of accepting bids. Evaluation etc. Give criterion of evaluation – Standard Evaluation Form.
5.	**Date for intimating the selected auditor**	Within next FIFTEEN WORKIN DAYS of opening the Technical Bids	The Technical Bids will be evaluated by a committee duly appointed by the Executive Body of the State SHS/DHS as per the Standard Evaluation
6.	**Last Date for appointing the auditor**	By 31st March of the year for which audit is to be done.	1. The Appointment Letter will clearly mention the date on which the Accounts of the SHS/DHS and District Societies will be made available to the auditor for audit.
7.	**Completion and Finalization of Accounts of all the District Health Societies**	30th April of the following year	
8.	**Completion of audit of District Health Societies (DHS).**	31st May of the following year	If the accounts of the SHS/DHS and the District Societies are not made available to the Auditor, the Auditor will be free to inform the GOI about the delay.
9.	**Consolidation of Accounts of all Districts Health Societies with the Accounts of State Health Society.**	15th June of the following year.	
10.	**Completion of Audit of State SHS.**	30th June of the following year	
11.	**Submission of Audit Report to MoHFW, GOI along with Management Letter and society's comments on it and UCs**	31st July of the following year	
12.	**Signatories to audited Statement of Accounts**		Mission Director/ State Programme Officers for respective programme/ State Finance Manager and the Auditor.

The following documents are to be submitted by the Auditor:

- Receipts and Payments Account
- Income and Expenditure Account
- Balance Sheet
- Accounting Policy
- Schedule of Fixed Assets
- Schedule of outstanding Advances recoverable
- Schedule of Sundry debtors/Creditors (if applicable)
- Bank Reconciliation Statement along with Balance statement from Bank.
- Utilization Certificate in the prescribed format. (GFR-19A)

Chart of Accounts

Sl No.	**Component**	**Budget**
1	**Human Resources**	Project Management Unit in Externally Aided Component State (EAC State) , MPW as per the sanction of MOHFW
2	**Training**	Type and duration of training please refer chapter training
3	**Commodities , Products & Drugs**	NVBDCP shall provide fund or the stock of the commodities products and drugs as per the centralized list (for supply of the commodities product and drugs please refer the chapter Annual Action Plan)
4	**IEC/ BCC**	**NVBDCP shall provide cash assistance to 6 scheme of IEC/BCC listed**
5	**Planning and Administration**	**Cash Grant**
6.	**Monitoring and Evaluation**	
7.	**MIS (NAMMIS)**	**To provide support for data updating**

Chapter 14

14. Logistics/Supply Chain Management & Norms for calculation of Programme material

The main objectives of logistics and/or supply chain management are planning, acquisition, storage, movement and control of materials/products (drugs/commodities in this case), so as to optimize resources, personnel, physical facilities & capacity. It is a dynamic approach for the control of materials and it seeks to provide right Materials, of right quantity, right quality, in right condition, at the right time & from the right source & at right cost so as to ensure a reliable and uninterrupted supply of good quality materials at service delivery points or to the end users.

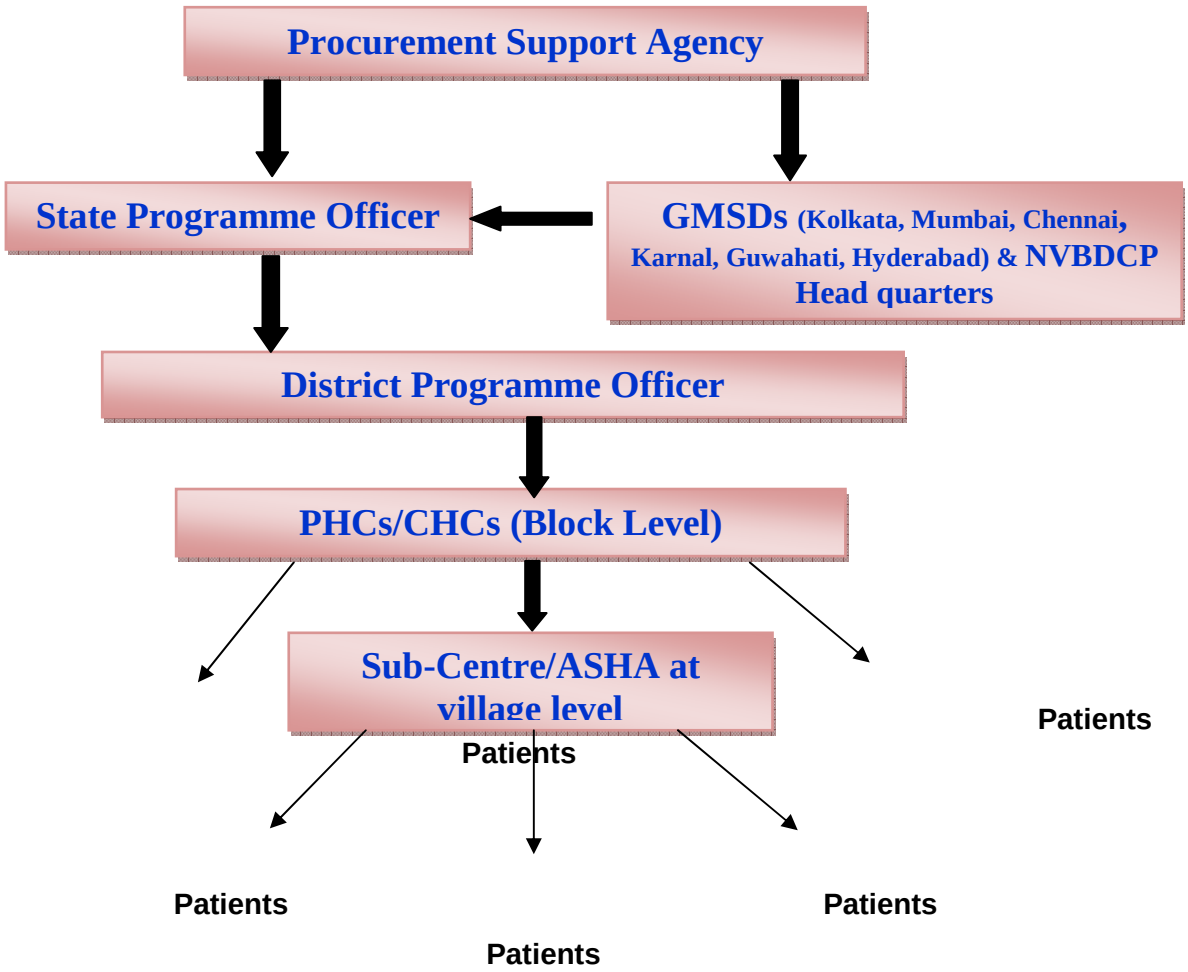
The programme managers/officials who are dealing with logistics and supply chain management should know:

- When to order or issue
- How much to order or issue
- Maintain appropriate stock levels of all materials (drugs/commodities) to avoid stock outs and overstocking which can lead to product loss due to expiry
- Make proper storage arrangements for the items
- Make proper documentation of the inventory (quantities of goods in hand)

Proper Inventory control systems helps to allow re-supply decision based on current consumption, stock in hand; established buffer stock levels based on lead times and order intervals. When the demand is unpredictable it is recommended to consider increasing the buffer stock (Safety stock), reducing lead times (time taken right from placing the orders to delivery of supplies) by hastening the administrative process, close monitoring of procurement process and follow up with the suppliers wherever there is delay in supplies. Inventory control system helps to determine quality of products and timing of facility orders and delivery schedules, so as to ensure uninterrupted supply of quality products. This is crucial for the management of drugs, commodities & other perishable items and is required to be managed with due diligence and accuracy at State and District level.

The states/districts should minimize the risk of stock-outs through effective management of logistics systems, which should include (but are not limited to) appropriate economic order quantity, buffer/safety stock, procurement period, stores & inventory and product demand. These procedures should include the establishment and maintenance of reliable inventory management, **first-expiry/first-out (FEFO)** stock control systems, internal audit/monitoring systems, and good governance structures. These should be established

14.1. Flow Chart of Logistics/Supply Chain of NVBDCP durgs/commodities



14.2. Steps involved in logistics/supply chain management:

After notification of Award (NOA) to the supplier, the following activities are carried out at the consignee level i.e., states to deal with the drugs and commodities being procured by NVBDCP and distributed to states/districts/CHC/PHC/Subcentre.

- Supplier informs all consignees for the quantities and approx. dates of arrival of the items
- Issue of Road Permits/ Octroi exemption certificates by the consignees to the supplier
- Receipt of supplies by the consignees and issue of Goods receipt and acceptance note (GRAN)
- Stock entries and documentation
- Physical verification of goods receipt and issue of final acceptance certificate (FAC)
- Storage of drugs and commodities as per the norms in the technical specifications
- Distribution of stores to the district, CHCs, PHCs, Sub-centres, ASHA as per the guidelines issued by NVBDCP
- Utilization of stores as per First expiry first out (FEFO) principle

- Monitoring of excess stock and short expiry stocks and diverting the same with prior approval from NVBDCP

14.3. Challenges in Logistics and supply chain management (General):

- Delay issue of Road permits, Goods receipt & acceptance note (GRAN) or Acknowledge of receipt of Goods and Final acceptance certificate (FAC)
- Limited availability of transport resources including for maintenance and repair
- Non availability of storage space
- Transport shared across other programs
- Additional products added to already burdened distribution systems
- Non availability of dedicated staff for this activity/lack of motivation/lack of supervision
- Improper documentation
- Lack of training and capacity building
- Non availability of adequate funds for improving supply chain management and up gradation existing and constriction of new stores.
- Stock outs due to improper planning or over stocking leading to expiry

To address these issues it is recommended to issue the Road permit, Octroi exemption certificates, GRAN and FAC in time to prevent delay in supplies. Apart from this, it is necessary to make proper storage arrangements, training/capacity building of staff on logistics/supply chain and stores/inventory management & record keeping, documentation etc. Incase of non availability of funds for such activities, it is recommended to include the same in the **State Annual Action Plans** while submitting the same to Directorate of NVBDCP and/or may be consulted with the state NRHM cell for support. Some check lists and formats have been provided for commodity receipt and record maintenance (see Annexure-I to V). It is recommended to follow these check lists for proper documentation/record maintainance.

The following actions need to be taken by the states:

- Timely issue of Road permit, Goods receipt and acceptance note (GRAN)/consignee reipt/consignee acceptance certificate, Final acceptance certificate (FAC)
- Reporting of stock position/status to Directorate of NVBDCP every quarter
- Monitoring of stock status every month in the DMO meeting so as to avoid any stock outs, or any other issues related to supply chain management and forward the copy of minutes of the meeting and action to be taken/being taken for the issues on supply chain management
- Insist all the districts/CHCs/PHCs to monitor stock position and reporting to states every month
- Monitor the quality of the drugs/commodities and report to the Directorate for any discrepancy
- Regular monitoring of expiry status of the drugs/commodities and instructions to the officials to follow **"First Expiry & First Out (FEFO)"** principle so as to use the products judiciously.

- Regular monitoring of storage conditions and provide necessary guidance/instruction to maintain proper storage conditions within the available resources (See Annexure-VI for brief guideline on storage practices)

14.4. Check list for commodity receipt and record maintenance for NVBDCP drugs/commodities:

- Once order is placed to the firm a copy is marked to the consignees (state/GMSD) to issue road permits and to ensure the availability of space before delivery.
- Once Road permits are issued by the consignees, supply will be started.
- Once supplies received by the state, they should issue Goods receipt and acceptance certificate (GRAN) to the supplier as well as to the procurement Agency immediately to avoid any demurrage charges of the goods and document discrepancy if any.
- Try to issue Final Acceptance Certificate (FAC) after detail physical verification of the quantities, specifications, batch no., expiry date, delivery schedule and Certificate of quality control test results in conformity with the standards as provided in the technical specifications as appropriate to the Goods and maintain it in the stock register with signature/verification report of the receiving authority with in one month time.
- Further district level allotment will be made by the state as per the technical requirement of the districts.
- State should fill up the stock position statement by compiling the data received from Districts and submit it to the Directorate every quarter in the format at **Annex.I**. They should also issue the quarterly consumption certificate in this format and finally the annual consumption certificate with details like consumption, stock in hand, further requirement, any transfer or expired items etc.
- If the state/district feels necessary, they may randomly check the quality of the items as per state procedure by an independent, authorized testing laboratory and document the test reports. If any discrepancy is noticed, they may immediately inform the Directorate for further necessary action.

14.5. CHECK LIST FOR RECEIVING GOODS/COMMODITIES

Annex.-I

Name of drugs/commodities (Unit/dosage/strength):

Name of Supplier with address:

Sr. No.	Particulars	Yes	No	Remarks
1.	Copy of invoice, purchase order (PO) (Check on invoice/PO the Contract number, Goods' description, quantity, unit price, and total amount or any other information furnished by the supplier/transporter)			
2.	Invoice stamped, signed in original and stamped or sealed with the company stamp/seal (Invoices must be signed in original and stamped or sealed with the company stamp/seal)			
	Copy of consignment note/ **Consignee note** from transporter			
3.	Copy of road permits/Octroi exemption certificate if any. LR/RR submitted.			
4.	Copy of Acknowledgement of receipt of goods to be received and signed by consignees i.e. Goods receipt and acceptance note **(GRAN)/ Consignee receipt/Consignee acceptance certificate**			
5.	Copy of packing list identifying contents of each package			
6.	Copy of manufacturer's or Supplier's Warranty certificate covering all items supplied if any			
7.	Copy of the Certificate of Inspection (Pre dispatch inspection) furnished to Supplier by the nominated inspection agency, i.e., inspection and dispatch clearance certificate and Copy of the Internal Test Analysis Report of drugs of the Manufacturers if any.			
8.	Copy of NOA/Contract with Tech. Specification			
9.	Certificate of country of origin, copy of insurance certificate			
10.	NVBDCP supply, not for sale marked/DOE & other instruction visible			
11.	If found broking/ damaged/ Any discrepancy please give specific remarks.			
12.	Any other procurement-specific documents required for delivery/payment purposes.			

Try to issue the **GRAN** as early as possible by fax and/or post (3 days)- Format of GRAN at **Annex.IV**

If there is any damage in packing/breakage etc., then don't accept it & inform it to the supplier and make proper documentation

Name:

Designation:

Signature of verifying Authority with stamp:

14.6. CHECK LIST FOR PHYSICAL VERIFICATION

Annex.-II

Name of drugs/commodities:

Date of Physical verification:

Sr. No	Particulars	Yes	No	Remarks
1.	After opening of package/box/cartons, if any damage/ shortage noted, pls. record it & inform to supplier/ NVBDCP			
2.	Is there any short expired/damaged items, if yes, pls segregate and record & report to Supplier/NVBDCP			
3.	Physically Count the quantity(pack/vials as per invoice), Specification adhered to/any discrepancy noted, pls. record it & inform to supplier/ NVBDCP			
4.	Batch no., expiry date, packing and storage conditions as per NOA/ Contract/Tech. Specifications			
5.	After storing material entered in stock ledger. Also make entry in the stock ledger for any expired items, any drugs transferred, any adjustments, any drugs received from other health facility			

Please issue the **Final Acceptance Certificate (FAC)** only after completing the physical verification of goods receipt and as soon as possible by **one month (**Format of FAC at **Annex.VI)**

Try to undertake physical counts/verification of all the stocks at least once every six month

Name:

Designation:

Signature of verifying Authority with stamp:

(Respective consignees)

Annex.-III

14.7. Statement on the stock of Drugs/diagnostics/Insecticides/Larvicides/commodities under NVBDCP

Name of the State/UT: Date:

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Sr. No.	**Items Supply**	**Opening Balance**	**Quantity Recvd.**	**Total (3+4)**	**Quantity Consumed**	**Quantity expired**	**Quantity diverted if any**	**Balance as on-------- {5-(6+7+8)}**	**Current Requirement**	**Net requirement (8-7)**
1	Chloroquine Tablets									
2	Primaquine 7.5 mg									
3	Primaquine 2.5 mg									
4	Quinine Injection									
5	Quinine Sulphate Tab.									
6	Artesunate Tab. 50 mg									
7	Sulphadoxine pyremethamine Tab.									
8	DEC Tab.									
9	RD Kits for Malaria									
10	RD Kits for Kalaazar									
11	Combi Blister Pack (ACT)-Adult									
12	Combi Blister Pack (ACT)-child									
13	Arteether Injection									
14.	Amphotericine B Inj.									
15	Miltefosine capsule 10mg									
16	Miltefosine capsule									

	50mg									
17	SSG Injection									
18	Albendazole tablet 400mg									
19	Malathion 25% (wdp)									
20	Malathion Technical									
21	Temephos 50% EC									
22	Pyrethrum extract 2%									
23	Primiphosmethyl 50%									
24	Mosquito Bednets plain									
25	LLINs									
26	Synthetic Pyrethrids (wdp)									
27	Synthetic Pyrethrids (Liquid)									
28	DDT 50%									
29	Stirrup pumps									
30	DEC tablet									

Name:

Designation:

Signature of verifying Authority with stamp:

Annex.-IV

14.8. Format for Goods Receipt & Acceptance Note (GRAN)/Consignee receipt/Consignee acceptance certificate

GRAN No:

Date:……

To,

Name & Address of Procurement Agency, if any or to NVBDCP

Goods Receipt & Acceptance Note (GRAN)/Acknowledgment of Receipt of Goods

(For part payment as per Contract)

This is to certify that the Goods as detailed below have been received in good condition in accordance with the conditions of the Contract and amended if any.

1. Project Name :
2. Purchaser :
3. Contract NO. & Date :
4. Name of the items supplied :
5. Name of the supplier/manufacturer :
6. No. of units supplied :
7. Schedule No./Lots no. if any :
8. Invoice No. & date :
9. Details of Batch no. :
   Manufacturing date :
   Expiry date :
   (that comply with NOA/Contract)
10. Date of delivery at consignee destination site :
11. Date of receipt at consignee destination site :
12. Outstanding/dues with the supplier as per NOA & discrepancy if any :

Name:

Designation:

Signature of verifying Authority with seal/stamp: (Respective consignees)

CC to:

1. Director, NVBDCP, 22- Shamnath Marg, Delhi-110054
2. Supplier/Manufacturer

Annex.-V

14.9. Format for Final Acceptance Certificate (FAC)

Final Acceptance Certificate (FAC)

(For final payment as per Contract)

(To be issued on letterhead in duplicate-One for supplier, one for Purchaser)

Description of Goods supplied :

NOA No./date :

Quantity supplied with any adjustment for short supply if any :

Name of Purchaser (e.g., NVBDCP, MOH&FW, Govt. of Inida) :

Name of Supplier/Manufacturer :

Consignee (Name, Address, Telephone & fax no.):

Date of Final Acceptance :

Stock entry no. & date :

Certificate

We do hereby confirm having received…….(Name of goods) in good condition dated ……..in accordance with the contract and entered in the Stock ledger at page no. ……dated …….

Name:
Designation:
Signature of verifying Authority with stamp:
(Respective consignees)

Annex.-VI

14.10. Guidelines for Proper Storage of Drugs and Commodities under NVBDCP

The main purpose of storage is to protect the quality of products and its packaging throughout the supply chain and make products available for distribution. The brief guidelines for storage of drugs/commodities are mentioned below:

1. Clean and disinfect the store room regularly and monitor the storage conditions
2. Clean receiving, storage, packing areas and remove the garbage and also keep the stores away from rodents, insects and termites
3. Safely handle the health commodities while loading and unloading from the transport vehicle
4. Clean bins, shelves and cupboards, if needed and Store supplies in a dry, well-lit and well ventilated store room and out of the direct sunlight
5. Ensure adequate ventilation and temperature control
6. Provide the rack storage system in such a way so that gang ways may be created for easy movement of materials and personnel handling the store
7. Stack cartons in steel racks/slotted angles and at least 10 cm(4 inch) off the floor, 30 cm (1ft) away from the walls and other stacks and no more than 2.5 m (8ft) high
8. Store supplies in a manner that is accessible for FEFO, counting, and general management. Use First Expiry First out (FEFO) principle. Please issue the drugs which are going to expire first.
9. Store medical supplies separately, away from insecticides, chemicals, old files, office supplies, and other materials.
10. Arrange cartons so that arrows point up, and ensure that identification labels, expiry dates, and manufacturing dates are visible.
11. Monitor store security and safety to avoid theft/pilferage
12. Secure store room from water penetration and from any seepage in the walls, roof, doors & windows, especially during rainy season
13. Monitor product quality (visually inspect commodities and check expiry dates) and physical verification of quantities
14. Ensure that fire safety equipment (fire extinguisher) is available and accessible and that personnel are trained to use it.
15. Ensure fire proof electrical fittings and appliances for any fire due to short circuit and keep the stocks away from the electrical sockets
16. Separate damaged and expired stocks from the usable stock and move to secure area and dispose of these products without delay as per the established procedure
17. Monitor stock levels, stock quantities and safety stocks and update stock ledger/records and maintain the files safe custody.

Chapter 15

Safeguarding Community, Environment and Governance

For quality implemntation of the programme activities, the safeguard issues related to community, environment and the governance will be given due importance by all the programme implementators especially in the high-risk areas where special projects with the support of **World Bank** and **GFATM** are implementated. '**Vulnerable Community Plan'** has been developed by NVBDCP to safeguard the interests of vulnerable population. The **'Environment Management Plan** has been envisaged to minimize the damage to the environment and the **Governance and Accountability Action Plan** has been prepared to ensure efficient program design and management, sound financial management, better competition and transparency in procurement and supply of health sector goods and services required to deliver high quality services and to prevent the fradulent activities This chapter deals with all the three plans in breif.

15.1 VULNERABLE COMMUNITIES' PLAN (VCP)

The term 'vulnerable community' includes the groups of people with social, cultural, economic and/or political traditions and institutions distinct from the mainstream or dominant society that disadvantage them in the development process. 'Indigenous people' (known as 'Scheduled Tribes' (ST) or 'tribal groups' in India are recognized as vulnerable communities, and so too are the 'Scheduled Castes' (SCs) and economically poor ('Below Poverty Line' or BPL), including those among minority religions.

As tribal habitations are concentrated in remote, forest or hilly areas the Government has enhanced the facility by relaxing the norms for health care infrastructure: The National Rural Health Mission (NRHM) launched in 2005 seeks to improve access to health care by strengthening the public health system notably with a village-based worker known as the ASHA, greater engagement of the private sector, and increased and flexible finances. It also seeks to enhance community demand for and ownership of services, and coordinated planning and implementation across related sectors such as Women and Child Development and Tribal Affairs.

In many tribal areas, traditional panchayats and Tribal Councils deal effectively with tribal issues. In addition to these traditional leadership systems, special legislation, the Panchayat Extension to Scheduled Areas Act, has introduced the 'modern' system of panchayats to scheduled areas. The NRHM has enhanced the ability of local panchayats to address local needs and priorities to improve health by providing untied funds to Village Health and Sanitation Committees (VHSCs). Additional funds are provided to the ANM and local panchayats have been mandated to ensure optimal resource utilization. Consultations at various levels with such vulnerable communities during programme implementation have been visualized for community involvement in the healthcare.

Framework for Consultations with Vulnerable Communities

The framework for consultations with tribal people and other vulnerable communities in the 'high-risk' areas especially during special project implementation is presented in Table 1. It indicates the possible facilitators at different levels, methods they could use and frequency of consultation. These consultations are expected to give 'real time', experience-based feedback from clients, local leaders, staff and NGOs on how the programme is functioning in tribal areas and/or for vulnerable communities, including suggestions for improvement of any aspect of the program. They will also contribute to the design and implementation of BCC efforts, operational pilots and NGO involvement, to help ensure need- and demand-based, culturally-acceptable approaches, plans and service delivery.

Table 1. Framework for Consultations with Vulnerable Communities during Programme Implementation in High-risk areas.

Consultation	Facilitator	Methods	Frequency
Village level	VHSC/ASHA/FTD with NGO	Community meeting and key client visits	Once in six months
Sub-Centre and APHC	MTS/MO-PHC with NGO	Staff meeting, community meeting, and key client visits	Once in six months
BPHC and CHC	District VBD Officer, Consultant Social Development Professional	Meeting with staff, Panchayats, key client visits	Once in six months
District	District VBD Officer/Consultant/Social Development Professional and BCC Consultants	Workshop with key stake- holders (incl. tribal reps, staff, clients, NGOs, PRIs)	Annually
State	State Program Officer, State Social Development and BCC Consultants	Workshop with key stakeholders (as above)	Annually
National	National Program Officer National Social Devpt. and BCC Consultants	Workshop with key stakeholders (as above)	Annually

Action Plan

Most of the "high prevalence areas" are tribal or backward, and many of its intended beneficiaries are tribal or other vulnerable people, so intervention strategies in these areas are designed to address the constraints faced in these areas and by these people in prevention, diagnosis and treatment of malaria. The strategies include supply-side improvements; increasing access according to need; communication for demand-generation, informed decision-making and improved practices; socio-culturally appropriate and gender-sensitive planning and implementation; and monitoring by dedicated VBD experts and Social Development specialists.

The consultations at the client and sub-district levels of the health system will focus on whether the program is reaching vulnerable groups, and cover all aspects of service delivery related to this project, including the cultural acceptability of interventions, BCC activities and grievance redressal mechanisms. At district level and above, the consultations will focus on whether tribal people and the most backward areas are receiving due attention in all aspects of program planning, management and implementation, including capacity-building and monitoring of private providers; and monitoring by Panchayats

At District Level: In all malaria endemic districts, the VCP will primarily be the responsibility of the District VBD Officer. The VCP will be implemented by the District VBD Officer with the support of the District VBD Consultant. This team will coordinate with the sub-district levels, and report on progress, constraints and resource requirements to the state team.

Capacity Enhancement: To build the knowledge and skills to implement and manage the VCP, the curriculum and modules will be revised to include topics such as: socio-cultural (including gender) issues; the political and self-governance structures of vulnerable communities, their rights and policies; methods to assess and address their needs and priorities; approaches to achieve and sustain vulnerable communities' access to VBD control services and products; and so on. Social mobilization, counseling and motivation skills will be stressed. Training on the VCP will be integrated into the overall NVBDCP training. A database of experts with social science backgrounds and knowledge of tribal people and other vulnerable communities will be developed to ensure the availability of appropriate trainers and technical resources.

The VCP will address any unintended or unforeseen effects of the Programme that may increase peoples' vulnerability to VBDs or its control operations. The potential adverse impacts could be related to vector management or case management and include insecticide resistance, drug resistance, poor health and environmental contamination caused by improper use, handling, storage, etc. of treatment agents. The program includes several activities to reduce these risks.

In addition, micro-planning of all interventions will be undertaken at the district level to ensure that local needs are addressed appropriately. Health volunteers, PRIs, Tribal Councils and other CBOs will be sensitized to participate in planning and implementation, and take responsibility for monitoring vector control, treatment interventions and effects. BCC activities will be targeted to make the affected and surrounding communities aware of the causes and methods of VBD prevention, diagnosis and treatment options, and to stimulate appropriate behavioral responses. The BCC will also build in information on the potential adverse consequences of use, non-use and improper use of drugs and insecticides. Capacity building, supervision and monitoring activities planned under Programme will also help to avoid, minimize, mitigate or compensate for adverse effects.

In view of the specific needs of such areas, the Programme will establish systems to bring out and redress grievances related to the lack of access to or availability of curative and preventive VBD services and information. Within the health system, cases and outbreaks, stock-outs of drugs, backlogs of unexamined blood slides, unavailability of bed-nets, poor coverage and quality of insecticide spraying, inadequate biological control, inadequate/ineffective BCC/IEC activities, and so on, will be reported upward from village to sub-district, district, state and national levels. In addition to this internal monitoring and reporting, individuals, community volunteers (such as ASHAs, FTDs, AWWs), local self-government (VHSCs/PRIs/Tribal Councils), NGOs/CBOs, the autonomous societies managing health facilities (Rogi Kalyan Samitis, RKS), and District and State Societies will be able to express their grievances through a variety of means. Tribal and other vulnerable community representatives will be included in stakeholder committees to recognize and address issues. Contact information for core program/project staff (such as telephone/mobile phone numbers and addresses for postcards/written communication) will be provided at the community level.

15.2 Environment Management

The Environmental Management Plan (EMP), prepared by the Directorate, consists of a set of mitigation, monitoring, capacity development and institutional measures to be taken during implementation and operation of the programme, to address the adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The Action Plan and recommended activities are summarizes in the EMP.

NVBDCP recommends and supports the GOI in updating the various regulations related to programme activities. The key activities include review of compliance of Insecticides Act to meet minimum essential international standards. Also activities will be undertaken for revision of the national guidelines (based on FAO's Pesticides Guidelines on Storage, Labeling, and Disposal), to include monitoring, efficacy evaluation for the registration of plant protection products; and compliance and enforcement of a pesticide regulatory program.

Procurement:
Pesticide procurement is highly specialized and complex due to time-lag of delivery between production and usage. While the NVDCP will utilize the services of procurement partners, the real challenge still remains in effective implementation of the program on the ground ensuring that quality services reach the neediest populations in time and appropriate pesticide management practices are followed. The EMP recommends a number of activities such as modification of specifications/contracts with insecticide producers to include guidelines for pesticide application and disposal of used bags/containers, measures for quality control and adequate labeling of products, including translation in local language of destination. The manufacturers should include instruction leaflets in local languages before dispatching the goods to destination. This will be one of the pre conditions in bidding document. Pre and post dispatch certification is necessary for all insecticide based products. Materials and quality of packaging by insecticide manufacturers shall be reviewed periodically by NVBDCP to ensure efficacy, shelf-life, human and environmental safety and manufacturers should provide independent certification of

chemical and physical analysis, product and formulation acceptability to NVBDCP. The NVBDCP has instructed all insecticide producers to provide protective gear along with their products

Storage and transport
Safe transportation of insecticides requires trained drivers, well-labelled vehicles, checking of quality of packaging and pesticide load during transit and at point of delivery. The NVBDCP has requested insecticides producers to changeover DDT packaging from gunny bags to fibre-board drums to reduce ruptures, spills and also loss of efficacy during storage. Licensing of insecticide manufacturers, distributors, retailers, and pest control operators is an important aspect of pesticide management. Annual procurement and distribution cycles between states and the Directorate should be synchronized to allow timely delivery and usage prevent stockpiling.

A systematic tracking system of volumes of insecticide from factory to point of delivery needs to be established by the manufacturers, along with a system for reporting spills and leakages during transit. NVBDCP shall include this requirement in their contracts to be monitored by the consignee state governments.

Application activities:
Safe and environmentally sound application of insecticides (space spraying and IRS, impregnation of bed-nets, larviciding etc) can be achieved by intensive training of all the spray workers and handlers and by timely availability of protective gear. Equipment management is important and states have to review all spray equipment and protective gear before start of each spraying season and keep appropriate records. Close supervision of application activities is essential and district and PHC level officials should be provided adequate funds and training to ensure good practices are being followed. Manufacturers are stipulated to provide instructions for disposal of pesticide containers including plastic wrappings and one way of reducing wastage is by provision of appropriately sized packages for spraying and impregnation activities.

Producers are instructed to develop clear pictorial instructions to health and spray workers on use, applications, preparation of suspension and disposal of insecticides, insecticide treated materials, insecticide containers etc.

Integrated Vector Management:.
NVBDCP will develop a phase-down plan for gradual decrease in DDT use and promotion of ITMN, biolarvicides and IGR compounds. Other activities include mapping of insecticide resistance status of malaria vectors and training staff in effective IVM procedures.

Capacity Building:
Capacity building for good worker practices is an integral and essential part of integrated vector management. This activity will include provision of rigorous and regular training for different levels and types of workers and certification of staff and operators in the following activities: stock management; good storage practices; proper handling of pesticides during transport and disposal; application of insecticides; surveillance methods; signs and symptoms of poisoning, emergency measures; PPE usage; accident reporting, data management and monitoring and reporting. Such capacity building should target those involved in the production, distribution, use and application of insecticides, householders and health personnel.

BCC /IEC:
A village level committee comprising of the village chief, Anganwadi worker/ANM, junior health worker and village teacher could be constituted to supervise the proper storage, spraying, environment management including disposal of used containers etc at sub centre/village. Community should also be educated to understand the importance of IRS and to take necessary steps to ensure maximum efficacy of spraying. Domestic and peri-domestic sanitation may be an important component where individual and community cooperation is essential.

For effective implementation of the EMP, the GOI and NVBDCP have decided to strengthen the institutional framework at national and state levels. The Accredited Social Health Activist (ASHA) under NRHM at village level is also being envisaged for supporting the implementation of the EMP.

The reporting system will include the following: tracking of insecticide movement from production to disposal, records of insecticides utilized in various applications (IRS, spraying and larviciding), records of ITN procured, distributed and impregnated, amounts of insecticides used for impregnation monitoring of spray workers, records of spray equipment, PPE and other tools related to insecticide use, conditions of storage and transportation, records of accidental poisoning etc. The state level surveillance committee should review the above records on an annual basis and recommend corrective measures where necessary.

15.3 Governance and Accountability Action Plan

The Ministry of Health and Family Welfare (MOHFW) is fully committed to improve the governance and accountability in all centrally sponsored programs including the NVBDCP by ensuring efficient program design and management, sound financial management and better competition and transparency in procurement and supply of health sector goods and services required to deliver high quality services.

MOHFW has developed the Governance and Accountability Action Plan (GAAP), to address critical operational concerns related to program management, financial management and procurement in NVBDCP.

The GAAP will be a dynamic document and will be strengthened, as necessary, based on lessons learned during the implementation of NVBDCP and other health sector projects.

While MOHFW will have the overall responsibility for the GAAP, the Directorate of the NVBDCP will be responsible for implementing program specific actions and will also act as a nodal point to co-ordinate with the states and other agencies for effective implementation of the GAAP. States will be responsible for implementing the relevant actions by district and sub-district level implementing entities.

Various institutional mechanisms - such as NVBDCP technical teams with state focal points (for technical guidance, program management and implementation oversight), Financial Management Group (for financial management), NVBDCP Procurement Unit (for procurement of services, monitoring of procurement undertaken by procurement agent and supply chain management) and the Empowered Procurement Wing (for establishment and updating of broader procurement policies and standards for the sector including procurement capacity building of states) - have been established for this purpose.

The MOHFW is carrying out all ICB through an internationally qualified procurement agent and has put in place a number of quality assurance and disclosure mechanisms. GAAP will be monitored as part of the implementation in addition to the day to day monitoring through meetings etc. with the implementing agencies.

Risks related to procurement such as poor market response, procurement delays and higher costs, submission of forged documents to win contracts, delay in bid evaluation, inadequate / improper bid evaluation, poor quality of commodities, delays in release of payment, sub-optimal use of commodities provided under the project, inadequate disclosure of project information and citizen oversight, weak mechanisms for client feedback and program accountability especially for tribal and vulnerable groups, weak Complaints handling mechanism, poor quality of commodities, inadequate supply chain and storage arrangements etc. will be taken care of under this plan. The details of the plan for each risk mitigation are available on the website.

Chapter 16

Vector Bionomics and it is Importance in the Planning of Malaria Control

The term bionomics is defined as the inter relationship of an organism to its biotic and abiotic environment. Climatic factors play an important role in species distribution, behavior, survival and vectorial status. The relative number of malaria vector species in an area determines the transmission of pathogens to the human populations. As such understanding of vector bionomics is the key importance in epidemiology of vector borne diseases and planning methods of vector control. The environment of immature species and adult vectors are interdependent since the adult vector must have access to water for egg laying. The adult vector environment is however largely aerial and terrestrial , the former environment being necessary for mating and dispersal and the later providing habitats for feeding, resting, and completion of the life cycle of ovarian development from blood meal to egg laying. Malaria transmission dynamics and it's prevalence re governed by stable and unstable environmental factors affecting vector, man and parasite. As a consequence of these, malaria disease entity presents a very complex phenomenon

16.1 Distribution

There are about 424 species of anopheles mosquitoes throughout the world. Of these some 70 species are of major importance. Anopheline mosquitoes are found in all parts of India from the sea level upto an altitude of 2000 to 2500 meters. There are records of mosquitoes found in deep mines particularly Culincine mosquitoes. They have been found at depths of over 1000 meters in the Kolar Gold Mines in Karnataka. However, Anophelines have been found only at depths of 90 to 180 meters in the coal mines of Bihar. Anophelines are found in all over the Indian subcontinent, from Ladakh in the north to Kanyakumari in south; and Andaman and Nicobar islands in the Bay of Bengal to Lakshadweep in the Arabian sea.

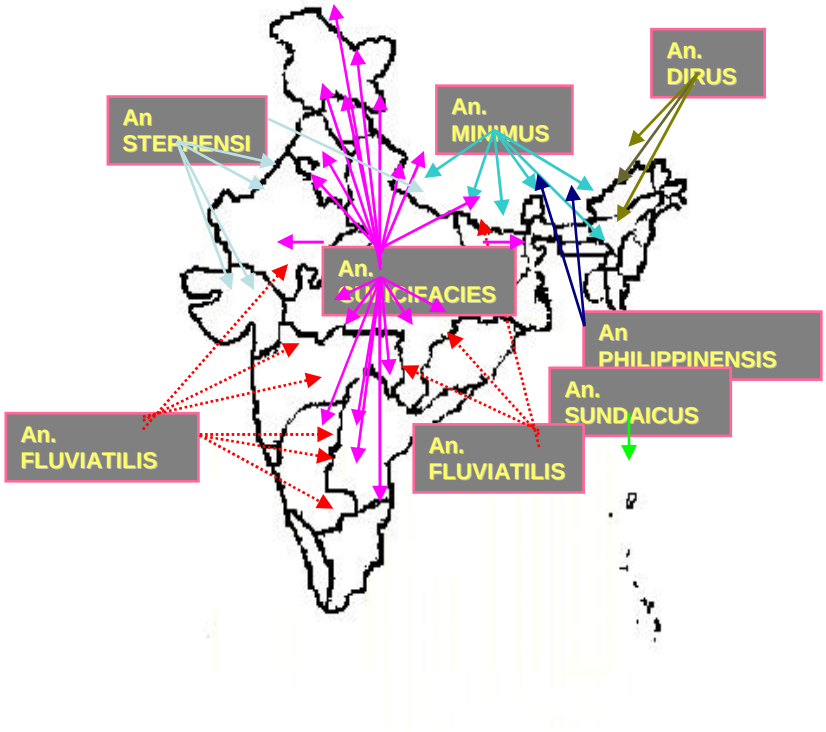
16.2 Malaria Vectors

Out of 58 species of anopheline mosquitoes in India, 9 species are vectors of malaria.

1. *Anopheles culicifacies*
2. *Anopheles fluviatilis*
3. *Anopheles minimus*
4. *Anopheles philippinensis*
5. *Anopheles dirus*
6. *Anopheles stephensi*
7. *Anopheles annularis*
8. *Anopheles varuna*
9. *Anopheles sundaicus*

An. culicifacies , An. fluviatilis, An. minimus, An.philippinensis, An.dirus and An.stephensi have been considered as principal vectors of malaria where as three species viz. *An. annularis, An.varuna* and *An.sundaicus* have been considered to be local importance in transmission the disease. *An. stephensi* is mainly involved in the transmission in urban areas.

PRINCIPAL VECTORS OF MALARIA



The transmission potential, endemicity levels, vectors of malaria and other factors of malaria differ from area to area. The multiple vectors require different invention strategy for malaria control.

16.3 Vector control strategy in NE States under influence *Anopheles dirus* and *Anopheles minimus*

In tropical rain forests where both An.dirus and An.minimus are vectors, malaria transmission becomes stable leading to hyperendemicity. An.dirus, and An.minimus, are susceptible to commonly used insecticide-DDT. If indoor residual insecticide id properly sprayed during the transmission period, the malaria endemicity can be controlled and interruption of transmission can be achieved. It also appears that transmission control in villages which are close to the forest fringes where An.dirus transmits malaria, may not be possible by indoor insecticidal spray. An.dirus is an exophilic vector although a poor flier, but after taking the blood meal, it leaves the human dwelling to rest outside. This vector has least contact with insecticide sprayed indoors in human dwellings. It avoids such a contact on account of its habit of leaving houses immediately after blood meal. Why a poor flier like An.dirus leaves the house immediately in spite of its abdomen full of blood meal, while An.minimus a strong flier rests indoor on insecticide sprayed surface after blood meal is partially explained by 1/3rd in quantity as compared with the blood meal taken by An.minimus. Even after a full blood meal An.dirus is lighter in weight than An.minimus. After blood meal it is aerodynamically more stable than An.minimus and therefore it goes out of human dwelling.

It is therefore, mooted that malaria transmission cannot be controlled by indoor residual insecticidal spray in areas under the vectorial influence of An.dirus. In many places it has been observed that in An.dirus areas wherever insecticidal spray coverage with insecticides was of a very high order and also the quality of spray was very good, transmission interruption or reduction was observed. An.minimus and An.fluviatils are endophagic and endophilic. They rest inside the house to partially digest the meal before they fly out to rest outside. Thus they are exposed to insecticide for a much longer period resulting in interruption of transmission by these two vectors.

16.4 Areas under *Anopheles fluviatilis* and *Anopheles culicifacies* –

An. culicifacies transmits malaria **in** epidemic form in unstable states like Haryana, Punjab, Western UP, Rajasthan, MP and few pockets in other states. *An. fluviatilis* supported by *An. culicifacies* also transmits disease in deciduous forest in Peninsular hills at forest fringes.. In such areas control can be achieve d by Indoor residual spray where *An fluviatilis* is a vector. An. culicifacies is resistant to DDT then IRS is not likely to achieve results. In such areas both methods i.e. IRS and ITN,s/LLIN will give better results.

The binomics of vectors including distribution ,sphere of influence , endemicity , transmission, larval habitats, resting places , biting time feeding habits, flight range and insecticide resistance are prerequisite for effective vector control measures in different eco-epidemiological settings.

16.5 Areas under the influence of *Anopheles stephensi* –

An.stephensi, the main vector in urban areas and in Rajasthan and is responsible for the transmission of malaria in these areas. It breeds in clean water and in various containers where the water is being stored. In rural areas of Rajasthan this is the main vector which breeds in underground water storage tanks called “TANKAS”. For the control of this vector various anti-larval methods are being used.

16.6 Malaria vectors-

An.culicifacies

Distribution: Widely distributed in India. Not reported in A& N lslands and Lakshadweep. Occurs sporadically in N.E. India.

Breeding Places: Breeds in rainwater pools and puddles, borrowpits, river bed pools, irrigation channels, seepages, rice fields, wells, pond margins, sluggish streams with sandy margins. Extensive breeding of *An.culicifacies* is generally encountered followed monsoon rains.

Resting Habits: Rests during daytime in human dwellings and cattlesheds.

Biting Time: Biting goes on throughout night but peak biting occurs from 19:00 to 04:00 hrs.

Feeding Habits: A zoophilic species but when high densities build up relatively larger numbers feed on men.

Flight Range: About 1-3 kms.

Susceptibility to Insecticides: DDT and Malathion resistance has been found in this species in Gujarat and Maharashtra, isolated pockets of Andhra Pradesh, Karnataka, Tamil Nadu and Haryana. Elsewhere it continues to be susceptible to DDT and malathion. It is highly susceptible to synthetic pyrethroids. Residual insecticidal spray with suitable insecticide

Relation to Disease: Most important vector of rural malaria in the plains of north-west and the peninsular India, including the southern states of Tamil Nadu, Andhra Pradesh and Karnataka. This species is associated with unstable malaria and has been responsible for outbreaks and epidemics of malaria when mosquitogenic conditions build up due to excessive rains or floods or other natural events.

An.fluviatilis

Distribution: Widely distributed in the foothill areas including both peninsular and north-east India.

Breeding Places: Breeds typically in slow running streams, seepages, irrigation channels. Also recorded from rice fields and shallow wells. During heavy rains the breeding of *An.fluviatilis* is often flushed out.

Resting Habits: Rests indoors in human dwellings and cattlesheds.

Biting Time: Generally enters houses at dusk and completes feeding before midnight with peak from 09:00 to 11:00 hrs.

Feeding Preferences: This species is in general highly anthropophilic: may be mainly zoophagic in northern India.

Flight Range: Limited flight range.

Susceptibility to Insecticides: Highly susceptible to insecticides including DDT, Malathion and commonly used synthetic pyrethroids.

Relation to Disease: A primary vector of malaria in the foothills. Most important vector in the WB/Global fund states where it may maintain extended transmission in conjunction with *An.culicifacies*. Use of ITN,s/LLIN and IRS

An.minimus

Distribution: Distribution is restricted to the north-eastern states. This species was thought to have been eliminated as a result of insecticidal spraying in 1950's and 1960's but reappeared in late 1970's.

Breeding Places: An.minimus breeds in shades slow flowing streaks with grassy margins, swamps, ditches, channels, shallow earth wells; occasionally found to breed in borrowpits, rice fields and seepage from flowing water.

Resting Habits: Rests in houses and cattlesheds, preferring to rest on the lower portions of walls.

Biting Time: Peak biting activity occurs from 18:00 to 19:00 hrs outdoors and 24:00 to 02:00 hrs indoors. Biting time may vary from locality to locality and seasonally.

Feeding Habits: A highly anthropophilic species, and as a consequence a very efficient vector of malaria.

Flight Range: Normally 0.5 km but can disperse upto 2 kms from the original locality.

Susceptibility to Insecticides: Highly susceptible 0.5 km can disperse upto 2kms from the original locality.

Relation to Disease: Primary vector of malaria in north-east India where it maintains perennial malaria transmission in concert with other vectors, *An.dirus, An.philippinesis* and An.fluviatilis. Use of IRS, ITN,s/LLIN

An.philippinesis

Distribution: Distributed in West Bengal, North Eastern states and A&N Islands.

Breeding Places: Breeds in tanks, swamps, ditches, rice, fields, pools, leaf axils, shaded lake margins, inundated drains and water bodies with generally good growth of vegetation.

Resting Habits: During daytime adults rest in cattlesheds and human dwellings.

Biting Time: Biting outdoors and indoors throughout night with two biting peaks from 20:00 to 22:00 and 02:00 to 04:00hrs.

Feeding Habits: Predominantly zoophagic but also bites main.

Flight Range: Normally upto 0.8 km.

Susceptibility to Insecticides: Susceptible to all insecticides.

Relation to Disease: It was a major vector of malaria in deltaic West Bengal. The species has also been incriminated as vector in N.E. India. ITN,s/ LLIN

An.dirus

Distribution: Distribution restricted to the forested areas of the seven north eastern states.

Breeding Places: Breeds in forest pools and rain water collections in forest and forest fringes, stream margins with decaying organic matter, and animal foot prints.

Resting Habits: Enters human dwellings to bite and rest but has a tendency to leave houses at dusk.

Biting Time: the peak biting activity is from 22:00 to 02:00 hrs.

Feeding Habits: High preference for human blood but also bites monkey and other primates.

Flight Range: Limited flight range.

Susceptibility to Insecticides: Susceptible to DDT and other insecticides.

Relation to Disease: Primary vector of malaria in forest and forest margins of the north eastern states: part of a multiple vector system in north-east India which maintains stable malaria transmission. Use of ITN,s and LLIN,s

An.stephensi

Distribution: Distributed throughout India except at higher altitudes. found sporadically in the north-east.

Breeding Places: Breeds in wells, overhead and ground level water tanks, cisterns, rain water collections in roof gutters in roof gutters, peridomestic containers, and underground water storage tanks. In Rajasthan desert it breeds and rests in the water storage tanks called 'Tankas' in the rural areas.

Resting Habits: Rest in human dwelling and cattlesheds. Inside swellings it may rest on hanging objects, behind curtains etc. Outdoor resting has been observed in wells and underground cement tanks.

Biting Time: Biting varies from area to area and seasonally, but peak biting activity is generally from 22:00 to 24:00 hrs.

Feeding Habits: An indiscriminate feeder and bites both man and animals.

Flight Range: Limited flight range in the urban areas but in rural areas the flight range may be up0to 3kms.

Susceptibility to Insecticides: Resistance to organophosphorus larvicides used in Urban Malaria Scheme not reported in India.

Relation to Disease: Most important vector of urban malaria, although in the peri-urban (semi-rural) transmission of malaria may also be supplemented by *An.culicifacies*. It is also a vector of rural malaria in Rajasthan. The species has been responsible for malaria epidemics in urban areas, focal outbreaks in projects and construction sites. Anti larval measuers

An.annularis

Distribution: Occurs all over the country. Not found in the A&N and Lakashadweep islands.

Breeding Places: Breeds in still water with abundant vegetation in a variety of water bodies: also breeds in wells, moats, tanks, borrowpits, rice fields and other water bodies such as lakes and stream margins with vegetation.

Resting Habits: During day time rests in houses, cattlesheds and mixed dwellings, and also rests outdoors in small numbers.

Biting Time: Peak biting activity takes place from 22:00 to 24:00 hrs.

Feeding Habits: A zoophilic mosquito; biting on man is infrequent.

Flight Range: Normally upto 1 km.

Susceptibility to Insecticides: Resistant to DDT but susceptible to malathion and synthetic pyrethroids. ITN,s/ LLIN

Relation to Disease: Secondary vector of malaria in the plains of Orissa, Jharkhand and West Bengal.

An.varuna

Distribution: Distributed widely in the country from north east plains peninsular India, and the Lakshadweep islands.

Breeding Places: Breeds in rain water pools, tanks, ponds, rice fields, drains, irrigation channels, wells and slow moving streams with plenty of shade provided by overhanging vegetation.

Resting Habits: Rests indoors during daytime in human dwellings, cattlesheds and mixed dwellings. Rests outdoors near stream banks.

Biting Time: Biting goes on throughout night, but the peak biting activity is from 24:00 to 02:00 hrs.

Feeding Habits: Resting habits may differ from area to area.

Flight Range: About 1 km.

Susceptibility to Insecticides: Susceptible to DDT, and other insecticides.

Relation to Disease: Secondary vector of malaria in Andhra Pradesh, Jharkhand and Orissa.

An.sundaicus

Distribution: Reported from coastal Orissa, Andhra Pradesh and West Bengal in 1950's. At present it is restricted to A&N Islands.

Breeding Places: Breeds in brackish water pools with algae, margins or mangroves and lagoons and swaps. *An.sundaicus* can tolerate salinity levels from 0.08 to 2.6 percent and pH from 7.7 to 8.5.

Resting Habits: Rests indoors in human dwellings, cattlesheds and mixed dwellings.

Biting Time: Biting goes on throughout night but peak biting is from 20:00 to 02:00 hrs.

Feeding Habits: An opportunistic feeder, prefers to bite man

Flight Range: About 1-3 kms.

Susceptibility to Insecticides: Susceptible to DDT, and other insecticides.

Relation to Disease: *An.sundaicus* was a vector in the coastal areas of Orissa, Andhra Pradesh, parts of West Bengal, but is now responsible for malaria transmission in A&N Islands only. IRS, ITN,s/LLIN

Under NVBDCP entomological surveillance in the programme is being carried out by 72 entomological zones and entomological set up at Regional Offices the details of which are provided in **Annexure N.**

Annexure A

Role of key functionaries in malaria prevention and control

1. ASHA

Responsibilities of ASHA within the village are to:

A. Early Diagnosis & Complete Treatment

- Be the first point of contact for fever cases. To be able to identify these cases and provide facility for diagnosis like RDTs and blood slides. To arrange for transportation of slides collected from fever cases and its feedback.
- To provide treatment as per the drug policy, to cases diagnosed positive by RDTs or blood slides.
- To observe all precautions and use sterilized needles, clean slides, etc. while collecting blood smears and administering drugs.
- To identify warning signs of severe malaria and to ensure timely referral of such cases with adequate pre-referral care, to the nearest First Referral Unit (FRU) such as a near by Block PHC with inpatient facility or District Hospital after taking Blood slide and performing RDT. To arrange funds for such transportation of patients from NRHM flexi pool.
- To identify any increase in the number of fever cases in the community and to provide prompt information of fever outbreak to the MPW, BMO and DMO/ DVBDCO/ Nodal Officer-IDSP.

B. Integrated Vector Management

- To work in close coordination with MPW & MTS of the village area to ensure adequate mobilization of the community for acceptance of IRS before the rounds. To provide prior information to the community and village opinion leaders, 7 days in advance and then again one day before IRS round.
- To assist the MPW and MTS in selection of sites for dumping of insecticides.

C. IEC/ BCC

- To educate the community about signs & symptoms of malaria, its treatment , prevention and vector control.
- To undertake advocacy for integrated vector control eg. Spreading awareness on source reduction activities and improving utilization of ITNs. To participate in camps organized for insecticide treatment of bed-nets.
- To participate in all the village level activities planned for the Anti-malaria month.

D. Recording & Reporting

- To maintain the record of fever cases in M1 and provide forthnightly report of the same to the MPW.

E. Village Health & Sanitation Committee

- ASHA is expected to be a member of the Village Health and Sanitation Committee. She must take part in the meetings actively and contribute to the discussions. She must convey the same to the community.

2. MULTIPURPOSE WORKER MALE-MALE (MPW-M)

A. Early Diagnosis & Complete Treatment

- To conduct weekly domiciliary house-to-house visit, in areas where FTDs/ ASHAs have not been deployed, as per schedule developed by Medical Officer in-charge of PHC in consultation with the District Malaria Officer.

- To collect blood smears (thick and thin) or perform RDT from suspected malaria cases during domiciliary visits to households and keep the records in M-1. To transport slide collected along with M1 to Lab for examination. To provide treatment to positive cases as per the drug policy.
- To advise seriously ill cases to visit PHC for immediate treatment. All the fever cases with altered sensorium must be referred to PHC/ District Hospital by him. The cases will be referred after collection of blood smear and performing RDT. To arrange funds for such transportation of patients from NRHM flexi pool.
- To contact all ASHAs/ FTDs of the area during visit to the village and collect blood smears and M-1 for transmission to laboratory. To cross verify their records by visiting patients diagnosed positive between the previous and current visit.
- To replenish the stock of microslides, RDKs and/or drugs to ASHAs/ FTDs wherever necessary.
- To keep the records of blood smears collected and patients given antimalarials in M-1.
- To take all precautions to use properly sterilized needles and clean slides while collecting blood smears.

B. Integrated Vector Control

- To decide dumping sites for insecticides.
- To supervise the work of spray squads.
- To deploy the squads (two pumps) in such a way that each squad works in a house at a time and all the squads under his supervision work in adjacent houses for convenience of supervision.
- To make an abstract of spray output showing insecticide consumed, squads utilized, human dwellings sprayed, missed, locked, refused and rooms sprayed/rooms missed in the proforma prescribed.
- MPW (Male) will ensure the quality of spray in the human dwellings.
    - The spray should be uniform.
    - The deposit should be in small discrete droplets and not splashes.
    - All sprayable surfaces – like walls, ceilings and eaves should be covered.
    - If the ceiling is thatched, it should be sprayed so as to cover both sides of rafters/bamboos, if necessary the ceiling should have two coats each starting from opposite direction.
    - All false ceilings and attics should be sprayed.
    - If houses are built on stilts/platforms, the under surface of platform should also be covered.
- To put a stencil on the wall of the house indicating spray status of the human dwelling (All rooms and verandahs are counted).
- To ensure that spray men use protective clothing and wash the spray equipment daily. The washing of the equipment, etc. should not pollute local drinking water source or water used for cattle. The spray men should wash the exposed surface of their body with soap and water.
- To ensure that all precautions are taken by spray men to avoid contamination of food material or cooked food or drinking water in the house. These can be protected by covering with a plastic sheet. Similarly, fodder for animals should be protected.

C. IEC/ BCC

- To educate the community about signs & symptoms of malaria, its treatment, prevention and vector control.
- Advance spray information to community/villages
- To participate in the activities of anti-malaria month

D. Recording & Reporting

- To maintain record of fever cases diagnosed by blood slides/ RDTs in M1 and prepare a Subcentre report (M4) for all cases in the area, including those of ASHAs and FTDs and submit it to PHC.

- To keep a record of supervisory visits in Tour diary and submit to MO-PHC during monthly meetings for verification.
- To keep records &reports as described in Chapter on Vector management

E.**Village Health & Sanitation Committee**

- MPW is expected to be a member of the Village Health and Sanitation Committee. He must take part in the meetings actively and lead the discussions. He must convey the importance of source reduction activities.

3. MULTI PURPOSE WORKER-FEMALE (MPW-F)

MPW (Female) is primarily responsible for collecting blood smears from suspected cases of malaria among all antenatal and post natal cases under her care as well as from infants. However in those endemic areas where the post of MPW (M) is vacant she is expected to conduct the malaria active aurveillance in general population also.

A. Early Diagnosis & Complete Treatment

- During antenatal and postnatal follow-up visits, to collect from a pregnant woman if she is a suspected malaria case, thick and thin blood smear and perform RDT and keep records in M-1. **It should be kept in mind that malaria is a very serious complication in pregnancy and postpartum period leading to high mortality.**
- To administer treatment as per drug policy
- To collect blood smear for microscopic diagnosis and give treatment as per drug policy, if other fever case or case with history of fever is found among the members of the household,
- To take the blood smears to the nearest Malaria Clinic/PHC laboratory on priority within 24 to 48 hours.
- To obtain the results of blood smears and give treatment malaria positives with the following exception:

Radical treatment should not be administered to pregnant women and during post partum period of 30 days and also to infants (below one year of age).

- To refer the seriously ill cases immediately to PHC/other nearest referral centre for proper treatment. All the fever cases having altered sensorium must be referred to PHC. The cases will be referred after collection of blood smear and RDT. To arrange for transport of such cases from the flexi-pool of NRHM.

C. IEC/ BCC

- To educate the community about signs & symptoms of malaria, its treatment, prevention and vector control.
- Advance spray information to community/villages
- To participate in the activities of anti-malaria month

B. Recording & Reporting

- To maintain record of fever cases diagnosed by blood slides/ RDTs in M1 and provide it to MPW-M
- To keep a record of supervisory visits in Tour diary and submit to MO-PHC during monthly meetings for verification.

4. MALARIA INSPECTOR

Malaria Inspector will be under the technical and administrative supervision of District Malaria Officer. District Malaria Officer will allocate PHCs for each Malaria Inspector for supervision & implementation of malaria control activities in the PHCs in his jurisdiction.

- Like Assistant Malaria Officer, the Malaria Inspector will be primarily concerned with planning/supervision and conducting of insecticidal spray operations and anti-larval operations under the guidance of District Malaria Officer in the PHCs allocated to him.
- To tour for 15 to 20 days in a month for field supervision. He will be responsible for supervision of spray operations and carry out the work as assigned by the District Malaria Officer/Assistant Malaria Officer.
- To ensure that the field staff i.e. Superior Field Workers, MPWs and incharge of the local spray squad carry out all the work as assigned for these categories of staff.
- Maintain Spray records and monthly submission of reports (VC1,2,3,4) and epidemiological investigations
- To maintain stock registers of insecticides and larvicides received for his area.
- To assist if community therapeutic measures are undertaken or epidemic containment is done, and also assist in record maintenance and reporting.
- To ensure complete treatment of cases.
- To ensure complete coverage and quality of insecticidal spray.
- In specific situation, he will be responsible for timely and proper anti-larval operations.
- To train the seasonal spray staff in correct technique of suspension preparation and insecticide spray for a period of two days.

5. HEALTH SUPERVISOR – PHC

A. Supportive Supervision

- To supervise all activities of MPW (Male).
- To undertake concurrent and consecutive supervision of domiciliary visits of MPW (Male).
- To ensure that DDCs/FTDs/Voluntary Link Workers are contacted regularly by MPW (Male). If the post of MPW is vacant, he will contact the ASHas/ FTDs.
- To administer radical treatment to all positive cases in his area found during the supervisory visit.
- To refer seriously ill cases to the referral centre.
- The PHC Health Supervisor will help in organizing and supervision of the spray operations in his area, wherever required.
- He will ensure that the MPW (Male) gives advance information on spray to the villagers.
- In case of refusal, he will motivate the householders for accepting the spray.
- He will ensure the quality of spray operations and keep records of insecticide consumption.

B. IEC/ BCC

- To educate the community about signs & symptoms of malaria, its treatment, prevention and vector control.
- Advance spray information to community/villages
- To participate in the activities of anti-malaria month

C. Recording & Reporting

- To maintain record of fever cases diagnosed by blood slides/ RDTs in M1 and provide it to MPW-M during supervisory visits of subcentres
- To keep a record of supervisory visits in Tour diary and submit to MO-PHC during monthly meetings for verification.

6.

MPW (Male &Female)/ASHA/ FTD/ DDC/ NGO/ Microscopist/Health Supervisor will immediately inform unusually high fever/positive incidence to MO PHC

MICROSCPIST/ LAB TECHNICIAN

The Malaria Microscopist/ Lab Technician should carry out malaria microscopy in health facilities according to national guidelines and norms

- To receive the Blood slides from Health Workers/ ASHAs etc along with the required form and to collect Blood slides from the fever cases referred from OPD.
- To stain, examine and send report on all slides received on the same day.
- To maintain Laboratory Record of Slide Examination (M3) up to date
- To send the report on slides received from outside the facility, where the microscopist is biased, by SMS, with confirmation on paper.
- To follow national quality assurance protocol in the Laboratory
- To ensure that supplies for malaria microscopy are never out of stock
- To maintain microscope in good working condition, and to send a written report immediately to district laboratory technician if it has a problem that the microscopist cannot fix.
- To assist the PHC MO/MTS in preparation of monthly case finding report
- To train peripheral health workers in taking slides and RDTs
- To carry out other duties related to malaria or other laboratory functions as required by BMO or block laboratory supervisor

Records & Reports:

- To maintain all records and registers according to national guidelines which will be checked by MTS, MO PHC & DVBDCO/ DMO during supervision.
- The Microscopist/ LT will report to the MO PHC on a regular basis.

7. MALARIA TECHNICAL SUPERVISOR (MTS)

Following are the key responsibilities of MTS

A. Supportive Supervision

- To provide supportive supervision to health workers and volunteers managing malaria cases and to the field staff implementing vector control operations, especially IRS and LLIN distribution
- To regularly assess the coverage of case management activities and to work with the local health authorities and other sectors to improve access, where needed
- To draft annual plans for malaria control in the area of responsibility and submit them to the district VBDC officer
- To manage the timely implementation of the approved annual malaria control plan in the area of responsibility including logistics, training, communication, and quality assurance
- To ensure the implementation of malaria surveillance based on NVBDCP norms, serving as the front-line professional for the early detection of outbreaks and special problems and ensuring that feed-back is provided to cadres and health workers involved in malaria control.
- Visit all the PHCs (block and additional) and designated microscopy centers in the area of responsibility once every fortnight, sentinel centers once a month, and sub centers and 10% of remote villages once every two months with additional visits to villages with epidemiological or operational problems;
- During visit to subcentres, try to visit remote villages and interview ASHA and 2 patients treated by ASHA in the last one month (checked from her records)
- guide health workers and volunteers in the planning of outreach services including active case detection;

- check the quality of malaria case management at all levels including recording, reporting and commodities management during visits to health facilities, health workers and volunteers and through home visits to malaria cases;
- MTS would fill the supervisory checklist during each field visit in triplicate; of these one copy is filed in the PHC, one is submitted to the DMO/ DVBDCO and the last is for his own record;
- supervise the quality and coverage of IRS and LLIN/ITN operations in the field;
- check completeness and correctness of recording and reporting, undertake primary analysis of malaria data and ensure timely submission of reports through the BMO and channelling surveillance feed-back from the district to BMO and sub-centers;
- communicate regularly with the affected communities, their leaders, administrative authorities at block level and representatives of other sectors to respond to their needs and to recruit their support for malaria control.
- To assist the MO-PHC in training of ASHAs & MPWs.

B. Reporting

- Monthly advance tour program by last Monday of preceding month for approval by the DVBDCP/MO officer.
- MTS reports to the district VBDC or malaria officer. Submits his tour diary, Supervisory Checklist and log book for verification to DMO/ DVBDCO each month.
- In collaboration with Block Medical Officers and their assistants, MTS provides supportive supervision to non-medical staff responsible for case management and surveillance and to vector control staff
- MTS reports regularly to the BMO supervising the facility, where the MTS' desk is located.

8. MEDICAL OFFICER – PHC

The Medical Officer should be well trained and take keen interest in malaria control activities. To fulfill the duties under the Primary Health Care System, he should carry out the following activities:

A. Early Diagnosis & Complete Treatment

- To select FTDs for the PHC area in consultation with District Malaria Officer and the community.
- To make a fortnightly calendar for house-to-house visit of MPW (Male) in consultation with DMO.
- To refer all fever cases to malaria laboratory for blood smear collection and examination before giving final prescription/medicines.
- He will ensure that the Laboratory Technicians maintains the M3 register and also other charts and graphs showing subcentre-wise and passive agency-wise blood smear collection, examination and positive cases.
- To ensure/supervise that all positive cases get treatment as per drug policy within 48 hours of examination.
- To ensure sufficient stocks of antimalarials in PHC and periphery.
- To analyse data for action and prediction of outbreak and also assist in epidemiological investigation based on weekly fever surveillance report.
- To provide referral services to severe cases of malaria to District Hospital and to arrange for their transportation.
- To monitor drug failure in malaria cases (failure of response to Chloroquine) and inform the District and State Headquarters immediately.
- To ensure that records of clinically diagnosed cases are maintained.
- To undertake trainings of HS/ MPW/ ASHA in the PHC area.

B. Integrated Vector Control

- PHC Medical Officer will ensure that the spray operations are conducted as per schedule and in case of any delay, he will find out the reasons and reschedule the programme.
- To assist the DMO/ DVBDCO in preparation of supervisory plan for the PHC area.

- To solve and bottlenecks in spray operations in his area such as turnover of seasonal spray men (field workers), insecticide supplies, shifting of camps, etc.
- To ensure that reports are sent in time.
- To contact DMO immediately in case of delay/suspension of spray programme and solve the problems.
- To inspect spray operations, during field visits, at least once a week.

C. Supportive Supervision

- Visit all PHCs & microscopy centres in the area of Block PHC once a month and monitor sentinel sites once a month. He should try to visit all Subcentres once in 2-3 months. During visit to subcentres, he should visit remote villages and interview ASHA and 2 patients treated by ASHA in the last one month (checked from her records)
- During supervision of all Malaria Clinics and PHC laboratory in his area, see the quality of blood smear collection, staining, efficiency of microscopic examination and check whether the stain is filtered daily, look into the condition of microscope and other equipment, stains, glass slides, etc..
- While on tour, to verify that MPW (Male), MPW (Female) and ASHA carry out malaria case detection as laid down in this manual.

D. IEC/ BCC

- To plan for anti-malaria month with DMO/ DVBDCO.
- To plan for IEC in the PHC area before spray operations, to improve their acceptance.

E. Recording & Reporting

- To ensure that all records of all fever cases examined and found positive are maintained in the Laboratory.
- To ensure that all MPWs submit the monthly Subcentre report and the PHC prepares the Subcentre wise Report on M4 and submits it to District.

Every PHC is provided with untied funds under NRHM. Medical Officer is expected to guide the Arogya raksha samiti (hospital management committee) in utilization of this budget as and when imperative for malaria treatment / prevention related activities. Procurement of Artesunate / quinine injections or other antimalarials can be done when the supply from the higher authorities is not there.

9. ASSISTANT MALARIA OFFICER

The Assistant Malaria Officer will work under the technical control of District Malaria Officer.

- To assist in chalking out fortnight domiciliary visits of MPWs.
- To help in selection of FTDs
- To help in working out insecticide requirements, their dumping programme and other aspects of logistics.
- To help in organization and supervision of spray operations.
- During field visits to carry out consecutive and concurrent supervision of both case detection and spray operations.
- To help in preparation of reports and returns and ensure that these are sent regularly.
- To help District Malaria Officer in all other technical and administrative functions connected with malaria control in the district.

10. DISTRICT VBDC CONSULTANT

To overall purpose of District VBDC Consultant is strengthening planning, monitoring, supervision and evaluation of VBDC in endemic districts with high burdens of malaria and to ensure seamless collaboration between state and district levels.

A. Early Diagnosis & Complete Treatment

- To ensure that FTDs are selected and are functional for the PHC area in consultation with District Malaria Officer, MO PHC and the community.
- To ensure that all fever cases are referred to malaria laboratory for blood smear collection and examination before giving final prescription/medicines by repeated sensitization of the MO PHC. To sensitize the MO PHC, MPWs and ASHAs on timely referral of severe cases of malaria.
- To assist the DMO in ensuring that all microscopy centres in the district are functional by positioning of LTs.
- To ensure sufficient stocks of antimalarials in PHC and periphery.
- To assist the DMO/ DVBDCO in analyzing data for action and prediction of outbreak and also assist in epidemiological investigation based on weekly fever surveillance report.
- To monitor drug failure in malaria cases (failure of response to Chloroquine) and inform the District and State Headquarters immediately.
- To ensure that records of clinically diagnosed cases are maintained.
- Along with MO PHC to undertake trainings of HS/ MPW/ ASHA in the PHC area.

B. Integrated Vector Control

- To provide technical support to DVBDCO/ DMO, BMOs and MTSs for the preparation of district and sub-district plans for control of malaria and other vector borne diseases;
- To supervise IRS micro-planning and implementation to ensure quality and coverage.

C. Supportive Supervision

- To ensure that current Programme Guidelines for planning, training, service provision, monitoring, supervision, and surveillance of Vector Borne diseases are applied in all health facilities and by all health workers concerned in the district ;
- To work with State and district-level officers to establish good practices of supportive supervision in the district for the control of vector borne diseases. Conduct regular field visits for ensuring quality implementation of the programme and provide technical support to the concerned staff on site, including ongoing on-the job training and supportive supervision of MTSs
- Visit all sentinel surveillance sites once a fortnight and 50% of PHCs in a month. Visit subcentres and supervise MPWs, ASHAs and make patient visits.
- To supervise the VBDC logistics of diagnostics, drugs and insecticides so as to ensure against stock-outs. To ensure that FEFO (First expiry first out) principle is followed in their utilization.

D. IEC/ BCC/ Inter-sectoral Collaboration

- To actively seek involvement of District Collector, district administration NGOs, CBOs and the private sector (health and non-health) under various schemes.
- To assist the DVBDCO/ DMO and specialized staff in development of the BCC/ IEC plan for the district with special emphasis on IPC tools and innovations in BCC/ IEC.
- To ensure timely data analysis, presentation and interpretation for VBD surveillance at district level;

E. Records & Reports

- Ensure preparation of Annual Report and Plan on VBD. To ensure timely submission of district level reports to State.
- Participate in all district level & state level meetings held to review the situation of Vector Borne Diseases.
- To submit a monthly advance tour program by 7th of the month to Dte NVBDCP & States. Maintain tour diary & Vehicle Log Book for each month.
- To submit monthly Activity Report to Dte NVBDCP & State Programme Officer

11. DISTRICT MALARIA OFFICER

A. Early Diagnosis & Complete Treatment

- To ensure that FTDs are selected and are functional for the PHC area in consultation with District VBDC Consultant, MO PHC and the community.
- To ensure that all fever cases are referred to malaria laboratory for blood smear collection and examination before giving final prescription/medicines by repeated sensitization of the MO PHC. To sensitize the MO PHC, MPWs and ASHAs on timely referral of severe cases of malaria.
- To ensure that all microscopy centres in the district are functional by positioning of LTs.
- To ensure sufficient stocks of antimalarials in PHC and periphery.
- To analyze data for action and prediction of outbreak and also assist in epidemiological investigation based on weekly fever surveillance report.
- To monitor drug failure in malaria cases (failure of response to Chloroquine) and inform the State Headquarters immediately.
- To ensure that records of clinically diagnosed cases are maintained.
- Along with MO PHC & District VBDC Consultant to undertake trainings of HS/ MPW/ ASHA in the PHC area.

B. Integrated Vector Control

- To prepare the District & Sub-district Micro Action Plan with assistance from District VBDC Consultant, BMOs and MTSs for control of malaria and other vector borne diseases;
- To supervise IRS micro-planning and implementation to ensure quality and coverage. To ensure that supervisory plan for monitoring of IRS is prepared and followed in each PHC.
- To make arrangements for transport of insecticide to field (dumping stations) well in time.
- To ensure that all spray equipments along with spare parts are purchased/repaired in time well before commencement of spray operations. To ensure certification of all spray equipment in the district before IRS rounds.
- To ensure that sufficient budget is available and spray men get their payment in time.
- Inform the State Programme Officer, ROH&FW & Dte. Of NMEP about the commencement of spray operations.
- To cover all PHCs of the district during spray inspection/supervision in each month. To visit and observe at least 5 to 10 villages every week to check the quality of spray.
- To ensure that complete coverage is achieved in time & space and to submit the spray completion reports within fifteen days of the completion of the respective rounds.

C. Supportive Supervision

- To ensure that current Programme Guidelines for planning, training, service provision, monitoring, supervision, and surveillance of Vector Borne diseases are applied in all health facilities and by all health workers concerned in the district ;
- To work with State and district-level officers to establish good practices of supportive supervision in the district for the control of vector borne diseases. Conduct regular field visits for ensuring quality implementation of the programme and provide technical support to the concerned staff on site, including ongoing on-the job training and supportive supervision of MTSs
- Visit all sentinel surveillance sites once a fortnight and 50% of PHCs in a month. Visit subcentres and supervise MPWs, ASHAs and make patient visits.
- To supervise the VBDC logistics of diagnostics, drugs and insecticides so as to ensure against stock-outs. To ensure that FEFO (First expiry first out) principle is followed in their utilization.

D. IEC/ BCC/ Inter-sectoral Collaboration

- To actively seek involvement of District Collector, district administration in the prevention & control of VBDs. To increase participation of NGOs, CBOs and the private sector (health and non-health) under various schemes.
- To prepare of the BCC/ IEC plan for the district with special emphasis on IPC tools and innovations in BCC/ IEC with assistance from the District VBDC Consultant and specialized staff at state level.
- To ensure timely data analysis, presentation and interpretation for VBD surveillance at district level;

E. Records & Reports

- To timely submit district level reports to State. To Prepare Annual Report and Annual District Action Plan.
- To ensure that all laboratory records and reports are maintained in the district up to date.
- Participate in all district level & state level meetings held to review the situation of Vector Borne Diseases. To ensure review of the VBDCP in these meetings.
- Maintain tour diary & Vehicle Log Book for each month.

District malaria officer is a member of the district health society. He should bring to the notice of the society relevant aspects of intersectoral co-ordination. He should prepare information as per the checklist to be reviewed by the District Collector.

District malaria officer also has to monitor the implementation of anti malaria activities in the urban malaria schemes functioning in the district. DMO is to have regular contact with professional bodies like IMA, IAP, etc so that national anti malaria policy is conveyed to the private medical practitioners.

Annexure B

Selection of insecticides, calculation of required quantities and safety precautions-

Intervention measures to restrict the transmission of malaria by controlling the vector population from the main part of the vector control. Effective vector control strategies are based on the following facts.

(i) Knowledge and understanding of vector biology
(ii) Surveillance of vector species
(iii) Incrimination of vector species
(iv) Public education and implementation of effective control measures.

Vector control programme in India, as in the case with many anti-malaria programme elsewhere, in the world, mostly rely on usage of natural and synthetic chemical molecules, which have potential to kill the target insects.

Presently different formulations of synthetic chemical insecticides are in the use for vector control. Wettable powder (WP) formulations are used for indoor residual sprays while emulsion concentrate (EC) formulations are used for larval control. For Indoor Residual Spray (IRS) insecticides in use are DDT 50% WP, Malathion 25% WP and Synthetic Pyrethroid (WP). Synthetic Pyrethroids include Deltamethrin 2.5% WP, Cyfluthrin 10% WP, Lambdacyhalothrin 10% WP and alphacypermethrin 5% WP,. Synthetic Pyrethroid insecticides are also used for impregnation of bednets.

Most of the insecticides having residual effect are sprayed indoors, so that mosquitoes after taking blood meal on an infective person will rest in the house and will pick up sufficient insecticide particles sprayed on the walls and other indoor surfaces of the house and its longevity will be reduced so much so that it does not survive to become infective. In areas where the vectors are strongly endophilic, i.e. they tend to rest indoors, indoor residual spraying of human dwellings can give very effective control. Vectors that are exophillic i.e. they tend to rest outdoor but tend to feed or rest indoors briefly, can be effectively controlled by indoor residual spraying with insecticides that have good airborne effect. In areas where vectors are strongly exophillic and/or exophagic , i.e. they rest and bite outdoors, other control methods, such as use of insecticide treated mosquito nets or outdoor space spraying (for emergency control), should be considered.

In practice, the effectiveness of house spraying for malaria control depends on adherence to the specified criteria of the insecticide and application procedure, public acceptance of spraying, the availability of well maintained equipment, adequately trained spraying personal depends on local circumstances and is influenced by the distribution of malaria and malaria vectors; distance from the active breeding sites, the flight range of the vectors and demographic features.

Selection of insecticides

Several factors need to be considered in the selection of an insecticide spraying, including availability, cost, residual effectiveness, safety, vector susceptibility and excito-repellency. There are large number of insecticides, which are used as adulticides for indoor residual spray. These are DDT, Malathion and different formulations of synthetic pyrethroids.

Change of Insecticide

If the change of insecticide is warranted, the state govt. should support their choice of alternative insecticide by documentation of data on vector resistance studies and field observations on epidemiological impact of spray in respect of insecticide in use. The change of insecticide will always be decided in mutual consultation between State Programme Officer for NVBDCP, ROH&FW and the Dte. of NVBDCP with concurrences of State and Central Govts. The proposal for any such change of insecticide should follow the following steps:

(i) State Govt. submits the proposal for change of insecticide to Dte. of NVBDCP in the month of January-February. All technical data on vector resistance, epidemiological impact of the current insecticide in use, along with financial outlay, quantity of alternative insecticide chosen, with comparative cost difference for spray operation should be included in the

proposal. The proposal should be discussed in the annual action plan meeting in Dte. of NVBDCP.

(ii) Mutual consultations between the State Programme Officer, NVBDCP, ROH&FW and Dte. of NVBDCP in the month of March-April and report prepared in this regard for submission to Technical Advisory Committee for approval under the chairpersonship of DGHS, GoI.

(iii) Approval of MOH&FW should be obtained in the month of April-May.

(iv) Insecticide should be procured for next year's spray operations and fixing of delivery schedule should be ensured so that the insecticide reaches the periphery by Map-April next year i.e well before starting the first round of spray operation.

Insecticide used under NVBDCP

The following formulations/compounds are used under the NVBDCP for control of malaria:

DDT (Dichloro-diphenyl-trichloroethane)

In India DDT has been in use for malaria control since 1946. Recently there has been a tendency to curb the use of DDT due to its persistence in the environment. It is a fact that if DDT is applied in agriculture, it contaminates water resources, enters the biochain and at each step of the biochain, it gets more concentrate (bio-magnification) till it reaches human beings. In human body, it is stored in the body fat and is excreted in the milk. Therefore it reaches the infants right from the time of birth. Since DDT persists for a long time in the environment, there has been apprehension that it will produce adverse reaction of DDT on human health.

A study group of WHO has recommended that at this stage there is no justification on toxicological or epidemiological grounds for changing current policy towards indoor spraying of DDT for vector-borne disease control. DDT may therefore be used for vector control, provided that all the following conditions are met:

a) it is used only for indoor spraying
b) it is effective
c) the material is manufactured to the specifications issued by WHO
d) The necessary safety precautions are taken in its use and disposal.

Govt of India has constituted a mandate Committee on DDT which reviews the use of DDT in public health and decides its quantity to be released for the vector borne diseases control programme every year.

DDT has an added advantage. It is comparatively cheaper than the other insecticides and even in those areas where resistance to DDT has been recorded with WHO test kits, the epidemiological impact of good spray operations is seen because of its excito-repellent action.

Requirement of DDT

150 MT per million population for two rounds of spray is required. In areas where third round is proposed in selected villages, additional requirement of 75 MT per million population should be estimated.

Malathion

Malathion 25% WP is used under the programme in areas with DDT resistance. The disadvantage of organophosphorous compounds is that unlike their use in agriculture where a farmer uses the organophosphorous compound for crop protection only once or twice a year, the spray squads engaged in spraying residual insecticide in the human dwellings work with these compounds for periods extending upto 6 or 7 months. This long exposure results in acute toxic symptoms and if not controlled properly may lead to mortality. Therefore, the spray staff engaged in spraying of organophosphorous compounds are to be provided with more elaborate protective garments and their blood cholinesterase level is to be checked periodically to assess the toxic impact of the compound. These compounds are also toxic to domestic pets.

Under Indian conditions, three rounds of spray with organophosphorous compounds are given as against two rounds of spray with DDT.

In case of OP poisoning, the patient should be transported as soon as possible to a doctor to receive an **antidote**. Organophosphate poisoning, 2-4 mg or atropine should be given intravenously (for children 0.5 to 2 mg according to weight). Depending on symptoms, further doses of 2 mg. Should be given every 15 minutes for 2-12 hours in several cases. Automatic injections are available for administration of atropine.

Requirement of Malathion 25%

900 MT per million population for three rounds of spray are required. If in some areas a further round is required in selected villages, 300 MT per million population for the special round for the population of selected villages only.

Synthetic Pyrethroids:

These are new insecticides introduced for control of vector borne diseases in India. The cost of these insecticides is much higher than the cost of DDT and Malathion. Currently there are five insecticides of this group registered with Central Insecticide Board for use in the programme. These are (i) Deltamethrin 2.5% WP (ii) Cyfluthrin 10% WP, (iii) Alphacypermethrin 5% WP (iv) Lambdacyhalothrin 10% WP and (v) Bifenthrin 10%WP.

In treating pyrethroid poisoning vitamin E oil preparations can be given for prolonged paraesthesia. Only in cases of definite allergic symptoms should corticosteroids be administered. On concurrence of convulsions after sever intoxication,intravenous injection of 5-10 mg Diazepam (or other benzdiazepine derivatives) should be given.

Requirement of Synthetic Pyrethroids

(i) Deltamethrin 2.5% WP: 60 MT per million population for two rounds of spray. In some areas, where a further round is required in selected villages, additional requirement of 30 MT per Million for the population of selected villages is estimated.

(ii) Cyfluthrin 10% WP: 18.75 MT per million population for two rounds of spray and 9.38 MT per million population for selected villages which would require special round/third round of spray.

(iii) Lambdacyhalothrin 10% WP: 18.75 MT per million population for two rounds of spray and for a special round or IIIrd round of spray in selected villages, 9.38 MT per million population may be estimated.

(iv) Alphacypermethrin 5% WP 37.5 MT per million population for two rounds of spray.

(v) Bifenthrin 10% WP: 18.75 MT per million population for two rounds of spray and 9.38 MT per million population for selected villages which would require special round/third round of spray.

Insecticide formulations and dosages for IRS

S.No.	Name of insecticide	Preparation of suspension in water	Dosage per sq.metre of active ingredient	Residual effect in weeks	Area to be covered by 10 lit. of suspension to get correct dosage	Requirement of Insecticide per Million pop. (in MT)
1.	DDT 50% WP	1 kg./10 lit.	1 gm.	10-12	500 sq.m.	150
2.	Malathion 25 % WP	2 kg./10 Lit.	2 gm.	6-8	500 sq.m.	900
3.	Deltamethrin 2.5% WP	400 gm/10 Lit.	20 mg.	10-12	500 sq.m.	60
4.	Cyfluthrin 10% WP	125 gm./10 Lit.	25 mg.	10-12	500 sq.m.	18.75
5.	Lambdacyhalothrin 10% WP	125 gm.10 Lit.	25 mg.	10-12	500 sq.m.	18.75
6.	Alphacypermethrin	250 gm/10	25 mg.	10-12	500 sq.m.	37.5

	5% WP	Lit.				

- In the case of Malathion, the requirement shown above, is for the three rounds

LARVICIDES FORMULATIONS AND THEIR DOSAGES

S. No	Name of Larvicide	Commercial formulation	Preparation of ready to spray formulation	Dosage per			Frequency of application	Equipment required	Remark
				One sq. metre	50 Linear Metres	Hectare			
1	2	3	4	5	6	7	8	9	10
1	MLO	100% petroleum project	As it is	20 c.c	1 Lit.	200 Lit.	Weekly	Knapsack /Hand compression sprayer	To be applied along the shore of water body
2	Temephos (Abate)	50% EC	2.5 c.c. in 10 Litres of portable water	20 c.c.	1 Lit.	200 Lit.	-do-	Hand compression/ Knapsack sprayer	Can be applied in clean water
3	Bacillus thuringiensis israelensis	Wettable Powder	5 Kg	-	-	1	Fortnightly	Knapsack / Hand Compression sprayer	For both clean and non-potable polluted water for

General safety precautions

Exposure to insecticides may occur when handling and spraying insecticides as follows:

- When handling the insecticide product during opening of the package, mixing and preparation of the spray.
- When spraying the insecticide, especially in high places, the operator should wear a protective hat and face-shield or goggles.
- Do not eat, drink or smoke while working.
- Wash your hands and face with soap and water after spraying and before eating, smoking or drinking.
- Shower or bath at the end of every day's work and wear new clean clothes.
- Wash your overalls and other protective clothing at the end of every working day in soap and water and keep them separate from the rest of the family's clothes.
- If the insecticide touches your skin, wash off immediately with soap and water.
- Change your clothes immediately if they become contaminated with insecticides.
- Inform your supervisor immediately if you feel unwell.

Protective clothing and equipment

Absorption of insecticide occurs mainly through the skin, lungs and mouth. Specific protective clothing and equipment must be worn in accordance with the safety instructions on the product label.
A. Broad-rimmed hat (protects head, face and neck from spray droplets).
B. Face-shield or goggles (protects face and eyes against spray fall-out).
C. Face mask (protects nose and mouth from airborne particles).
D. Long-sleeved overalls (worn outside of boots).
E. Rubber gloves.
F. Boots.

Disposal of remains of insecticides and empty packaging

At the end of the day's work, the inside of the sprayer should be washed and any residual insecticide flushed from the lance and nozzle. The rinsing water should be collected and carefully contained in clearly marked drums with a tightly fitting lid. This should be used to dilute the next day's tank loads or disposed properly by the supervisor.

Never pour the remaining insecticide into rivers, pools or drinking-water sources.
Decontaminate containers where possible. For glass, plastic or metal containers this can be achieved by triple-rinsing, i.e. part-filling the empty container with water three times and emptying into a bucket or sprayer for the next application.
All empty packaging should be returned to the supervisor for SAFE disposal according to national guidelines.
Never re-use empty insecticide containers

Storage and transport

Pesticide storage must be located away from areas where people or animals are housed and away from water sources, wells, and canals. They should be located on high ground and fenced, with access only for authorized persons. However, there should be easy access for pesticide delivery vehicles and – ideally – access on at least three sides of the building for fire-fighting vehicles and equipment in case of emergency. Pesticides must not be kept where they would be exposed to sunlight, water, or moisture, which could affect their stability.

Storehouses should be secure and well ventilated. Stocks should be arranged so that the oldest are used first (“first in first out” or, better, “first expired first out” principle),
to avoid the accumulation of obsolete stock. Containers should be arranged to minimize handling and thus avoid mechanical damage which could give rise to leaks. Containers and cartons should be stacked safely, with the height of stacks limited to ensure stability.

Pesticides should not be transported in the same vehicle as items such as agricultural produce, food, clothing, drugs, toys, and cosmetics that could become hazardous if contaminated. Pesticide containers should be loaded in such a way that they will not be damaged during transport, their labels will not be rubbed off, and they will not shift and fall off the transport vehicle onto rough road surfaces. Vehicles transporting pesticides should carry prominently displayed warning notices. Pesticides should not be carried in the passenger compartments of transport vehicles and should be kept tightly secured and covered at all times during transport. The pesticide load should be checked at intervals during transportation, and any leaks, spills, or other contamination should be cleaned up immediately using accepted standard procedures. In the event of leakage while the transport vehicle is moving, the vehicle should be brought to a halt immediately so that the leak can be stopped and the leaked product cleaned up. Containers should be inspected upon arrival at the receiving station. There should be official reports to the national level and follow-up enquiries in the event of fires, spills,poisonings, and other hazardous events.

Distribution of pesticides should be carried out by trained personnel or under proper supervision. Misdirection or mishandling can result in the product falling into the hands of uninformed recipients or causing human or environmental risk. Proper packaging is also important to ensure the confinement of the product and its safe handling. The original package is intended to ensure safe distribution; when repacking is necessary, the new packing should meet the specifications of the original packaging.

Annexure C

Technique for IRS

Manpower Requirement

The Expert Committee 1995 recommended 52 squads for 5 months spray period to cover one million population with DDT and synthetic pyrethroids. Eighty seven (87) squads for four and a half ($4^{1/2}$) are required for malathion spraying. It is expected that on an average a spray squad of 5 persons can cover 60 to 80 houses per day. One squad will take 12 to 17 days to cover a subcentre area with an average population of 5000.

Each spray squad consists of 5 field workers working with two stirrup pumps and one Superior Field Worker.

Equipments

Each squad will require the following equipment which must be available well in time before spray operations:

- Stirrup pumps – (2)
- Spray nozzle tips for spray pumps – (2)
- Bucket 15 litres – (1)
- Bucket 5/10 litres – (1each)
- Asbestos thread – (3 metres)
- Measuring mug – (1)
- Straining cloth – (1 metre)
- Pump washers – (2)
- Plastic sheet (3x3 metres) – (1)

Squad Supervisor must have extra spray pumps, nozzle tips, washers asbestos threads. A set of tools for minor repairs should also be available which should include a pipe wrench, pliers, screwdrivers and a set of spanners. A good quality nozzle should be used.

Each squad must also be provided with personal protection gear including masks and soap to wash.

Preparation of insecticide suspension

The required quantity of insecticide, calculated as indicated in Annex B, should be issued to the squads each day by the supervisor after checking balance stocks available from previous day's supplies.

The preparation of the spray suspension is made just before the start of the spray operations every day. It is important that the suspension is made correctly so that the correct dosage is applied on the sprayed surfaces. The procedure for the preparation of the suspension is the same irrespective of the insecticide. However, the quantity of the insecticide used per 10 litres of water will depend on the insecticide used (See Annex B).

The required quantity of the insecticide is measured with a plastic mug and poured into a 15 litre bucket. A paste is made with a small quantity of water. The remainder of water is then poured slowly into the bucket and the insecticide water mixture is stirred vigorously to obtain a uniform suspension. The suspension is then poured into another bucket through a cloth sieve to remove any particulate matter that might clog the nozzle of the spray pump.

The insecticide suspension should be stirred vigorously at least every hour.

Spraying

All food, cooking utensils, bedding and clothes must be protected from insecticide by taking them outside the house before spraying starts.
The barrel of the stirrup pump is put in the bucket containing the spray suspension. One man operates the pump and the other man sprays. The spray lance should be kept 45 cms (18 inches) away from the wall surface. The swath should be parallel. Spray is applied in vertical swaths 53 cm (21 inches) wide. Successive swaths should overlap by 7.5 cm (3 inches). Spray is done from roof to floor, using downward motion, to complete one swath; then stepping sideways and spraying upwards from floor to roof. Do not let the spray drip to the floor. Spraying is done on inner surfaces including eaves and roofs.

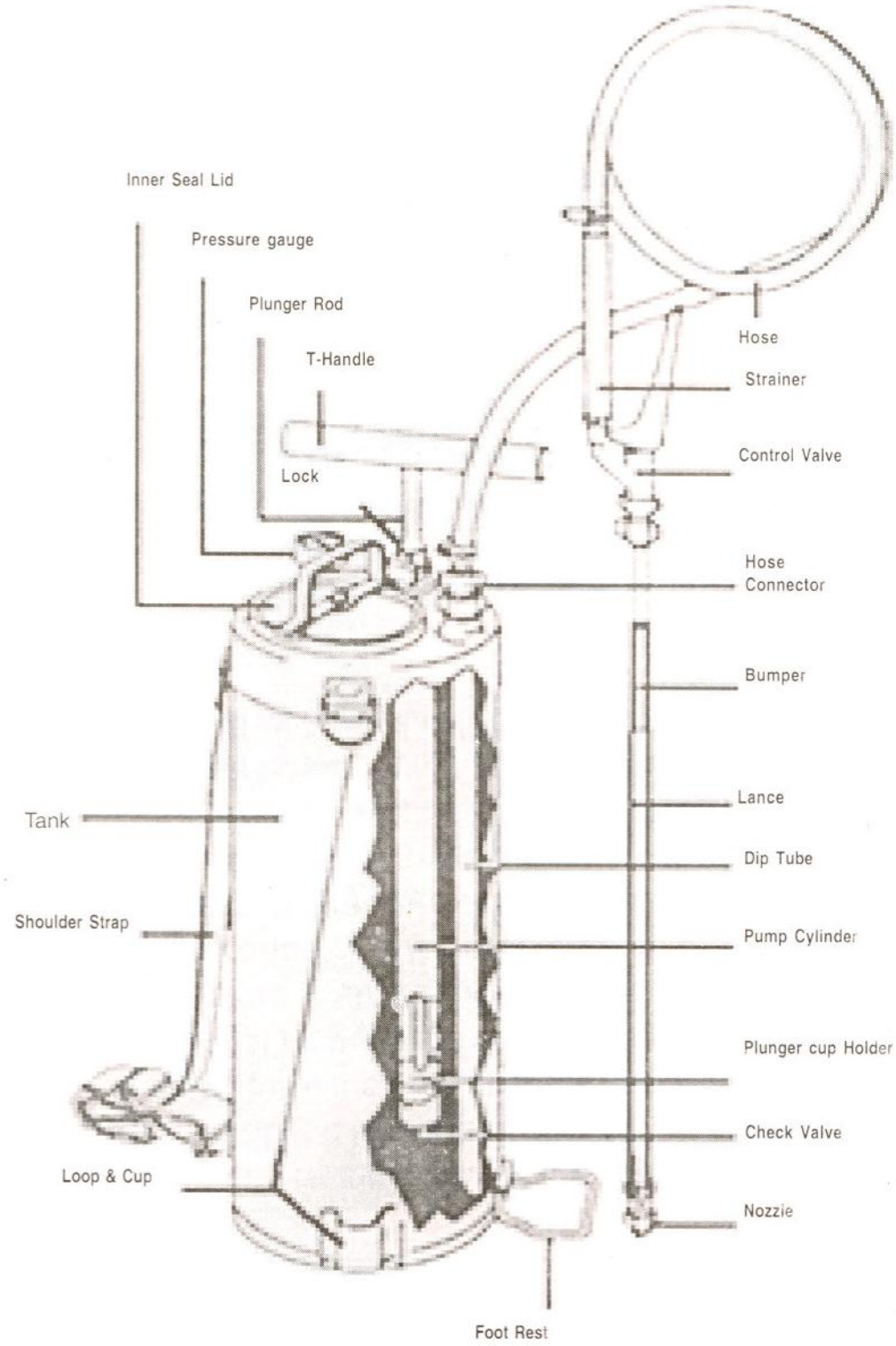
The discharge rate should be 740 to 850 ml per minute. To obtain the above discharge rate, the pump man should give 20 to 26 strokes per minute with 10-15 cms plunger movement at a pressure of 10 PSI (0.7 kg/sq.cm) at the nozzle tip. Spraying into a bucket for one minute and measuring the quantity of the suspension in a graduated mug will check the correct discharge rate (740 to 850ml/minute). The nozzle tip should be discarded if the discharge rate exceeds 850 ml per minute.

If the spray stops due to a blockage in the nozzle, the nozzle cap should be unscrewed to remove the blockage and replaced with a new one. The blocked nozzle should be put in a container with water for a few hours before the blockage is removed with a finer wire.

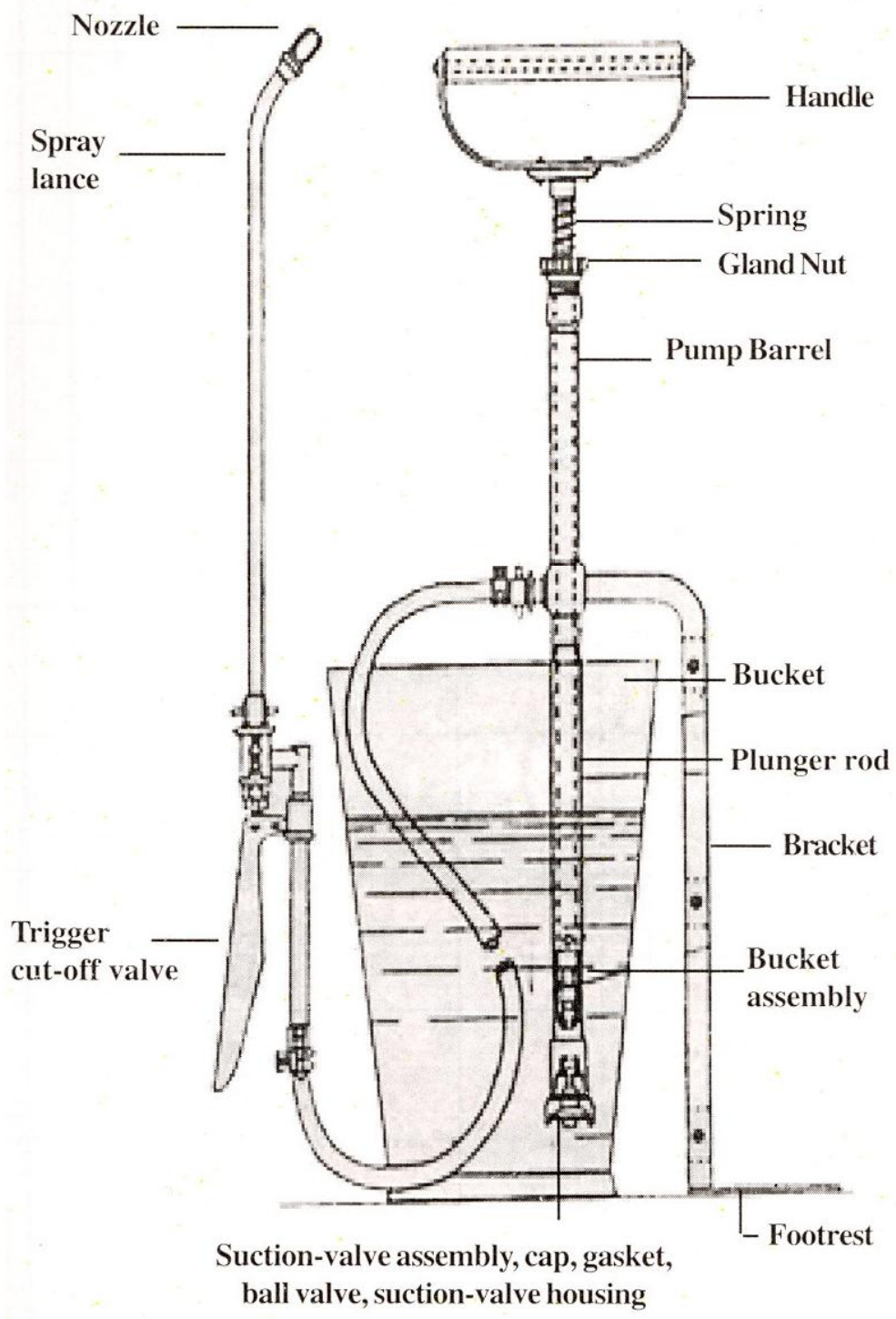
A good quality spray should lead to uniform deposit on walls and other sprayable surfaces. This is easy to verify for DDT and malathion sprays as the insecticide deposits are clearly visible. Deposits of synthetic pyrethroids are visible on wooden structures. The supervisor through physical verification should verify the quality and coverage of spray randomly.

It takes about 5 minutes to spray a house with an average surface area of 150 sq. metres. A summary of spray operations in each village should be maintained by the superior field worker and verified by the health worker showing the areas covered and room coverage (Form VC1).

HAND COMPRESSION SPRAYER



STIRRUP PUMP SPRAYER



Annexure D

Technique of Impregnation of Bednets

10 Easy Steps for Mass Treatment

Step 1: Collect the necessary equipment
The necessary equipment consists of: mosquito nets, insecticide, basin, measuring container, rubber gloves, soap.

- Make sure the net is washed/cleaned before treatment.
- Preferably, nets should be treated outdoors in the shade. If treatment is to be carried out indoors, a room with open windows should be used.
- Use basin, gloves that are **not** used for any other purpose.

Step 2: Put on protective gloves before treating nets

Step 3: Measure the correct amount of water

The amount of water needed depends on the net material. Regardless of the size and shape of net, the amount of water required for one synthetic net (nylon, polyester) – ½ litre (if the net is very large, more water may be needed).

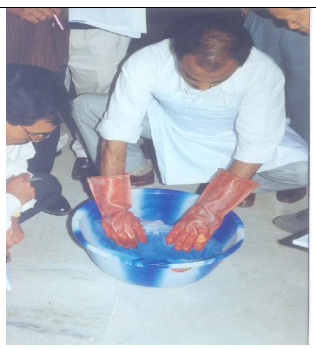
- ✓ If measuring container comes with insecticide, use it to measure water. Otherwise, use any measuring container, that is **not** used for food, drinks, medicines.

Step 4: Measure the correct amount of insecticide

- The amount of insecticide or "dose" needed to treat a net depends on type of insecticide used. Follow instructions on the container, sachet, packet. Generally, 10-15 ml of insecticide is required to treat one single net.
  - [BIS Number of Liquid Synthetic Pyrethroid used for treatment of Bed Nets - i) Deltamethrin – IS14411: 1996; ii) Cyfluthrin – IS14156: 1994].
- Store leftover insecticide in its original container, in the dark and away from children.

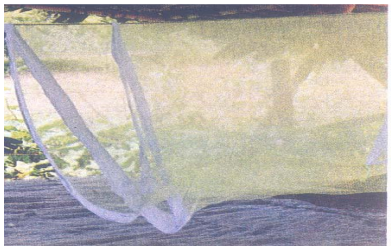
Step 5: Mix the water and insecticide thoroughly by gloved hands in basin

Step 6: Treatment of nets

• Always impregnate one net at a time • Put the net in the basin containing water and insecticide • Soak the net long enough to ensure that all parts of the nets are impregnated • Take out the nets and allow excess liquid to drip back by squeezing it gently, but do not wring it.	 ***Treatment of bed net***

Step 7: Drying the nets

- *Let the net **dry flat in the shade on plastic sheets**.*
- **Later,** the net can be hung up to **finish** drying **in the shade**.

	
First phase of drying on a non- absorbent flat surface under shade	***Second phase of drying- semi-dry nets under shade***

Step 8: Disposal of leftover mixture of water and insecticide and insecticide containers

- Following treatment of all available nets, leftover mixture of water and insecticide, if any, may be used to treat curtains.
- Otherwise, dispose the liquid in the toilet or a hole away from habitation, animal shelters, drinking water sources, ponds, rivers, streams.
- Destroy empty insecticide containers, sachets, packets and/or bury in a hole away from habitation, animal shelters, drinking water sources, ponds, rivers, streams.
-

Step 9: Washing and cleaning of hands, equipments

- Wash equipments (basin, measuring container) with lots of water while wearing protective gloves.
- Wash gloves (if non-disposable ones are used)] with soap and lots of water, or dispose with insecticide containers.
- Wash hands with soap and lots of water.

Step 10: Washing and re-treatment of nets

- Washing removes insecticide from the net. So, **wash the nets as seldom as possible** and gently with soap and cold water and **dry flat on plastic sheet in shade**.

✓ Do **not** wash/rinse treated net in or near drinking water sources, ponds, lakes, rivers, streams. Dispose of water for washing/rinsing in the toilet or in a hole away from habitation, animal shelters, drinking water sources, ponds, rivers, streams

- Nets must be **re-treated** again after it has been **washed three times**. Or, at least once a year even if it is not washed, preferably just before the rainy season. Nets may be treated twice a year in areas that have a lot of mosquitoes all year long.

Remember:

- **Use the insecticide-treated net every night, all year round, even if mosquitoes are not seen/heard.**
- **Preferably, everyone should sleep under a treated mosquito net. Or, at least pregnant women and children under five years must sleep under treated net.**
- **Insecticides used for mosquito nets are not harmful to people, if used correctly.**
  Direct skin contact with the insecticide on a still wet net may cause a tingling sensation on the skin. This is not harmful, even for small children.
- **After treatment, the net may smell of insecticide. This will go away in a few days and is not harmful to people who sleep under the net.**

Characteristic and Logistics of LLINs

As shown in the Table below, LLINs have different weight and volume characteristics.

Table . Characteristics of LLINs relevant to logistics

Characteristics	Multifilament polyester LLIN (deltamethrin-coated)	Monofilament polyethylene LLIN (permethrin-incorporated)
Weight per LLIN	440 g	625 g
LLINs per bale	100	40
Weight per bale	42 kg	29 kg
Volume per bale	0.1727–0.1894 m^3	0.127 m^3
LLINs per 40-ft container	36 900	16 800

Those with responsibility for logistics must ensure adequate storage capacity and reliable transport at all levels, as well as precise timing. The planning of logistics must include a detailed budget for all transport and storage needs. Most importantly, logistic mechanisms must ensure adequate *supervision* and *control* of all operations and full *accountability* at every stage. It is recalled that LLINs are saleable; their diversion could have extremely deleterious effects on the NVBDCP at all levels.

Storage

Bales of LLINs are well and securely packed; the nets are essentially non-perishable and are usually individually wrapped in sealed plastic bags. Nevertheless, it is important to ensure that warehouses are clean and dry. Shelf-life should be ascertained from the manufacturer.

Bales are relatively easy to handle, being light enough to be moved manually. The principal concern in their storage is thus one of volume rather than weight. The very large volumes involved make it critical that there is adequate storage capacity at all levels.

The tightly packed and tied bales can be stacked several layers high (up to a height of 5 m) without any damage to the bottom layers. In theory, 5.8 bales of polyester LLINs occupy a volume of 1 m^3; in practice, 4 bales/m^3 is a reasonable working figure. Thus, if a warehouse space is 10 m x 20 m with a storage height of 3 m, available volume is 600 m^3, which would accommodate 600 x 4 = 2400 bales or a total of 240 000 polyester LLINs.

Monofilament polyethylene LLINs can be stored at 6 bales/m^3, so that the same warehouse volume of 600 m3 would accommodate 3600 bales or 144 000 LLINs of this type.

Storage space can often be rented, but rental costs would then have to be weighed against the possibly greater cost of staggered delivery.

Stock management is relatively simple because LLINs are well packed and do not deteriorate physically. Stock management should be based on the “first in, first out” rule, making a methodical approach particularly important when containers are off-loaded in a large warehouse. Bales must be stacked in the same way throughout the operation, to create equal piles each identified by a bin card. Bales must be carefully counted by at least two individuals during off-loading of the containers; this provides a double-check of the quantities indicated on the bills of lading.

Transport

Although LLINs are usually individually wrapped and bales robustly packaged, every transport vehicle must be equipped as a minimum with a tarpaulin for the protection of its loads.

As for storage, the principal consideration in the transport of LLINs is one of volume rather than weight. Travelling on good roads, a typical 25-ton semi-trailer truck can carry the equivalent of the contents of a 40-foot container; correctly loaded, an 8-ton truck can carry 140 bales.

Onward transport of LLINs from district level storage to health facilities could be done, if needed, by the vehicles normally used to carry medicines, vaccines and other supplies within the district – most often bicycles and motorcycles. Initial experiences in some countries indicate that it is possible to transport 4–6 LLINs on a bicycle and 10 on a motorcycle, in addition to a vaccine carrier. Weight of one LLIN = 650 g approximately.

Assumptions for carrying capacity:

- one person with bicycle and vaccine carrier can carry 4–6 LLINs weighing 2.6–4.0 kg depending on various factors.
- one person with motorcycle and vaccine carrier can carry 10 LLINs weighing 6.5 kg
- a 4 x 4 vehicle with mobile team members and vaccines and equipment can carry 150 LLINs weighing 97.5 kg.

A. Technique of Preparation of Blood Smear

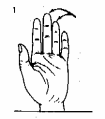
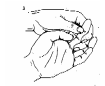
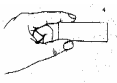
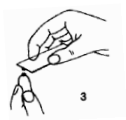
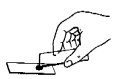
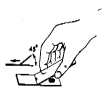
For preparation of blood smears following items are required:

1. Clean glass slides
2. Disposable Lancet
3. Spirit or Cotton swab for cleaning the finger
4. Cotton
5. Clean piece of cotton cloth
6. Lead pencil

After the patient information has been recorded on the appropriate form, the blood films are made as under:

- Take a clean glass slide free from grease and scratches
- Clean the finger of the patient using a spirit swab

Follow the following steps for preparation of the blood smear:

	i. Select the second or third finger of the left hand
	ii. The site of the puncture is the side of the ball of the finger, not too close to the nail bed
	iii. Allow the blood come up automatically. Do not squeeze the finger.
	iv. Hold the slide by its edges
	v. The size of the blood drop is controlled better if the finger touches the slides from below
	vi. Touch the drop of blood with a clean slide, three drops are collected for preparing the thick smear.
	vii. Touch another new drop of blood with the edge of a clean slide for preparing the thin smear.
	viii. Spread the drop of blood with the corner of another slide to make a circle or a square about 1 cm
	ix. Bring the edge of the slide carrying the second drop of blood to the surface of the first slide, wait until the blood spreads along the whole edge

	x. Holding it at an angle of about 45^{o} push it forward with rapid but not too brisk movement
	xi. Write with a pencil the slide number on the thin film, Wait until the thick film is dry

The **thin film** is always used as a label to identify the patient.

REMEMBER

- The blood should not be excessively stirred. Spread gently in circular or rectangular form with 3 to 6 movements.
- The circular thick film should be about 1 cm (1/5 inch) in diameter.
- Allow the thick film to dry with the slide in the flat, level position protected from flies, dust and extensive heat.
- Label the dry thin film with a soft lead pencil by writing in the thicker portion of the film the blood slide number and date of collection

The lancet, cotton swab should be disposed off as per Standard Hospital waste management policy. The Standard Operating rocedures of NACO on laboratory work and Universal Precautions for blood collection are to be followed. Traditionally non-disposable Hagedorn needles were used in the programme, requiring sterilization after each use. These should be discontinued and replaced by disposable lancets.

B. Technique for performing rapid diagnostic test

MATERIALS IN THE RAPID DIAGNOSTIC TEST KIT

1. Spirit (alcohol) swab (one for each patient)
2. Disposable Lancet (one for each patient)
3. Capillary tube (one for each patient)
3. Test strip (one for each patient)
4. One multiple well plastic plate
5. Test tube (one for each patient)
6. Buffer solution or reagent solution
7. Desiccant

PROCEDURE

- Check that the test kit is within its expiry date. If not discard it. Read the instructions of the test kit, as there may be minor variations in the procedure between different kits. Place a small box, jar or bottle for trash next to the kit.
- Open a foil pouch and check that the desiccant inside it is still blue. If not, discard the test.
- Remove the test strip and the small glass tube or loop from the foil pouch and place them on a clean dry surface.
- Take out the buffer solution and the dropper. Place a new test tube in the multiple well plate.
- Clean a finger with the swab and let the skin dry completely in the air. Prick finger on the side with a lancet. Place lancet in trash container. Let a drop of blood come out on the skin.

- Touch the tip of the glass tube or the loop to the blood drop on the finger and let a small quantity of blood (a small drop) come up in the tube or the loop.
- Touch the tube or the loop to the test strip just below the arrow mark to place the blood there. If there is a paper, where Plasmodium falciparum is written, remove it and place the blood, where it was. Place tube/loop in trash container.
- Using the dropper, place 4 drops of buffer solution into a new test tube. After this, place the test strip containing blood in the buffer solution with the arrow pointing down. While waiting, a slide can be prepared.
- Observe after 15 minutes – if any red line does not appear in the test strip then the test strip is not working: discard it and use another one.
- If a single red line appears, it is not falciparum malaria. If two red lines appear, the test result is falciparum malaria.
- The test should be read 15 to 20 minutes after blood was taken. Earlier or later readings may lead to false results.
- Place test strip and test tube in trash container. Make sure this container is kept out of reach of children. When it is full, if in a village, bury it in the ground, or send it with the MPHW to the PHC for safe disposal.

QUALITY ASSURANCE OF LABORATORY DIAGNOSIS OF MALARIA BY MICROSCOPY AND RAPID DIAGNOSTIC TESTS

Introduction

Early laboratory diagnosis of malaria greatly facilitates the management of the disease by confirming the clinical diagnosis. Under the National Vector Borne Disease Control Programme (NVBDCP) both microscopy and Rapid Diagnostic Tests (RDT) are used for diagnosis of malaria. Microscopy is a reasonably affordable, sensitive and specific technique. Microscopic examination of blood smears stained with JSB stain (and /or Giemsa, Leishman), continues to be the method of choice-the "Gold Standard", for confirming the clinical diagnosis of malaria. It not only allows the differentiation of *Plasmodium* species but also provides an estimate of the parasite load i.e. number of parasites per micro liter of blood. With the advent and spread of antimalarial drug resistance, particularly of multidrug resistant *P. falciparum*, the need and the importance of accurate microscopic diagnosis has been felt more acutely. Though microscopy is the main tool and **"**A Gold Standard**"** but has got its limitations.

RDTs have been introduced under NVBDCP in endemic areas which are inaccessible or where microscopic facilities are either poor or lacking (due to operational reasons). These are relatively easy to perform. The detection of parasite's antigen is an evidence of a current or recent infection. These RDTs provide quick results, require less skilled persons as compared to microscopic diagnosis and do not require electricity or any equipment. RDTs are based on the principle of immunochromatography, require finger prick blood and detect malaria specific antigen. Three different RDTs are available commercially, one of them is specific for detecting Pf antigen and the other two detect one or more of the three malaria species prevalent in India. Currently under the programme only RDTs for Pf is being used.

Like other diagnostic tests, various conditions of manufacture, transport, storage and the method of use may impair the accuracy of RDTs. Hence, irrespective of the technique employed, establishment and maintenance of a reliable diagnostic service depends on operational feasibility of the test, availability of adequate trained personnel, equipment and laboratory management systems at all levels. Quality Assurance and adequate monitoring of laboratory services at the peripheral level have been perceived as one of the important but weak components under NVBDCP which needs to be strengthened.

Quality Assurance (QA) and adequate monitoring of laboratory services at the peripheral level have been perceived as important but weak component in the programme. Therefore, it is essential to build and incorporate a sustainable Quality Assurance Programme under NVBDCP.

Quality Assurance

Definition: Quality Assurance (QA) is a wide ranging concept covering all components that individually or collectively influence the quality of a product. It is the totality of the arrangements made with the objective to ensure that the product is of the required quality for its intended use. It denotes a system for continuously improving reliability, efficiency and utilization of products and services. The activities encompass all those factors in any health care organization that are concerned with inputs, processes and outcomes of the health care system.

A QA programme (QAP) deals with the dynamic ongoing process of monitoring the diagnostic laboratory's testing system for reproducibility in order to permit corrective action when established criteria are not met. This includes sampling specifications, testing methods, reporting and documentation for procedures ensuring that the necessary and relevant steps have been taken for quality services.

Objectives : The objectives of QAP are to

- assess the quality of the specimen/sample collection and processing.
- document the validity of the test methods
- monitor reagents, stains, equipment, the performance of test procedures and personnel

- review test results of microscopy
- provide feedback for corrective action

This can however be attained only by active participation of everyone working in the system.

Following are the components of a QA programme:

- adhering to Standard Operating Procedures
- ensuring correct methods of specimen/sample collection
- ensuring quality of reagents used and calibration of equipment
- performing the tests with proper precision and accuracy
- interpreting of the results correctly
- monitoring and evaluation
- coordinating and supervising
- adequate training and re-training (experienced personnel)
- giving timely feedback
- detecting errors in the techniques and taking corrective steps
- documenting procedures, results, etc.

Main components

A QA programme has two important parts: Internal quality control (IQC)and External quality assessment (EQAS) . Differences between these two are as follows:

Salient points	**Internal quality control (IQC)**	**External quality assessment (EQAS)**
Nature	Concurrent and continuous	Retrospective /prospective and periodic
Objective	Provide reliable result on day to day basis	Ensure inter-laboratory comparability and assesses proficiency of participating lab.
Performed by	Laboratory staff	Independent agency

Current status of QA of Microscopy

There has been a well established programme for cross verification of the laboratory results of microscopy under Dte. of NVBDCP, wherein all the blood smears found positive at the Primary Health Centres (PHC) or other peripheral laboratories are supposed to be cross-checked for parasite species and stage by the Regional Office of Health & Family Welfare (ROH&FW), Govt. of India and State Headquarter laboratories. The negative slides are also cross checked as well. All positives and 10% of all negative blood smears examined at PHC/ Malaria Clinic would be cross-checked.

The PHC/ malaria clinic laboratory technician is supposed to collect all negative slides examined during the previous month with number ending with the code digit and dispatch to the concerned cross-checking laboratory by 10th of every month. All positive blood smears are cross checked in the Regional Office of Health & Family Welfare (ROH&FW), Govt. of India and State Headquarter laboratories. Depending on the workload, it is shared 50:50 between these laboratories. The negative slides are distributed between state/zonal and ROH&FW laboratories, at the ratio of 8.5: 1.5 between former and latter. Instructions are issued to the PHC/malaria clinic laboratory to preserve the rest of the slides, until the cross-checking results are received back.

The results of cross-checking were to be sent to the concerned laboratory by the 10th of the succeeding month. In case of high discrepancy rate i.e., 2% or above, the state programme officer and Regional Director of each ROH & FW was to take the needful remedial action like supervision of the concerned laboratory reporting high discrepancy rate.

Current Status of QAP for malaria RDTs

During the past one decade number of RDTs for malaria diagnosis have been developed, evaluated and validated for improved sensitivity and specificity. These RDTs are based on the principle of immunochromatography, require finger prick blood and detect malaria specific antigen. It can detect malaria parasite antigens in lysed blood by absorbent using monoclonal antibodies.

RDTs are relatively easy to perform. The detection of parasite's antigen is an evidence of a current or recent infection. There is therefore, a distinct advantage in using a technique which determines whether antigens are present in a person's blood or not. RDTs have been introduced under NVBDCP in endemic areas which are inaccessible or where microscopic facilities are either poor or lacking (due to operational reasons) and grass roots level workers are expected to perform these tests.

RDT being a recent entry into the programme has no QA programme at present.

Need for strengthening the QAP

Over the years, the QA of malaria microscopy in the form of regular cross-checking of examined blood smears could not be sustained upto the desired extent due to various operational and technical reasons. One of the main reasons was/is vacant posts of laboratory technicians at each level that is at PHCs, malaria clinics, at State/Zone and ROH & FW. Besides, the quantity of the negative slides (10%) is too high.

As mentioned above RDTs are mostly used by semi skilled persons in the peripheral areas. Sometimes, they may not be exactly following the guidelines for storage of the kits. Moreover, the climatic conditions like temperature may also play a vital role in deterioration of the RDT quality in the filed. Besides, sensitivity of malaria RDTs is dependent on several factors, including the rate of flow of blood upto the nitrocellulose strip, the adherence of antibody (Ab) to the strip, ability of the Ab to bind antigen (Ag) and the integrity of the Ab-dye conjugate. All these factors are subject to deterioration in adverse transport and storage conditions.

Large nos of RDTs are procured every year for use for the remote and in-accessible endemic areas where microscopy is unavailable and the quantity is increasing every year.

Moreover, published trials and experience in various countries have demonstrated a wide variability in the sensitivity of malaria RDTs, both within and between product trials. Sensitivity is particularly variable at lower parasite densities.

In view of the above as well as due to increasing trend of *P. falciparum* cases, emergence of newer foci of drug resistance and high mortality due to malaria, an urgent need has been felt to revitalize the QA component of the laboratory services provided by microscopy and also to develop, implement and establish a quality assurance programme for rapid diagnostic tests as an integrated part of malaria control under NVBDCP.

Proposed Quality Assurance under NVBDCP

As a first step to achieve this goal, the development of Standard Operating Procedures (SOPs) was felt imperative and two SOPs have been developed. For a sustainable and fool proof implementation of Quality Assurance Programme NVBDCP has networked the laboratories involving Apex Institutes, Medical Colleges, Regional and State Referral Laboratories, ROH&FW and ZMOs. NVBDCP will act as the Nodal Agency and has identified National Institute of Malaria Research (NIMR) as National Reference Laboratory for Quality Assurance for malaria diagnosis both by microscopy and RDT which are described in the third manual. Another user friendly hand book for use by the laboratory technicians including trouble shooting guidelines has also been developed to ensure the quality diagnosis. Following SOPs and manuals have since been developed:

1. Manual on Quality Assurance of Laboratory Diagnosis of Malaria by Microscopy - *Guidelines for Standard Operating Procedures*

2. Manual on Quality Assurance of Laboratory Diagnosis of Malaria by Rapid Diagnostic Tests - *Guidelines for Standard Operating Procedures*
3. *Manual on Quality Assurance of Laboratory Diagnosis of Malaria : Networking of Laboratories*
4. *Laboratory Diagnosis of Malaria: Operational Guidelines for Laboratory Technicians.*

Both the SOPs (1 & 2) have already been field tested and approved by DGHS for implementation at the periphery.

Standard operating procedures

The Standard Operating Procedure (SOP) is the most important document in a laboratory. It describes in detail the complete procedure for performing tests and ensures that consistent and reproducible results are generated. The instructions given in a SOP must be strictly adhered to by all those who are related with the functioning of the laboratory.

1 QAP of Malaria Microscopy

Microscopy is the most widely used diagnostic test in India, since the inception of a structured malaria control programme in our country. It is till today the "Gold Standard" for laboratory diagnosis, yet it does have some disadvantages, the most important being the subjectivity in interpretation of the result by the examiner. Human factors as well as reagents and equipment affect the sensitivity and specificity of malaria microscopy. The new QAP includes both internal quality control and external quality assurance. For details kindly refer manual 1.

A Internal Quality Control (IQC): it describes all the activities taken by a laboratory to monitor each stage of a test procedure to ensure that microscopic examinations are performed correctly that is accurately and precisely which are as follows:

- all testing laboratories adhere to IQC procedures with strict control of techniques (slide preparation, staining, examination etc) and equipment (microscope, micro-slides, pricking needles etc) as per the National SOP to ensure reproducibility and sensitivity of detection.
- periodic training and retraining of microscopists/laboratory staff are ensured.
- availability of equipment in functioning state and good quality stains/kits are ensured.
- the quality of each prepared slide is assessed at the time of microscopic examination. Whenever possible, any slide that is inadequately spread should be prepared again until a slide of an acceptable standard is produced.
- with a multitude of steps involved in processing of a specimen, errors can occur at any stage. Laboratory management needs to be aware where errors can happen to reduce the possibility of their occurrence and monitoring all stages from the preparation through the examination up to the results. Reference slides and coloured charts supplied by Dte of NVBDCP should be followed.
- frequency and magnitude of incorrect results may be determined by independent cross-checking of the results of a proportion of the routine slides by some senior staff in the laboratory, if present.
- troubleshooting guides for equipment, reagents and methods would be useful additions to the more isolated laboratories where instant help is not available.
- work station should be clean and with sufficient light. Ensure availability of water.
- proper and correct documentation, timely report.
- the Coordinator of each malaria Reference Laboratory at national/ regional/state level must ensure systematic compliance with the norms for IQC. In peripheral laboratories (PHC/CHC), the MO I/c / LT must assume this responsibility.

B External Quality Assurance schemes (EQAS): involves specimens, of known but undisclosed content being introduced into the laboratory by designated "Apex/Reference" laboratory and examined by the staff of participating laboratory/ies using the same procedures as used for routine/normal specimens of the same type. This method checks the accuracy of the test results produced by the participating laboratories.

In the present QAP, EQAS includes cross checking of the examined slides and performance evaluation (Proficiency testing) of the laboratory technicians working in the peripheral laboratories by coded panel slides.

i) EQAS of the slides examined in the field

The cross checking of examine slides would now carried out by NRL (NIMR) and its field stations, ROH & FWs, GoI and cross checking laboratories of respective states. States where ZMOs are functional, they will carry out the cross checking activity as per new guidelines.

To assure the quality of microscopy, the DMOs will collect **all positive and 5% negative** slides from PHCs/CHCs and send them to the SRLs. To get 5% negative slides, a random number will be given every month, and every twentieth slide will be sent. In case a positive slide falls among these numbers, next slide would be sent. This exercise would be done every three months.

The SRLs would in turn send 20% of the referred positive and 5% of the referred negative slides to the National Reference Laboratory (NIMR). The feedback of results would be sent promptly to the linked laboratory in order to take corrective action.

ii) Proficiency testing

This will be carried out through analysis of known but coded panel slides (high quality stained blood slides), representing all the species present in the region, different parasite densities, mixed infections and also negative slides. The NRL will prepare these according to standardized procedures and will send them for a fixed number of times per year, (not less than twice a year), to each participating laboratory where microscopists are to be assessed. These slides are examined by the same staff using the same procedures as normal specimens of the same type. The results of these tests will be dispatched to the National Reference Centre/ Institution concerned, within a specified time, for comparison with the national identities of each slide after decoding. Results from a laboratory might be highly reproducible but consistently incorrect. This method checks the accuracy of the test results. Feed back are to be sent promptly to correct the results.

Slide banks of unimpeachable quality with their content validated at NIMR would be utilized for training as well as for support assessment of microscopists. Such coded slides prepared according to SOPs, would be acquired by NIMR through its field stations, as they have access to the required range of *Plasmodium* species. NIMR should also be capable of providing coded and matching negative slides to make standardized and high-quality slide sets that can be used for EQAS. These slides must be cross-checked to ensure the accuracy of the original diagnosis. It should contain the slides of all the three human species of malaria parasites *Pf, Pv, Pm* (prevalent in India) in thick and thin smears with different parasiteamia level, including rare forms of Pf, mixed infections and negative slides as well.

iii) Proposed QAP for RDT

As mentioned under the NVBDCP, mainstay of malaria diagnosis has been microscopy. However, in recent years, for the remote and in-accessible areas where microscopy is unavailable, RDTs are being used. These are mostly used by semi skilled persons in the peripheral areas. Sometimes, they may not be exactly following the guidelines for storage of the kits. Moreover, the climatic conditions like temperature may also play a vital role in deterioration of the RDT quality in the filed.

NVBDCP guidelines are 95% sensitivity at 200 parasites/μl as a reasonable target for RDT performance. Therefore, it is important to determine the sensitivity & specificity under field conditions and to monitor any deterioration over the time. On the other hand for procurement of new RDTs for use in the programme it is of paramount importance to assess the post dispatch (post purchase) quality. Normally pre-purchase QA is mandatory for procurement of RDT under NVBDCP.

Post dispatch QA will be carried out after receiving the RDTs at the district by the DMO. Before dispatching the RDTs to the periphery, samples will be taken out randomly, and sent to the designated SRL/RRL. Thereafter randomly 7 RDTs will be collected at the interval of 3 months till the date of expiry. Like microscopy the QA of RDT also includes both internal quality control and external quality assurance. For details kindly refer manual 2.

C Internal Quality Control (IQC)

The Internal Quality Control starts with proper shipment and storage of the kits/samples. The DMOs should ensure that the consignee lists are prepared before shipment. The principle of first-expiry-first-out should be followed in utilizing the kits. RDTs supplied by NVBDCP though stable at temperatures up to 40ºC, should however be kept in a cool, dry place away from direct sunlight. Care should be taken that the kits are at a considerable height from the ground away from dampness. The storage should be protected from rodents, fire, water and high temperature. IQC should be a part of training of ASHA, MPWs and ensure its adherence during supervisory visits by health supervisors, MTS, DMO.

i) External Quality Assurance (EQA)

An important component of the EQA scheme is the development and use of Quality Control (QC) panel to test the threshold sensitivity of RDTs to determine if deterioration of RDTs has occurred. The method followed to develop QC panel is preparation of antigen-based or parasite-based samples. Malaria parasites with parasite density sufficiently high are used for preparation of QC panel for testing malaria RDTs. Malaria RDTs are designed for use with fresh human blood. QC samples should therefore mimic fresh blood infected with wild parasites as closely as possible.

QAP for malaria RDTs also aims to ensure high accuracy of tests in the hands of end-users. Besides quality, this programme also aims to monitor technical standards of the RDTs and processes to minimize environmental impacts.

ii) Lot/batch Testing of RDT kits using QC samples

The sensitivity of malaria RDTs is dependent on several factors and these factors are subject to deterioration in adverse transport and storage conditions. The rates of deterioration and their effect can vary between products. Hence, it is essential to assess the quality of the RDTs at periodical intervals with known low and high positive samples. This would be achieved by lot and batch testing of the procured kits.
From each RDT lot, 13 kits would be drawn and tested using positive (low and high parasitaemias) and negative controls for immediate QC. For long term quality assurance, 28 kits would be drawn in four lots depending on the expiry date of the kit (e.g. if expiry date is around one year, seven kits would be drawn every 3 months). For this, Manual for Quality Assurance of Malaria Diagnostic Tests by the NVBDCP would be strictly followed. The tests would be carried out at the in the designated laboratories. At the periphery, DMOs would collect and send 13 randomly selected kits to the linked SRLs for QA testing.

iii) EQA of the RDTs used by health workers at periphery

The Once RDTs are supplied to the states; a sample would be drawn and tested for its quality from various levels. The District Malaria Officers would collect RDT samples from the periphery and send the same to SRL. Few kits would also undergo a temperature sensitivity test.

The District Malaria Officer would monitor the process of QA at peripheral levels i.e. at the lever of ASHA and health workers apart from PHCs/CHCs to determine any deterioration in the kit. Both immediate and long term QA will be performed with the RDT kits supplied to the periphery. It will be the responsibility of the DMO to pick up 2 samples of different sources to check the sensitivity and specificity of RDTs on quarterly basis by selecting the villages randomly.

The DMO would collect information on lot number and batch number of the consignment at the time of distribution. He would retain randomly 14 kits out of the entire lot to send seven of them to the SRL. After 3 months randomly he would select some PHCs, out of which from one sub center he would pick up one RDT. The process would be repeated to collect total seven RDTs from different sub centers after every

three months. The next batch of seven RDTs would be collected from different centers at an interval of 3 months. The process of QA will be continued till the expiry period as mentioned on the kits by the manufacturer. (e.g. if expiry date is 12 months from the date of manufacturing and consignment is received after 3 months, than on receipt the 1st round of QA, thereafter 2nd, 3rd and 4th round should be carried out. The Vector Borne Diseases Consultants and Malaria Technical Supervisors will also be actively engaged in the QA programme.

ASHA and other end users of RDT shall be making blood smears of all samples whether RDT is positive for Pf or not. The negative smears are to be send for laboratory for confirmation of other than falciparum infection (Pv). After the tests used RDT (positive or negative) and the blood slide of the RDT positive should be marked and store for QA. The slides of all positive and 5% negative samples by RDT would also be collected and sent to the District Malaria Officer; who in turn would send them to designated laboratory SRL for cross check.

iv) EQAs in referral laboratories by coded QC samples

Coded panel samples will be sent to all the RRLs and SRLs for testing twice every year. International shipping norms would be followed while shipping the samples for testing. The linked laboratories will be required to send back the results to the linked laboratory within one month of receiving the sample. The results will be matched at the referral laboratory and corrective measures adopted. Proper documentation of the test results will be ensured.

D Results

- the results of cross-checking by the Reference Laboratories in the prescribed format should be sent to the concerned DMOs by the 15th of the succeeding month with a copy to the state and Dte. of NVDBCP. Dte. of NVBDCP envisages use of NAMMIS for transmission of cross-checking of results as well.
- the district would pass on the results to the PHCs during the monthly review meeting which is held in each district every month.
- the states would compile the data of each district and send to the Dte. of NVBDCP.
- in case of high discrepancy rate i.e., 2% or above, the cross-checking laboratories would take the needful remedial action as per SOP.
- there will be supervision of the concerned laboratory to find the condition of the microscope and to provide hands on training to the concerned LT (s).
- results of QA of will also follow the similar route.
- remedial actions would be taken in consultation with the state programme officer.

E Reporting

Dte. of NVBDCP envisages that all the documents of QA testing would be completed within the same day and the report would be sent to the NVBDCP and NIMR within 48 hours of the test. The data and documents are to be maintained preferably in the electronic format.

F Supervision

NVBDCP would actively monitor and supervise the activities in the field and laboratory. Officers and staff from the headquarters would visit the field areas for training, supervision. Officers from NIMR and ROHFW also make supervisory visit and undertake necessary corrective measures . State Programme Officers, DMOs, VBD consultants, MTS would also be actively involved in the activity and will serve as a link between National Referral Centre, concerned State Referral Centre and periphery.

G Bio-safety aspects

Bio-safety is a key component of total quality control programme. There is definitely a potential risk of infection to Health care workers (HCWs), who provide direct or indirect health care to people or handle samples (blood) and thus continuously come in contact with pathogenic organisms, They also handle infected waste and transport potentially infected specimens. Therefore all biosafety measures should be

ensured as per guidelines and HCWs must take all precautionary measures to protect themselves from accidental injury, while handling the blood (standard work precautions) and patients must also be protected from infection. RDTs are biological component; it also needs special disposal. For this the guidelines for segregation and disposal of waste would be followed.

H Training

Training will be provided to the officials of the District State and ROH&FW involved malaria programme control and also to the identified laboratory personnel involved under QA network. Training will include both Internal Quality Control and External Quality Assurance Scheme including programme implementation, supervision and monitoring. Emphasis would be given on Good Clinical and Laboratory Practices, Hospital / Laboratory Waste Management, Universal Safety Precautions, and various aspects of Quality Assurance of Rapid Diagnostic Tests. For laboratory technicians special trainings for orientation on QA procedures and remedial trainings are designed. The NVBDCP manuals will be followed and distributed for this purpose so as to maintain uniformity.

I Roles and responsibilities

Directorate of NVBDCP would be the nodal agency for the QA programme on laboratory diagnosis of malaria. It would be the focal point for national and international contacts regarding any issue related to the National malaria QA programme. Initially the QAP programme would implementing in the endemic areas by NIMR which will than be handed over to the States to carry out as an integral component of malaria control. The National Institute of Malaria Research (NIMR), Delhi, National Reference Laboratory would act as the National Reference Laboratory and provide technical support to the national QA programme, as per the criteria laid down by the Dte. of NVBDCP.

For details of the responsibilities of programme managers at regional, state and district level refer the SOPs.

Note: Whole concept of QA is a team work and if one member of the team does not adhere to the SOPs the entire system will collapse. Therefore, it is essential that Regional Directors, SPOs, ZMOs, DMOs, VBD Consultants and MTS are well conversed with the procedures and NVBDCP guidelines on QA.

*****

ASSESSMENT OF LOGISTICS REQUIREMENT

Norms for calculation of Anti-malarials

The norms for calculation of Anti-malarial drugs to avoid stock-outs even in the circumstances like unforeseen outbreaks and procurement delays are as follows:

1. The data of positive malaria cases of the last completed year is taken as basis for calculation.
2. 25% additional quantity is to be taken as buffer on the technical requirement.
3. In declining trend of malaria cases, the chance of outbreak is always there. Therefore the maximum possible deviation may be up to maximum number of cases reported in any of the years during the decade may be considered. This figure should also be considered for calculation of requirements of anti-malaria's. For 2006 (as base year), maximum cases reported in 1997 are taken, which is 40% more than 2006. This factor is also considered especially when under reporting is known.

Chloroquine:

The presumptive treatment of fever cases with 4 chloroquine tablets, is being phased out however, in the existing health system the requirement for treatment of clinical malaria with full dose may remain up to 50% of blood slide collected (delayed report). Thus requirement of Choloroquine has to be worked adopting following norms.

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

This amount will also take care of confirmed P. vivax and, in remote and inaccessible areas where treatment after diagnosis is not possible within prescribed time.

Requirement of Choloroquine for treatment of clinical malaria would be reduced to < 25 % of blood slide collected, when multivalent (bivalent) RDT is introduced in the programme. After few years when case detection facilities are enhanced inclusive of RDT and laboratory facilities then just technical requirement and buffer stock will suffice the need.

Primaquine:

Primaquine is contraindicated in infants and pregnant women. As per national drug policy for treatment of malaria cases 2008, Pv. cases should be given radical treatment primaquine . In general for easy dose adjustment 2.5 mg strength tablets should be kept for pediatric Pv. cases and for adult Pv. cases and all Pf cases 7.5 mg strength tablets should be used. The dose for Pv. case is 0.25mg per Kg. body weight and for Pf. cases 0.75 mg per kg body weight .

Primaquine 2.5 mg tablets are used ***for children*** 1 to 14 year old constituting about 30% of P. vivax cases. The dose of Primaquine is 0.25 mg per Kg body weight. The average no. of tablets comes to 4 per child per day for 14 days and, therefore:

For Pediatric Pv. Cases : Requirement of Primaquine tablets in numbers = (Total No. of P. vivax cases x 30% x 4 x 14) + 25% buffer .

Primaquine 7.5 mg

The Primaquine 7.5mg is required to be given to adult Pv.patients which constitutes around 70% of Pv cases, adult and pediatric Pf. Cases

i. Requirement of Primaquine tablets for adult Pv. cases in numbers = (No. of P.vivax cases x 70% x 2 x 14) + 25% buffer .
ii. Requirement of Primaquine tablets for adult Pf. cases in numbers = (No. of Pf. case cases x 70% x 6) + 25% buffer .
iii. Requirement of Primaquine tablets for pediatric Pf. cases in numbers = (No. of Pf. case cases x 30% x 4) + 25% buffer

Total requirement of primaquine tabs 7.5 mg tablets in no. = i +ii +iii

ACT Combi Pack :

As per National Drug Policy 2008, ACT is to be rolled out in entire 117 identified districts and 258 PHC either chloroquine resistance or surrounding cluster block PHCs.

A.ACT for adult Patient:-

There are various no / types of outlets for treatment which includes ASHA at village level, Sub-centre, PHCs, CHC and hospital. To ensure no stock out of this important drug, some deployment reserve is essential and the estimated norms of deployment reserve are:

- ASHA will keep 2 dosage for each age group,
- Sub centre will keep 3 dosage for each of pediatric age group & 6 dosage for adult
- PHC will keep 10 dosage for each of pediatric age group & 25 dosage for adult and
- CHC will keep 15 dosage for each of pediatric age group and 50 dosage for adult.
- *At the District and State level stock for replenishing will be kept on the basis of total Pf cases expected to be treated in a year which will include blisters of all age group in a proportion Adult 60% of total and pediatric age group 40% 0f total and among Pediatric Age group under 1 yrs = 10% , 1 to 4 year =22% , 5 to 8 year = 30% and 9 to 14 Years = 38% Plus 25% as buffer for each of the age group to meet requirement for exigency and requirement for other CQ resistant district / States*

B.ACT for adult Patients:-

60% of Pf cases are adults. A blister contains 3 tablets of Sulpha Pyremethamine (SP) and 12 tablets of Artesunate. The pack is to be given to the confirmed Pf cases, especially in high Pf and chloroquine resistance areas and therefore:

Technical Requirement of ACT blister packs for treating Pf cases (in nos.) = (No. of Pf Cases x 60% x 1) + 25% buffer .

Net total requirement will be technical requirement plus deployment reserve as mentioned above.

C.ACT Combi Pack for pediatric patients:

40% of Pf cases are pediatric. The ACT combi tablet are to be given to confirmed Pf cases only. From 2009-10 onwards combi blister packs of Artesunate and sulfa Pyrimethamine for each of pediatric age group will be procured and **no loose** tablets of Artesunate and sulfa Pyrimethamine will be procured.. The technical requirement for each age group are as under;..

- Technical requirement of ACT combi pack for under 1 year (in nos.) = (No. of Pf Cases x .04) + 25% buffer
- Technical requirement of ACT combi pack for 1 – 4 years (in nos.) = (No. of Pf Cases x .09) + 25% buffer
- Technical requirement of ACT combi pack for under 5- 8 year (in nos.) = (No. of Pf Cases x .13) + 25% buffer
- Technical requirement of ACT combi pack for under 9-14 year (in nos.) = (No. of Pf Cases x .15) + 25% buffer

Total requirement of CAT would be A+B+C

Net requirement for each of the age group will be technical requirement plus deployment reserve as mentioned below. The deployment reserve will be almost same for each of the age group

To ensure no stock out at each level the expiry of ACT at various levels is inevitable as the shelf life of ACT is only 2 years and effective shelf life after reaching periphery would be one and a half year only.

Quinine Injection and Arte-ether Injection:

These injections are required for treatment of severe and complicated Pf cases. It is assumed that in the prevailing infrastructure in high malaria endemic areas, upto 10% of Pf cases may develop severity and complications.

Adults are treated with Arte-ether Injection while children and pregnant women are treated with Quinine injections. Generally, treatment with Quinine injection is required to be given for 3 days till patient is able to take oral treatment. The patient is given Quinine Sulphate tablets during the remaining 7 days. Average 10 injections of quinine and 30 tablets of quinine sulphate are required for one patient.

Requirement of Arteether Injection (in nos.) = (No. of Pf cases x 60% x 10% x 3)+ 25% buffer

Requirement of Quinine Injection (in nos.) = (No. of Pf cases x 40% x 10% x 10) + 25% buffer

Requirement of Quinine sulphate Tablets (in nos.) = (No. of Pf cases x 40% x 10% x 30)+ 25% buffer

Requirement of RD Kits:

RD Kits are to be used in remote, inaccessible and Pf predominant areas where laboratory facilities are not readily available. Around 100 million blood slides are collected in the country of which 40% are from high Pf endemic areas. Out of it around 40% are from remote inaccessible areas. The programme is endeavoring to train ASHAs in the use of RD Kits and administration of malaria drugs. RDK use is to be scaled up along with the training of ASHAs. Once the trained ASHAs are deployed in these areas, around 16 million RD Kits would be required for the country When multivalent RDT is introduced in the programme then this requirement may go up to 40 million and blood slide collection and examination will also be reduced by similar numbers which enable in improving quality of slide examination. At present state may follow following steps for working out requiring of RDT for pf. Case detection.

i. Total blood slide collected from PHCs with > 3 API and >30% Pf. Cases
ii. Around 40% of Blood slide collected from such areas will be from remote areas where blood slide result can be available within 24 hours

Total RDT requirement (Test numbers) = Total Blood slide examine (total test preformed i.e, blood slide examine + RDT positive) of PHC having >3 API and >30% Pf. Cases X 40% + 25% buffer

Detailed Planning for Epidemic Containment Measures

A) Mass Survey – Period: Seven Days
Manpower Requirements

$\frac{\text{Population X 2}}{\text{100 x 7}}$	=	No. of persons required for B.S. Collection and administration of presumptive or radical treatment

(It is expected that two member team can collect 100 blood smears per day)

If the mass survey cannot be completed in seven days, it can be extended by another three days. Any further delay will result in extension of epidemic zone and deaths.

B) Material required -
It is assumed that in any epidemic at the most 40% population would be affected.

1. ACT for Adult Population: Adult populationx 0.4(affected population) x 1 blister pack (or 0.6 x total population x 0.4(affected population) x 1 blister pack)
2. ACT for Children: (8 Artesunate tablets + 2 SP tablets) x Child Population x 0.4(affected population)
3. (or 0.4 x total population x 8 for Artesunate, 0.4 x total population x 2 for SP) x 0.4(affected population)

    - For above, consider child population to be 40% and adult population to be 60% of total population of the
    - In the instance of availability of ACT blisters for all age group , calculation of blisters for each group has to be done according to demographic profile for the age groups

4. Chloroquine tabs : Population X 0.4(affected population)X 6
5. Primaquine 7.5 mg base tab : Population x 0.4 x 6
6. Micro- slides/RDTs: Population x 0.4 x 1 (RDT would be 40% of slide
7. Microscopists: $\frac{\text{Population}}{\text{50X7}}$
8. Microscopes: One per microscopist
9. Injection Arteether: Adult Population X 0.4(affected population) 0.1X3
    - It is to be used for adult population only, which is 60% of population. Assume maximum 10 % of affected population(40% of Total population) may develop sever & complication
10. Injection Quinine ampoule : Paediatric Population X 0.1X10
    - It is to be used for paediatric and pregnant population only. Assume maximum 10% of population may develop sever & complication
11. JSB Stain, cotton-wool, alcohol/Savlon, slide boxes, lancets, material for cleaning and packing of slides, stationery, etc. to be procured on ad-hoc basis.
12. Accordingly other supportive materials like IV set , IV fluids etc should be pprovisoned.

C) Proformas for epidemic management

Epidemic Control Proforma - I

List of villages within the Malaria Epidemic Zone

PHC_____

Subcentre _____

Sl. No.	Name of Village	Population	No. of households	No. of fever cases
1	2	3	4	5
1 2 3 4 Cont.				
Total				

Epidemic Control Proforma - II

Proforma For Field Recording Of Survey Data

The M1 format will be utilized for the purpose of recording survey data. This information will also be reflected in the fortnightly case surveillance report in M4.

Epidemic Control Proforma – III

After completion of rapid fever survey or mass survey, the field data of Proforma-II are tabulated in Proforma-III given below for epidemiological evaluation and analysis of the pattern and course of epidemic

Results Of Mass Survey In Epidemic Area

PHC_____ Subcentre_____

S. No.	Name of village	Population					
		<1	1-4	5-8	9-14	15 & above	Total
1	2	3	4	5	6	7	8

Population surveyed Blood smears collected/ RDT performed						Drugs consumed			
<1	1-4	5-8	9-14	15 & above	Total	Chloroquine	ACT	PQ	Paracetamol
9	10	11	12	13	14	15	16	17	18

Positives detected						% of Blood smears collected/ RDTs performed	Positives			
<1	1-4	5-8	9-14	15 & above	Total		Pv	Pf	Mixed	Total
19	20	21	22	23	24	25	26	27	28	29

Remarks
30

D. Anti-vector Measures

a) **Indoor space Spray** – should be started as soon as survey results of a village are available. Do not wait for completion of survey in the entire area. Other villages are included as soon as the survey results are available.

Formulation (vide Annex-2)	
Pyrethrum extract 2%	– Dilute 1 litre with 9 litres of kerosene oil to make 0.1% ready to use spray.
(or any other formulation readily available like 'Finit', 'Hexit' or 'Baygon', etc.)	
Dosage	– 15 to 30 cc to be sprayed in 30 cubic metres of space
Equipment	– Hand operated micro-discharge fogging machine/hand operated atomizers (Flit pump).
Timing	– Preferably evening hours or early morning
Precaution	– Close all doors/windows and other openings before space spray.

b) **Indoor Residual Spray Operations** - Manpower and equipment required for 10 days operation:

i) **No. of spray squads required to cover the area**

Plain Area – No. of human dwellings and mixed dwellings in the villages targeted / 600 = No. of spray squads

(at the rate of 30 houses per pump per day)

Hill Area - – No. of human dwellings and mixed dwellings in the targeted villages / 500 = No. of spray squads

(@ 25 houses per pump per day)
Depending upon terrain

ii) **Field Workers** = No. of Squads x 5
iii) **Superior Field Workers** = No. of Squads x 1
iv) a) **Stirrup Pumps** = No. of Squads x 2
one pump as reserve for 2 squads.
b) **Bucket** 3 gallon capacity = No. of Squads x 4
c) **Bucket** 2 gallon capacity = No. of Squads x 1
d) Soap, straining cloth, nozzle tips, measuring jug, rope, pump repair kit, asbestos thread, washers and plastic sheets.

v) **Insecticide required** should be calculated proportionately for the population affected by epidemic for one round of spray only.
- DDT 50% wp @ 75 MT per million population
- Malathion 25% wp @ 300 MT per million population
- Deltamethrin 2.5% wp @ 30 MT per million population
- Cyfluthrin 10% wp @ 9.38 MT per million population
- Lambdacyhalothrin 10% wp @ 9.38 MT per million population

The insecticide formulations and their dosages for indoor residual spray are given in Annex-1.

.

The spray operations are planned village-wise. A ten day advance spray programme covering all villages in the epidemic zone is chalked out in the proforma prescribed for advance spray programme.

The MPW/Superior Field Worker of the mobile epidemic team will supervise spray and maintain diary to record daily achievement of spray coverage of human dwellings, mixed dwellings and rooms in the villages sprayed. On completion of spray coverage & space spray operations, completion report is prepared for both operations and sent to appropriate authorities. The MO-PHC along with MTS will supervise these operations during their entire course.

Management of severe malaria

Management of severe malaria comprises four main areas: clinical assessment of the patient, specific antimalarial treatment, adjunctive therapy and supportive care.

These guidelines for management of severe malaria are based on WHO Malaria Treatment Guidelines, 2006.

Clinical assessment

Severe malaria is a medical emergency. The airway should be secured in unconscious patients and breathing and circulation assessed. The patient should be weighed or body weight estimated so that drugs, including antimalarials and fluids can be given on a body weight basis. An intravenous cannula should be inserted and immediate measurements of blood glucose (stick test), haematocrit/haemoglobin, parasitaemia and, in adults, renal function should be taken. A detailed clinical examination should be conducted, with particular note of the level of consciousness and record of the coma score. Several coma scores have been advocated. The Glasgow coma scale is suitable for adults, and the simple Blantyre modification or children's Glasgow coma scale are easily performed in children. Unconscious patients should have a lumbar puncture for cerebrospinal fluid analysis to exclude bacterial meningitis. The degree of acidosis is an important determinant of outcome; the plasma bicarbonate or venous lactate level should therefore be measured if possible. If facilities are available, arterial or capillary blood pH and gases should be measured in patients who are unconscious, hyperventilating or in shock. Blood should be taken for cross-match, and (if possible) full blood count, platelet count, clotting studies, blood culture and full biochemistry should be conducted. The assessment of fluid balance is critical in severe malaria. Respiratory distress, in particular with acidotic breathing in severely anaemic children, often indicates hypovolaemia and requires prompt rehydration and, where indicated, blood transfusion.

Specific antimalarial treatment

It is essential that antimalarial treatment in full doses is given as soon as possible in severe malaria. Two classes of drugs are currently available in India for the parenteral treatment of severe malaria: the cinchona alkaloids (quinine and quinidine) and the artemisinin derivatives (artesunate, artemether and arte-ether). Although there are a few areas where chloroquine is still effective, parenteral chloroquine is no longer recommended for the treatment of severe malaria because of widespread resistance. Intramuscular sulfadoxine– pyrimethamine is also not recommended.

Quinine

Quinine treatment for severe malaria was established before modern trial methods were developed. Several salts of quinine have been formulated for parenteral use, but the dihydrochloride is the most widely used. Peak concentrations following intramuscular quinine in severe malaria are similar to those following intravenous infusion. Pharmacokinetic modelling studies suggest thata loading dose of quinine of twice the maintenance dose (i.e. 20 mg salt/kg bw) reduces the time to reach therapeutic plasma concentrations. After the first day of treatment, the total daily maintenance dose of quinine is 30 mg salt/kg bw (usually divided into three equal administrations at 8 h intervals). Rate-controlled i.v. infusion is the preferred route of quinine administration, but if this cannot be given safely, then i.m. injection is a satisfactory alternative.

Artemisinin derivatives

Various artemisinin derivatives have been used in the treatment of severe malaria globally. The pharmacokinetic properties of artesunate are superior to those of artemether as it is water soluble and can be given either by intravenous or intramuscular injection. Randomised trials comparing artesunate and quinine from South-East Asia show clear evidence of benefit with artesunate. In the largest multi-centre trial, which enrolled 1461 patients (including 202 children □15 years old), mortality was reduced

by 34.7% compared to the quinine group. The results of this and smaller trials are consistent and suggest that artesunate is the treatment of choice for adults with severe malaria. There are, however, still insufficient data for children, particularly from high transmission settings to make the same conclusion. An individual patient data meta-analysis of trials comparing artemether and quinine showed no difference in mortality in African children.

National guidelines for specific antimalarial therapy in India are given below:

- **Quinine salt** 20 mg/kg* body weight (bw) on admission (IV infusion or divided IM injection) followed by maintenance dose of 10 mg/kg bw 8 hourly; infusion rate should not exceed 5 mg salt / kg bw per hour.

(*loading dose of Quinine salt i.e 20mg /kg bw on admission may not be given if the patient has already received quinine or if the clinician feels inappropriate).

- **Artesunate:** 2.4 mg/kg bw i.v. or i.m. given on admission (time=0), then at 12 h and 24 h, then once a day.
- **Artemether:** 3.2 mg/kg bw i.m. given on admission then 1.6 mg/kg bw per day.
- **Arteether:** 150 mg daily i.m for 3 days in adults only (not recommended for children).

Follow-on tretment:

A. *The parenteral treatment should be given for minimum of 48 hours and once the patient tolerates oral therapy, quinine 10 mg/kg bw three times a day with doxycycline 100 mg once a day or clindamycin in pregnant women and children under 8 years of age, should be given to complete 7 days of treatment in patients treated with parenteral quinine.*

B. *Full course of ACT should be administered to patients treated with artemisinin derivatives.*

C. *Use of mefloquine alone or in combination with artesunate should be avoided especially in cerebral malaria due to neuropsychiatric complications associated with it.*

Source:National Drug Policy on Malaria(2008), NVBDCP,Delhi

Practical aspects of treatment

Artemisinins

Artesunate is dispensed as a powder of artesunic acid. This is dissolved in sodium bicarbonate (5%) to form sodium artesunate. The solution is then diluted in approximately 5 ml of 5% dextrose and given by intravenous injection or by intramuscular injection to the anterior thigh. The solution should be prepared freshly for each administration and should not be stored. Artemether and Arteether are dispensed dissolved in oil (groundnut, sesame seed) and given by i.m. injection into the anterior thigh.

Quinine

Whereas many antimalarials are prescribed in terms of base, for historical reasons quinine doses are often recommended in terms of salt (usually sulphate for oral use and dihydrochloride for parenteral use). Recommendations for doses of this and other antimalarials should state clearly whether the salt or base is being referred to (doses with different salts must have the same base equivalents). Quinine must

never be given by intravenous injection, as lethal hypotension may result. Quinine dihydrochloride should be given by rate-controlled infusion in saline or dextrose solutions at a rate not exceeding 5 mg salt/kg bwt per hour. If this is not possible then it should be given by intramuscular injection to the anterior thigh, not the buttock (to avoid sciatic nerve injury). The first dose should be split, 10 mg/kg bw to each thigh. Undiluted quinine dihydrochloride at a concentration of 300 mg/ml is acidic (pH 2) and painful when given by intramuscular injection, so it is best either formulated or diluted to concentrations of 60–100 mg/ml for intramuscular injection. Gluconate salts are less acidic and better tolerated than the dihydrochloride salt when given by the intramuscular and rectal routes. As the first dose (loading dose) is the most important in the treatment of severe malaria, this should be reduced only if there is clear evidence of adequate pretreatment before presentation. Although quinine can cause hypotension if administered rapidly, and overdose is associated with blindness and deafness, these adverse effects are rare in the treatment of severe malaria. The dangers of insufficient treatment (i.e. death from malaria) exceed those from excessive treatment initially. After the second day of parenteral treatment, if there is no clinical improvement or in acute renal failure, the maintenance doses of quinine given by infusion should be reduced by one-third to avoid accumulation.

Adjustment of dosing in renal failure or hepatic dysfunction

The dosage of artemisinin derivatives does not need adjustment in vital organ dysfunction. Quinine (and quinidine) levels may accumulate in severe vital organ dysfunction. If there is no clinical improvement or the patient remains in acute renal failure the dose should be reduced by one-third after 48 h. Dosage adjustments are not necessary if patients are receiving either haemodialysis or haemofiltration. Dosage adjustment by one-third is necessary in patients with hepatic dysfunction.

Pre-referral treatment options

The risk of death from severe malaria is greatest in the first 24 h, yet in most malaria endemic countries, the transit time between referral and arrival at appropriate health facilities is usually prolonged thus delaying the commencement of appropriate antimalarial treatment, during which time the patient may deteriorate or die. It is recommended that patients are treated with the first dose of one of the recommended treatments by the parenteral route if possible before referral (unless the referral time is very short) as given above.

Adjunctive treatment

In an attempt to reduce the unacceptably high mortality of severe malaria, various adjunctive treatments for the complications of malaria have been evaluated in clinical trials. These are summarized in the Table given below:

Immediate clinical management of severe manifestations and complications of falciparum malaria

Manifestation/complication	Immediate management[a]
Coma (cerebral malaria)	Maintain airway, place patient on his or her side, exclude other treatable causes of coma (e.g. hypoglycaemia, bacterial meningitis); avoid harmful ancillary treatment such as corticosteroids, heparin and adrenaline; intubate if necessary.
Hyperpyrexia	Administer tepid sponging, fanning, cooling blanket and antipyretic drugs.
Convulsions	Maintain airways; treat promptly with intravenous or rectal diazepam or intramuscular paraldehyde.
Hypoglycaemia (blood glucose concentration of < 2.2 mmol/l; <40 mg/100ml)	Check blood glucose, correct hypoglycaemia and maintain with glucose-containing infusion.
Severe anaemia (haemoglobin < 5 g/100ml or packed cell volume < 15%)	Transfuse with screened fresh whole blood
Acute pulmonary oedema[b]	Prop patient up at an angle of 45°, give oxygen, give a diuretic, stop intravenous fluids, intubate and add positive end-expiratory pressure/continuous positive airway pressure in life-threatening hypoxaemia.
Acute renal failure	Exclude pre-renal causes, check fluid balance and urinary sodium; if in established renal failure add haemofiltration or haemodialysis, or if unavailable, peritoneal dialysis. The benefits of diuretics/dopamine in acute renal failure are not proven.
Spontaneous bleeding and coagulopathy	Transfuse with screened fresh whole blood (cryoprecipitate, fresh frozen plasma and platelets if available); give vitamin K injection.
Metabolic acidosis	Exclude or treat hypoglycaemia, hypovolaemia and septicaemia. If severe add haemofiltration or haemodialysis.
Shock	Suspect septicaemia, take blood for cultures; give parenteral antimicrobials, correct haemodynamic disturbances.
Hyperparasitaemia	See section 8.14.

[a] It is assumed that appropriate antimalarial treatment will have been started in all cases.

[b] Prevent by avoiding excess hydration.

Continuing supportive care

Patients with severe malaria require intensive nursing, in an intensive care unit if possible. Following the initial assessment and the start of antimalarial treatment, clinical observations should be made as frequently as possible. These should include recording of vital signs, with an accurate assessment of respiratory rate and pattern, coma score, and urine output. Blood glucose should be checked, using rapid stick tests every 4 h if possible, particularly in unconscious patients. Convulsions should be treated promptly with intravenous or rectal diazepam or intramuscular paraldehyde. Fluid requirements should be assessed individually. Adults with severe malaria are very vulnerable to fluid overload and there is a thin dividing line between underhydration, and thus worsening renal impairment, and overhydration, with the risk of precipitating pulmonary oedema. If the patient becomes oliguric (□0.4 ml of urine/kg bw per hour) despite adequate rehydration, and the blood urea or creatinine are rising or already high, then fluids should be restricted to replace insensible losses only. Children, on the other hand, are more likely to be dehydrated and may respond well to a bolus of fluid. The fluid regimen must also be tailored around infusion of the antimalarial drugs. Central venous pressure should be maintained at 0–5 cm. If the venous pressure is elevated (usually because of excessive fluid administration), the patient should be nursed with the head raised at an angle of 45^{o} and, if necessary, intravenous furosemide should be given. If available, heamofiltration should be started early for acute renal failure or severe metabolic acidosis unresponsive to rehydration. If blood glucose is □2.2 mmol/l then hypoglycaemia should be treated immediately (0.3–0.5 g/kg bw of glucose). Hypoglycaemia should be suspected in any patient who deteriorates suddenly. Stick tests may overestimate the frequency of hypoglycaemia, so laboratory confirmation may be necessary. Patients with acute pulmonary oedema should be nursed in an upright position and given oxygen, and filling pressures on the right side of the heart should be reduced with whichever treatments are available (loop diuretics, opiates, venodilators, venesection, haemofiltration, dialysis). The right-sided pressure should be reduced to the lowest level compatible with an adequate cardiac output. Positive pressure ventilation should be started (if available) early if the patient becomes hypoxic. Fewer than 5% of patients with severe malaria develop clinically significant disseminated intravascular coagulation. These patients should be given fresh blood transfusions and vitamin K. Patients with secondary pneumonia should be given empirical treatment with a third-generation cephalosporin, unless admitted with clear evidence of aspiration, in which case penicillin or clindamycin is adequate. Children with persistent fever despite parasite clearance may have a systematic *Salmonella* infection, although in the majority of cases of persistent fever no other pathogen is identified after parasite clearance. Urinary tract infections are common in catheterized patients. Antibiotic treatments should take account of likely local antibiotic sensitivity patterns.

Additional aspects of clinical management Diagnosis

The differential diagnosis of fever in a severely ill patient is broad. Coma and fever may result from meningoencephalitis or malaria. Cerebral malaria is not associated with signs of meningeal irritation (neck stiffness, photophobia, Kernig sign) but the patient may be opisthotonic. As untreated bacterial meningitis is almost invariably fatal, a diagnostic lumbar puncture should be performed to exclude this condition. There is also considerable clinical overlap between septicaemia, pneumonia and severe malaria – and these conditions may coexist. In malaria endemic areas particularly, where parasitaemia is common in the young age group, it is often impossible to rule out septicaemia in a shocked or severely ill obtund child. Where possible, blood should always be taken on admission for culture, and if there is any doubt, empirical antibiotic treatment should be started immediately along with antimalarial treatment.

Other treatments

Many other supportive strategies and interventions have been proposed in severe malaria, but very few are supported by evidence of benefit, and many have proved harmful. Heparin, prostacyclin, deferoxamine, pentoxifylline, low molecular weight dextran, urea, high-dose corticosteroids, acetylsalicylic acid, deferoxamine, anti-tumour necrosis factor antibody, cyclosporin, dichloroacetate, adrenaline and hyperimmune serum have all been suggested – but none of these is recommended.

Severe metabolic acidosis is common but apart from correction of hypovolaemia and anaemia, no specific treatment is of proven value. Significant electrolyte abnormalities are relatively unusual, and

potassium supplementation is often not required in the acute phase. The optimum fluid resuscitation regimens, the thresholds for blood transfusion, the role of exchange transfusion, and the management of seizures remain areas of uncertainty, and these are discussed in more detail below. The optimum body positioning in comatose patients, and the timing and type of feeding in patients who remain unconscious for □□24 h have not been studied. It is generally agreed that early ventilation for respiratory abnormalities and early management of renal failure or severe metabolic acidosis are beneficial. In acute renal failure, haemofiltration is associated with a lower mortality, and more rapid correction of biochemical abnormalities compared with peritoneal dialysis. There have been no comparative trials of haemodialysis and haemofiltration.

Fluid therapy

Patients, especially children with severe malaria may be dehydrated. However, the degree of fluid depletion varies considerably. As a result, it is not possible to give general recommendations on fluid replacement. Each patient must be individually assessed and fluid resuscitation based on estimated deficit. In hightransmission settings where severe malaria is confined to childhood, children commonly present with severe anaemia and hyperventilation (sometimes termed “respiratory distress”). In the past this was ascribed to “anaemic heart failure” (i.e. pulmonary oedema), and sometimes diuretics were administered. It is now clear that this syndrome is not a result of anaemic heart failure, but results from severe metabolic acidosis and anaemia, and so should be treated by blood transfusion. In general children tolerate rapid fluid resuscitation better than adults, and are less likely to develop pulmonary oedema. In adults, there is a very thin dividing line between overhydration, which may produce pulmonary oedema, and underhydration contributing to shock and worsening acidosis and renal impairment. Careful and frequent evaluations of the jugular venous pressure, peripheral perfusion, venous filling, skin turgor and urine output should be made. Where there is uncertainty over the jugular venous pressure, and if nursing facilities permit, a central venous catheter should be inserted and the central venous pressure measured directly. The optimum rate of resuscitation, the role of colloids compared with crystalloids, and the optimum electrolyte composition of the replacement fluid have not been determined.

Blood transfusion

Severe malaria is associated with rapid development of anaemia as infected and uninfected erythrocytes are removed from the circulation. In areas of high stable transmission, severe anaemia in young children is the principal manifestation of severe falciparum malaria. Ideally fresh blood should be transfused, and the patient’s relatives are often willing donors. However, in most settings cross-matched virus-free blood is in short supply. As with fluid resuscitation, there have not been enough studies to provide strong evidence-based recommendations, so the recommendations given here are based on expert opinion. In hightransmission settings, blood transfusion is recommended for children with a haemoglobin level of □5 g/100 ml (haematocrit □15%). Mortality as a direct result of anaemia rises at lower haemoglobin levels. In low-transmission settings, a threshold of 20% (haemoglobin 7 g/100ml) is recommended. These general recommendations still need to be tailored to the individual, as the pathological consequences of rapid development of anaemia are worse than those of acute on chronic anaemia, where there has been adaptation and a compensatory right shift in the oxygen dissociation curve

Exchange blood transfusion (EBT)

There have been many anecdotal reports and several series claiming benefit for EBT in severe malaria but no comparative trials, and there is no consensus on whether it reduces mortality or how it might work. The rationale for EBT has been variously proposed as:

removing infected red blood cells from the circulation and therefore lowering the parasite burden (although only the circulating relatively non-pathogenic stages are removed – and this is also achieved rapidly with artemisinin derivatives);

reducing rapidly both the antigen load and the burden of parasite-derived toxins, metabolites and toxic mediators produced by the host;

replacing the rigid unparasitized red cells by more deformable cells and therefore alleviating microcirculatory obstruction. EBT requires intensive nursing and a relatively large volume of blood, and carries significant risks. There is no consensus on the indications, benefits and dangers involved, or on

practical details such as the volume of blood that should be exchanged. It is therefore not possible to make any recommendation regarding the use of EBT.

Use of anticonvulsants

Seizures are common in cerebral malaria, particularly in children. The treatment of convulsions in cerebral malaria with intravenous (or, if not possible, rectal) benzodiazepines or intramuscular paraldehyde is similar to that for repeated seizures from any cause. In a large double-blind placebo-controlled evaluation of a single intramuscular injection of 20 mg/kg bw of phenobarbital (phenobarbitone) in children with cerebral malaria there was a reduction in seizures but a significant increase in mortality in phenobarbital recipients. This resulted from respiratory arrest, and was associated with additional benzodiazepine use. Clearly the 20 mg/kg dose of phenobarbital should not be given without respiratory support, but it is not known, whether a lower dose would be effective and safer or whether, if ventilation is given, mortality would not be increased. In the absence of further information, prophylactic anticonvulsants are not recommended.

Concomitant use of antibiotics

The threshold for administering antibiotic treatment should be low in severe malaria. Septicaemia and severe malaria are associated and there is diagnostic overlap, particularly in children. Unexplained deterioration may result from a supervening bacterial infection. Although enteric bacteria (notably Salmonella) have predominated in most trial series, a variety of bacteria have been cultured from the blood of patients diagnosed as having severe malaria, and so broadspectrum antibiotic treatment should be given initially.

Treatment during pregnancy

Pregnant women, particularly in the second and third trimesters of pregnancy are more likely to develop severe malaria than other adults, often complicated by pulmonary oedema and hypoglycaemia. Maternal mortality is approximately 50%, which is higher than in non-pregnant adults. Fetal death and premature labour are common. The role of early Caesarean section for the viable live fetus is unproven, but is recommended by many authorities. Obstetric advice should be sought at an early stage, the paediatricians alerted, and blood glucose checked frequently. Hypoglycaemia should be expected and is often recurrent if the patient is receiving quinine. Antimalarials should be given in full doses. Severe malaria may also present immediately following delivery. Postpartum bacterial infection is a common complication in these cases. Falciparum malaria has also been associated with severe mid-trimester haemolytic anaemia in Nigeria. This often requires transfusion, in addition to antimalarial treatment and folate supplementation. Parenteral antimalarials should be given to pregnant women with severe malaria in full doses without delay. Artesunate or artemether are preferred over quinine in the second and third trimesters because quinine is associated with recurrent hypoglycaemia. Recent evidence shows that in non pregnant adults with severe malaria in areas of low transmission, artesunate was superior to quinine, reducing mortality by 35% compared to quinine, which makes artesunate the preferred option in the second and third trimesters. In the first trimester, the risk of hypoglycaemia associated with quinine is lower, and the uncertainties over the safety of the artemisinin derivatives are greater. However, weighing these risks against the above evidence in favour of the efficacy of artesunate, and until more evidence becomes available, both artesunate and quinine may be considered as options. Treatment must not be delayed so if only one of the drugs artesunate, artemether or quinine is available it should be started immediately.

Hyperparasitaemia

Patients with high parasite counts are known to be at increased risk of dying, although the relationship between parasite counts and prognosis varies at different levels of malaria endemicity. Many hyperparasitaemic patients have evidence of vital organ dysfunction but there is a large subgroup in which no other manifestations of severe disease are present. These patients have symptoms and signs compatible with a diagnosis of uncomplicated malaria in association with a high parasite count (sometimes termed uncomplicated hyperparasitaemia). The relevance for treatment is firstly the increased risk of progressing to severe malaria, and secondly the generally higher treatment failure rates. This is of particular concern as resistance to antimalarials is most likely to arise in patients with

heavy parasite burdens and little or no immunity. In a low-transmission area in north-west Thailand, the overall mortality of uncomplicated falciparum malaria was 0.1%, but in patients with parasitaemia of 4% it was 3%. In areas of moderate or high transmission, much higher parasitaemias are often well tolerated, however. There is not enough evidence to provide a firm recommendation on the definition of hyperparasitaemia, although ≥5% parasitaemia in a low-transmission setting and ≥10% in a higher transmission setting are commonly used.

Treatment of hyperparasitaemia

Available evidence indicates that use of oral treatment under close supervision is effective in the treatment of patients with hyperparasitaemia who have no other features of severe malaria. Parenteral treatment should, however, be substituted at any time if there is concern. The rapidity of action of the artemisinin derivatives makes them ideal drugs. The standard treatment course should be given, as there is insufficient information on the safety of higher doses of the partner drug. Alternatively, the first dose of artemisinin derivative can be given parenterally or rectally to ensure adequate absorption, followed by a full course of ACT. Mefloquine-containing regimens in which the tablets are dispensed separately should be given such that mefloquine is given on days 2 and 3, rather than day 1, when it is better tolerated, with a lower incidence of early vomiting.

The optimum duration of treatment for hyperparasitaemia is still unresolved. Data to support the suggestion that patients should be treated conservatively with 7 days of an artemisinin derivative, plus a full course of partner medicine (e.g. artesunate 7 days + mefloquine 25 mg/kg bw divided over 2 days) are lacking. A longer ACT course than is recommended for uncomplicated malaria may not be possible in places where only fixed-dose combinations are available.

Treatment of severe vivax malaria

Although P. vivax malaria is considered to be a benign malaria, with a very low case-fatality ratio, it may still cause a severe and debilitating febrile illness. It can also very occasionally result in severe disease as in falciparum malaria. Severe vivax malaria manifestations that have been reported are cerebral malaria, severe anaemia, severe thrombocytopenia and pancytopenia, jaundice, spleen rupture, acute renal failure and acute respiratory distress syndrome. Severe anaemia and acute pulmonary oedema are not uncommon. The underlying mechanisms of severe manifestations are not well understood. Prompt and effective treatment and case management should be the same as for severe and complicated falciparum malaria.

Annexures K1 –K 28

ANNEXURE K 25

INVESTIGATION REPORT ON DEATH DUE TO MALARIA

The investigation should be carried out by District Malaria Officer, Assistant Malaria Officer or Medical Officer PHC only. Any investigation carried out by a person below these ranks will not be valid.

1. Basic information

1.1 Date of Death: _____
Time of Death: _____

1.2 Full Name of the deceased: _____
_____

1.3 Age: _____ 1.4 Sex: _____

(In adult female, indicate status of pregnancy and its complications, if any):_____
_____

1.5 Address (usual place of residence)
District: State

1.6 Occupation of the deceased:

2. Case history of illness:

2.1 Source of information:
- Relatives (specify relationship):
- Paramedical staff (specify by designation):
- Treating Physician (specify by qualificatifons):
- Any other (specify):

2.2 Date & hour of onset of illness

2.2.1 Total days of illness:

2.3 Signs and symptoms at the time of onset of the illness (Tick mark those present):

Fever intermittent/ Fever continuous/ Rigor/ Headache/ Diarrhoea/ Vomiting/ Blood in Stools/ Suppression urination/ Abnormal behavior/ Convulsions/ Blurring of Vision/ Unconsciousness/ Other (specify)…….

2.4 Place where disease started:
a). Usual place of residence Yes/No
b). If no, give address

2.5 History of movement/specify halting station(s) preceding 3 weeks from the date of onset of illness:
a). date of departure from residence
b). during first week
c). during second week
d). during third week

2.6 Referred to Hospital/PHC/Dispensary/Any other (Private Provider/ NGO)_____
(Tick mark the institute where referred)

2.6.1 Referred or advised by: (Tick mark whichever is applicable)
Self/ family member/ MPW/ FTD/ ASHA/ Private Practitioner/ NGO/ Other Community Volunteer (Specify) _____.

2.6.2 Date of reference:_____

2.6.3 Date of Consultation:_____

2.6.4 Name of the referred institution/ Facility _____
_____

2.6.5 If consulted Name and qualification of the Private Practitioner(s)
2.6.6 Treatment/investigation/advised by Private Practitioner(s) & results: _____
_____
_____

3. Parasitological Investigation and treatment before Hospital Admission

3.1 RDT done before Hospital admission
3.1.1 Date of RDT collection & results: _____ (Positive/ Negative)
3.1.2 RDT collected by (Tick mark the correct entry): FTD/MPW/Lab Technician / ASHA/Supervisor or others (specify)_____
Name: _____

3.2 Blood smear examination and treatment before Hospital admission
3.2.1 Date of Blood Slide collection: _____
3.2.2 Date of blood slide examination: _____
3.2.3 Date of receipt of results: _____
3.2.4 Result of Blood slide: Pf/ Pv
3.2.5 Blood slide collected by (Tick mark the correct entry): FTD /MPW/ Lab. Technician/ ASHA/ Supervisor or others (specify):_____
3.2.6 Name of the laboratory where examined: _____
3.2.7 Name of the Technician: _____

3.3 Treatment Received
3.3.1 Was treatment started immediately after Blood test: Yes/ No
3.3.2 Date of start of treatment: _____
3.3.3 Treatment given:

S. No.	Name of Drug	Dose	Duration

4 Parasitological investigations and treatment after admission of hospital:

4.1 History of case on admission to Hospital
4.1.1 Sources of information (Tick mark the correct entry: Treating physician / Case History sheet.
4.1.2 Date of Referral _____ and by whom _____
4.1.3 Date and time of admission: _____
4.1.4 Name of treating Physician (s) and qualifications
1.
2.
4.1.5 Date and time of first examination by Physician
4.1.6 Signs/Symptoms observed/recorded in case sheet: Rigor/Fever intermittent/Fever continuous/Headache/Diarrhea/blood in stools/vomiting/suppression of urination/abnormal behavior/convulsions/Blurring of Vision unconsciousness/any other (specify) _____

4.2 FOR EACH BLOOD SMEAR COLLECTED/ RDT DONE

Sl. No.	BSC/ RDT		Examination		Results			
	Date	Time	Date	Time	Positive	Species	Stage	Density*
1 2 3								

* Per 100 fields of thick smear

4.2 Other Biochemical/Pathological investigations done (specify): _____

_____

_____

4.3 Tentative Diagnosis:_____

4.4 Clinical progress of the case

Treatment

(a). Antimalarials

S. No.	Date	Name of Drug	Dose	Duration	Route of Administration

(b) Other supportive treatment

S. No.	Date	Name of Drug	Dose	Duration	Route of Administration

(c) Evaluation of clinical progress (date-wise)

S. No.	Date	Clinical condition	Time

5 **Cause of Death in microscopically / RDT confirmed** cases of malaria (Use international Certificate proforma)

1.
2.
3.

6 **Cause of death in clinically suspected case of malaria** (tick what is applicable):

a) Sign/symptoms present in the deceased	During differential diagnosis following were excluded
- Coma	Diabetes, head injury, hepatic, and other conditions.
- hyperpyrexia	Heat stroke, viral infection and septicaemia due to U.T. infection, etc.
- convulsions	Other conditions
- shock/collapse	Other causes of shock and collapse
- pregnancy/abortion with pyrexia	Spontaneous/induced/foetal or other other abnormalities
- pulmonary oedema	Cardiac/respiratory tract conditions

- haemoglubinuria/ oliguria — Kidney, bladder lesions; Kidney dysfunction due to other diseases
- diarrhea/dysentery — Acute intestinal infection, cholera, gastroenteritis, bacterial dysentery

The death on clinical grounds can be suspected if:

b). *P.falciparum* is predominant infection in the locality.

c) Or the case had acquired infection in ***P.falciparum*** predominant area as ascertained by history of movement at ..... (name of place)

Exception – If the locality/area does not have *P.falciparum* focus as confirmed during implementation of remedial measures or *P.falciparum* infection is not encountered in contact & mass survey cases, the death should not be labeled as death due to malaria on clinical grounds only.

7. Postmortem details, if undertaken.

8. Remedial Measures undertaken:

Period from _____ to _____

Place: (a) where patient had fallen sick
(b) Where patient had fallen sick
(c) Both (Tick any one)

8.1 Contact Survey : Date :
Number of RDTs done:
Number of blood smears collected:
Number of blood smears examined:
Number of blood smears/ RDTs positive :
Results: Species: ***Pf*** ***Pv*** ***Pm*** **Mixed**

8.2 Mass Survey : Date :
No of RDTs done:
Number of blood smears collected:
Number of blood smears examined:
Number of blood smears/ RDTs positive :
Results: Species: ***Pf*** ***Pv*** ***Pm*** **Mixed**

8.3 Focal spray (specify)

8.4 Mass drug therapy (specify) population and coverage

8.5 Any other measures (specify)

8.6 Assessment/ Remarks:

_____

_____

_____

Name and Signature of Investigator
Designation_____
Date of investigation_____

EPIDEMIOLOGICAL INVESTIGATION OF DEATH DUE TO MALARIA

Instructions for filling investigation report on death due to malaria:

- The investigation report in case of death due to malaria infection is necessary to confirm the epidemiological factors and operational failures resulting in the death of patient due to this disease.

It may be clearly understood by the investigating officer that: -

- In case of Infection with P.vivax and P.malariae death occurs as a direct consequence of infection with malaria parasite.
- In case of P.falciparum death occurs as consequence of malaria infection, because of the pathological changes produced by the parasite in the human body. Pathological changes caused by P.falciparum infection in different organs like brain, lungs, liver, kidneys and intestines are directly responsible for the case fatality. However it has been observed that in rare situation complications and death may also occurs due to P.vivax.
- The pathological changes noticed in P.falciparum are preventable and reversible, if treatment with appropriate anti-malarial is administered in time.
- However, in case of epidemic with predominance of P.falciparum infection in the community, if the blood smear of a death case could not be examined, the circumstantial evidence from sign and symptoms may indicate that the patient might have died due to P.falciparum infection, or the death has occurred because treatment with anti-malarial was started too late.
- In many seriously ill patients malaria infection can be a concomitant infection, especially in malaria endemic area during transmission season, in such situation the primary cause of death should be carefully ascertained.
- Therefore, the Performa entitled '**Investigation report on death due to malaria'** was introduced under NVBDCP. It has now been revised to incorporate the current interventions.

***Further important points to be observed during the investigation are*:**

- District Malaria Officer / Assistant Malaria Officer (always under assistance of the MO) / Medical Officer of the PHC or an officer of similar rank and qualifications should carry out the investigation. Any investigation carried out by any other officer below these ranks will not be valid.
- The investigator will gather history of the case from (1) family members (2) relatives (3) paramedical staff
- If the illness has started at some place other than usual place of residence, the history of movement should start from the usual place of residence of the patient terminating at the place where the patient became sick for the first time, and three weeks prior to sickness these addresses are to be recorded and movement traced back to usual place of residence. The history of movement is given along with halting stations. In case the patient dies at his usual home, it is still necessary to record history of movement during last three weeks to pinpoint the place where infection was acquired.
- It is necessary to indicate whether the patient was examined by a medical practitioner. If death occurred in a Medical Institution then date of reference of the Institute is entered.
- Date of communication of result to the periphery and radical treatment, if any should be recorded. Normally it is not expected that a person would die or develop serious complications after having received full anti-malarial treatment along with radical treatment with primaquine. But in a very rare case, if death occurs, it is essential to understand the sequence of events. Therefore, the date of collection blood smear, examination, and radical treatment are necessary and they should be filled by the investigator after fully satisfying himself with the accuracy of information.
- Evaluation of clinical progress date-wise is to be given for the entire period of stay in the hospital. Usually these remarks are given in the case sheet of the physician treating the case. They should be copied verbatim in this Performa (extra sheet may be added if required).
- For remedial measures undertaken, the investigator would look into the records of the District Malaria Officer or PHC Medical Officer to find out what remedial measures were implemented in the place where the person had fallen sick, or in the area, where on the basis of epidemiological investigation, he might have contracted the malaria infection.
- If remedial actions were taken in both areas, it should be entered in respect of both the places.

The **death on clinical grounds can be suspected if:**

a). P.falciparum **infection** is **predominant in the locality**.

b). The case had acquired infection in P.falciparum predominant area as ascertained by history of movement at_____ (Name of the place)_____.

Please note: The death should not be labeled as death due to malaria on clinical grounds alone if the locality does not have P.falciparum focus as confirmed in contact & mass survey.

c) The RDT positive Pf malaria case should be treated as confirmed case.

- The investigator should write the date of investigation, his name and designation in the appropriate column
- If the death due to malaria occurs in a hospital/ dispensary, the DMO and MO-PHC should be informed within 48 hours by the treating physician
- If the death in a village is detected by FTD/ ASHA /DDC holder or MPW, the same shall be informed immediately to DMO and MO/PHC
- The MO/PHC shall investigate the death within a week after receipt of information
- The history should establish the date when the first symptom of the disease was noticed either by patient or his attendants

Most of the items of the Performa are self-explanatory.

The following should be recorded:

i. The source of information.
ii. The name of the place where the disease symptoms were first noticed.
iii. The signs and symptoms elicited from the medical history, statement of relatives, and medical and paramedical personnel.
iv. The drugs administered along with the date of administration.
v. If the patient was unconscious, the route of drug administration whether intravenous or intra muscular
vi. It is necessary to fill all the sub-items, in the chronological order of events.
vii. Name of the physician, his observation, tentative diagnosis and treatment
viii. The details of blood slide examination/RDT.
ix. In case the postmortem was performed on the deceased, the details of postmortem
x. Any other diagnostic measure by which the diagnosis was confirmed (e.g., PCR).
xi. At the end of investigation, the investigator should record the cause of death (confirmed or on clinical grounds) and comments regarding observation, promptness of response from GHS both in treatment and preventive actions.
xii. The investigation report on death rate due to malaria should reach all concerned within 7 days of the completion of investigation.

STATE……..

NATIONAL MALARIA ERADICATION PROGRAMME

CONFIRMED DEATHS DUE TO MALARIA FOR THE MONTH OF …….

Sl. No	Name of the district	Name & address of the deceased	Age	Sex	Date of collection of B.S. RDT	Date of examination of B.S/RDT Result	Species	Period of R.T.	If hospitalized, date of admission	Date expired on

Annexure L

Districts/Areas identified for use of ACT Combination (AS+SP) for treatment of Pf malaria (January 2009)

S.No.	State/UT	Name of Districts	Name of Chloroquine resistant PHC /surrounding cluster of Block PHCs
1	**Andhra Pradesh (5 districts)**	VizianagaramVishakapatnam, Srikakulam, East Godavri, Khammam	Entire 5 districts
2	**A&N Islands (2 districts)**	Great Nicobar & Little Andaman	20 PHCs
3	**Assam (24 districts)**	Dhubri,Kokrajhar,Goalpara,Bongaigaon,Barpeta,Nalbari,Kamrup, Kamrup M, Darrang, Sonitpur, Lakhimpur, Dhemaji, Golaghat, Nagaon, Jorhat, Morigaon,Karbi-Anglong, N.C.Hills, Cachar(Silchar), Haila Kandi, Karimganj, Tinsukhia, Sibsagar, Dibrugarh,	Entire 24 districts
4	**Arunachal Pradesh (6 districts)**	Changlang,Lohit,East Siang,Papum Pare,East Kameng,West Kameng,	Entire 6 districts
5	**Chhatisgarh (11 districts)**	Jagdalpur,Korba, Ambikarpur, Raigarh, Jashpurnagar, Raipur, Dhamteri, Dantewada, Kanker, Bilaspur,Korea	Entire 11 districts
6	**D & N Haveli**	D & N Haveli (6 PHCs)	Whole D & N Haveli (6 PHCs)
7	**Goa (2 districts)**	North Goa and South Goa(28 PHCs)	Whole state (28 PHCs)
8	**Gujarat (27 PHCs of 7 district)**	Panchmahal (4 PHCs)	(Kadana,Lunavada, Khanpur, Santarampur)
		Kutch Bhuj –(6 PHCs)	Kavada, Gorewali, Mundra, Mandavi, Anjar, Nakhatrana
		Anand (2 PHCs)	Pansora, Anand
		Dahod (3 PHCs)	Degawada, Limkheda, Dhanpur
		Patan (5 PHCs)	Lolada, Harij, Radhanpur, Patadi, Rapar
		Surat (4 PHCs)	Surat city,Olpad, Choryasi, Kamrej
		Kheda (3 PHCs)	Matar, Mahudha, Mehmdabad
9	**Jharkhand (12 districts)**	Gumla, Ranchi, Simdega,East Lohardaga, Singhbhum, West Singhbhum, Saraikela, Sahibganj,Godda, Dumka, Latehar, Pakur	Entire 12 districts
10	**Karnataka (52 PHCs of 12 districts)**	Kolar (,6 PHCs)	Gulur, Bagepally, Chelur,Pathpalya,Shivpura, Chakavelu
		Raichur, (20 PHCs)	Echanal, Hatti, Ramdurga, Nagarala, Anwari, Anehosur, Gurugunta, Mudgal, Maski, Sajjalgudda, Makapur, Mediknal, Santhakallur, Galag Jalahally,Gabbur, Arkera, Kopper, Masarkal, Hirebuddur,
		Bellary (2 PHCs)	Kamalpura, Kamply
		Mandya (1 PHC)	D.K. halli

		Bagalkot (4 PHCs)	Kamatagi, Nandikeshwar, Hungunda, Pattadkal
		D.Kannada (1 PHC)	Mangalore
		Chemarajanagar (1 PHC)	Sathegala
		Gadag (1 PHC)	Bellati
		Chitradurga (6 PHCs)	Ranganathapura, Betturpalya, Dindawara,Yelladakere,V.V.Pura, J.G.Hally
		Belgaum (1 PHC)	A.K. Hal
		Gulbarga (8 PHCs)	Kakkera, Kembhavi Project, Pettampura, Rajankallur, Kurkunta, N.pura Project, B.R.Gudi Project, Malkhed
		Bijapur (1 PHC)	Almatti Project
11	**Madhya Pradesh (9 districts)**	Jhabua, Dindori, Shahdol, Chhindwara, Siddhi Mandla,Seoni,Hoshangabad, Guna	Entire 9 districts
12	**Maharashtra (32 PHCs of 2 districts)**	Raigarh,	Washi
		Ghadchirroli(31)	Korchi(2), Dhanora(5), Gadchiroli(2), Etapalli(3), Bhamragad(3),Aheri(3), Sironcha(5), Kurkheda(2) Mulchera(2), Chamorshi(2), Aarmori(2)
13	**Manipur (11 districts)**	All district (total no.11)	Whole state
14	**Meghalaya (7 districts)**	All District (total no. 7)	Whole state
15	**Mizoram (3 districts)**	Lunglei, Kolasib, Mamit	Entire 3 districts
16	**Nagaland (12 districts)**	All District(total no, 12)	Whole state
17	**Orissa (13 districts and 39 PHCs of 11 districts))**	Keonjhar, Kandhamal, Sundergarh, Mayurbhanj, Kalahandi, Nuapada, Koraput, Sambalpur, Gajapati, Rayagada, Jharasguda, Malkangiri, Nawarangpura,	Entire 13 districts
		Angul (7 PHCs)	Bantala,Madha pur/Athamallic, Banarpal,Koshala/ Chendipada, kanhia, Khamar/Palalahda,R.K. Nagar/ Kishorenagar
		Dhenkanal (3 PHCs)	Khajurikata,Odapada,Beltikri/ Dhenkanal
		Deogarh (3 PHCs)	Tileibbani, Chhatabar/Riamal, Bamparda/Barkot
		Bolangir (6 PHCs)	Khaprakhol, Bangamunda/Sindheipalli, Guduvella, Ghasian/patna, Belpada,Tureikela
		Boudh (3 PHCs)	Adenigarh, Manamunda, Baunshini/Boudh
		Balasore (3 PHCs)	Bherhampur ,Iswarour, Khaira
		Baragarh (2 PHCs)	Bukuramunda, Jamla
		Cuttack (2 PHCs)	Kanpur, Maniabandha
		Ganjam (4 PHCs)	Badagada, Adapada, Bomkei, Dharakot

		Nayagarh (2 PHCs)	Gania, Madhyakhand
		Sonepur (4 PHCs)	Birmaharajpur, Naikenpali, Tarva,Ullunda
18	**Rajasthan (10 PHCs of 3 districts)**	Dungarpur (4 PHCs)	Bicchiwara,Damri, Simalwara, Dungurpur
		Banswara (4 PHCs)	Kushalgarh,Chota Dungara, Banswara, Talwara
		Baran (2 PHCs)	Kishanganj, Shahbad
19	**Tamilnadu**	Rameshwaram Island	
20	**Tripura (4 districts)**	All District(total no. 4)	Whole state
21	**Uttar Pradesh**	Mirzapur	NTPC Projecct area Mirzapur
22	**West Bengal (37 PHCs of 4 districts)**	Purulia (11 PHCs)	Bagmundi, Sadar, Bandhwan, Sirkabad, Jhalda-II, Balarampur, Jhalda-I, Joypur, Barabazar, Manbazar-II, Manbazar-I
		Jalpaiguri (13 PHCs)	Uttar Latabari, Mal,Kalimpong, Sukna, , Falakata, Kumargram, Garubathan, Rajgunj, Maynaguri, Matiali, MadarihatAlipurduar-I, Alipurduar-II,
		Bankura (5 PHCs)	Ranibandh,Raipur,Khatra,Belpahari, Hirbandh
		Darjeeling (8 PHCs)	Naxalbari, Sukna,Kurseong, Mirik, K-Phansidewa, Kalimpng-I, Phansidewa, Rajgunj
	Total	**117 districts (50 WBD+67 NE states + 253 PHCs of 46 districts)**	

A Anti-Malaria Month

During monsoon and post monsoon months, the risk of malaria increase manifold on account of increases breeding of vector mosquitoes, responsible for spreading malaria and other vector borne disease.The month of June is therefore, observed as Anti Malaria Month (AMM), before the onset of monsoon prior to the transmission season since 1977.

B Goal

Integrated and accelerated action through communication for behavioral impact and delivery of services for informed decision-making, initiation of individual and social change towards reducing mortality on account of Malaria, Dengue, Japanese Encephalitis by half and elimination of Kala-azar by year 2010 and elimination of Lymphatic Filariasis by 2015 as defined under the National Health Policy (2002) and effective control of Chikungunya.

The AMM campaign is also an attempt to augment and ensure appropriate public health focus; peoples' orientation and ownership of public health prgorammes; community-based approaches; public-private partnership; involvement of local bodies and Panchayati Raj Institutions; gender equity, en route to improved access to primary health care, prevention and control of communicable disease including vector borne diseases, reduction of infant mortality rate and maternal mortality ratio by 50% by year 2012 and promotion of healthy life styles as per the goals of the National Rural Health Mission (2005-2012) launched by the Hon'ble Prime Minister of India on April 12, 2005.

C Objective

The specific objectives of the AMM is to:

- Enhance awareness regarding source and transmission risk reduction, treatment, availability of services at different levels.
- Build support for the programme across inter-sectoral partner organizations, influential sectors of society (corporate houses, political representatives, social activists, media, civil society organizations, etc.) and health care service providers and elicit commitment for action.
- Ensure availability of services.

D Strategy for AMM

1. Social mobilization: It is a planned process of bringing together all inter-sect oral partners, health care service providers and the community to determine felt needs and raise awareness of and demand for a social development objective. If a disease treatment or health is felt need of the society, social mobilization puts pressure on the health system to provide necessary services. Alternatively, if community is unable to recognize a disease as a threat, social mobilization strategy is directed to create a demand for the services and to convince people to accept it.

The social mobilization can be achieved through:

(i) Advocacy Workshops : which aim to develop enabling environment by education the political leaders, elected which representatives, planners, organized sectors, professional bodies, media for building support, elicit commitment and motivate them to be advocates for social development objectives. For instance, prevention and control of malaria and other vector borne diseases. Thus, priorities are defined, appropriate policies are framed, sufficient resources are allocated and directions are provided to the implementers thereby facilitating availability and accessibility of resources to community.

Workshops are to be planned at States, Districts, Municipal Corporations, Municipal Councils, Town areas, Blocks, Sub-centers and villages during May/June for involving various stakeholders like:

- Community volunteers and peripheral health workers
- Local self-government (PRIs, Village councils, Tribal councils)
- Urban local bodies (Municipal Corporation, Municipal Councils, Notified Area Committees)
- Civil society organizations (non-governmental organizations, faith based organizations, women's self-help groups)
- Corporate sector, tea associations/estates, chambers of commerce, Confederation of Indian Industry
- Govt. departments, Armed and Paramilitary Forces
- Elected representatives, Bureaucrats
- Media
- Medical colleges, Medical Associations
- Educational Institutions (Student & Teachers)

The Advocacy workshops should be interactive in nature supported by live demonstrations for sharing knowledge, concern, experiences and identifying areas of cooperation, mobilization of available resources and implementation of effective measures for prevention and control of malaria and other vector borne diseases.

At village level, one Exhibition-cum-Information Centre would be organized at weekly Bazaar/Haat. The centers would undertake public announcements/folk performances of control of malaria and other vector borne diseases, demonstration of mosquito larvae, larvivorours fish, insecticide treatment of bed nets, and source reduction through minor engineering methods, home bases morbidity management of lymphoedema. Facilities for detection of fever cases should also be made available during such event.

(ii) Social mobilization through inter- sectoral collaboration for prevention and control of malaria and vector borne diseases including:

- National task force meeting and identifying a nodal activist/champion in member organizations for monthly coordination
- State task force meetings and identifying a nodal activist/champion in member organizations for monthly coordination
- District co-ordination committee/Block co-ordination committee /Urban Area co-ordination Committee/Village Health Committee meetings and identifying nodal activists/champions in member organizations for monthly coordination.

(iii) Programme communication utilizing different media (mass media, inter-personal communication) which takes care of:

- Strengthening knowledge, beliefs, values, attitudes, confidence,
- Strengthening enabling environment, strengthening reinforcement of knowledge, action through family, peers, teachers, employers, health service providers, community leaders.

This could be done through:

- Publicity through different types of communication:
- Inter-personal communication (Focus Group Discussion, counseling, song & drama, skits, Nukkad nataks, religious sermons)
- Mass media: Electronic/multi media (TV, Radio progrmmes, local cable; documentaries, music videos, soap operas with in-programme messaging) Print (newspapers, banners, pamphlets, stickers, bus/railway tickets, post cars, envelopes, etc) Other media (wall paintings, hoardings, glow signs, panels, public announcements, mobile vans, health exhibitions, etc)

In addition, following activities are to be under taken:

- Re-orientation of Block Extension Educators/Health Educators/Nehru Yuva Kendra, National Social Services, NRC volunteers

- Re-orientation of private medical practitioners in states/districts through Indian Medical Association.

(iv) Interpersonal Communication (IPC) through (Focus Group Discussions, meetings, interactive sessions on prevention and control of vector borne diseases, Folk, Media, Song and Drama, etc.)

- Interpersonal Communication works best when there is one-on-one contact between the heath worker and/or health educator and the person whose behaviour is sought to be changed to adopt new knowledge, life skills and practices to ensure the welfare of their families and children.
- One-on-one contact facilitates comprehension of new concepts and demonstration of new practices. Over a period of time, if done consistently, this method can result in adoption of new practices on a sustainable basis.
- The tool kit for interpersonal communication includes aids that enable the communicator/health worker to easily demonstrate any concept through visual aids like manuals, demonstration devices such as role plays, toys, flash cards, flip books that depict the desired practices, interactive games and puzzles that familiarize users with the desired practices.

Interpersonal communication materials would include:

- Flip Books, Flash cards: To be by volunteers, health workers to counsel audiences during home visits.
- Stickers: For distribution among school children, shops, and other places to remind people about the core themes on prevention and control of vector borne diseases.
- Badge, signboards with log: For identification of those associated with the campaign, such as FTDs and other health workers,
- Bag with logo: For volunteers to carry al IPC material during door to door visits.
- Calenders: To promote the anti malaria messages among influencers, panchayat members, etc. with the key periods highlighted.
- Mailers, gate folders and wall charts/logo stickers: For civil society organizations, doctors, chemists, FTDs. Community volunteers.
- Illustrated booklets (predominantly visual) with stories on prevention and control of malaria and other vector borne diseases especially for children.

(v) Mass Media

- **Telecast/Broadcast: TV, radio** – spots, jingle, skits, interactive programmes, phone-in programmes, quiz programmes through Doordarshan/Regional Channels: All India Radio/Vividh Bharti/FM radio/Regional Channels etc.
- **Print:** Newspapers, pamphlets, leaflets, stickers, booklets, posters, flip books, flash cards, tickets, OPD registration forms, Official stationery, calendars, mailers, gate folders and wall hangings
- **Multi-media:** Documentaries, music videos/bands, soap operas
- **Outdoor publicity:** Hoardings, Glow Signs, Bus panels.
- **Other Media:** Local cable, mobile vans etc.

(vi) Ground Communication:

Folk performances

The folk performances are important on account of reach, credibility, persuasiveness, ability to adopt performances to the message as well as costs. The focus and venue on the show are to be selected with care, keeping in mind the socio-cultural environment of the area and target audience.

'Melas' and 'Haats/Bazaars'

Melas and Haats/Bazaars are prominent features of rural life. While Haats/Bazars refer to periodic markets held for trading, melas are usually more for either religious or exhibition purpose. Both of these

offer large audiences in a short span of time, who are open and more receptive to information as they are in leisure mode.

D Recognition of services of Drug Distribution center (DDCs) /Fever Treatment Depot (FTD).

1. ASHA and AMM

During Anti Malaria Month, ASHA is expected to create awareness on health and its social determinants such as basic sanitation & hygienic practices, healthy living, appropriate water storage practices, existing health services and the need for timely utilization of health services (like re-impregnation of ITN) in addition to her regular activities newly providing a minimum package of curative care and arrange timely referrals.

2. Role of ASHA as Behaviour changing agent:

Source reduction of mosquito breeding through BCC campaigns,

During anti malaria month ASHA would organize BCC campaign providing information to the community through Inter-personal communication, distribution of IEC materials as well as other BCC activities i.e. Group communication, Mass Media etc. pertaining to prevention and control of Malaria like:
ASHA should make community aware about how to eliminate breeding sites.

- Filling of pools, ponds, borrow-pits and hoof-prints in and around the village.
- Remove discarded containers that might collect water. Cover water tanks with properly fitted lids.
- Clear water vegetation and other matters from the bank of the streams-this will speed up the flow of water and eliminate pools where mosquito prefers to breed.
- Leaking taps, spillage of water around hand pumps and wells or peer drains, may cause pool of water, Repairs or improvements to the water supply or drainage system can eliminate this pools

3. Augmentation of Vector Control Measures

During AMM campaign ASHA is expected to communicate the following messages:

Indoor residual spray (IRS): ASHA should communicate that Insecticide spraying on the walls help to drive away the mosquitoes, thus reduce the risk of Malaria. Outside walls or places like the cattle shed are not to be sprayed because this would actually drive the mosquitoes into the house and thereby cause more harm. She should inform the community that mud plastering after spray operations should not be done as it will lower the effect of DDT on mosquitoes.

Larvivorous fishes: During AMM, ASHA should advise the community to introduce larvivorous fishes in water bodies that eat mosquito larva as their food. She would contact the health workers to get the larvivorous fish through the nearly hatchery.

ITN: ASHA would promote the use of bed nets by explaining the importance of using insecticide treated bednets. To maintain it is important these ITNs are not to be washed frequently and needs to be re-treated timely. She should organize camp for treatment of ITN and community owned bednet at village level.

6. Phasing of AMM Campaign

Since 2005 it has been envisaged that Anti-Malaria Campaign would not be confined to that specific month of June alone like earlier, but would be implanted in phases throughout the year. During the months of June, August, intensive activities would be undertaken through three modes, viz., umbrella campaign, localized campaign and on-ground initiatives as well as concurrent and consecutive evaluations would be completed. Localized follow up campaign as well as on ground initiatives should be continued in the months of September, October & November. The months of December to February would be the preparatory phase for the next years' AMM Campaign.

During this phase, AMM report of the previous year would be compiled, Action Plans would be drawn and BCC materials would be finalized and distributed to different levels of implementation. In the months of March to May, advocacy workshops, Task Force/Coordination Committee/ Health Committee meetings will be held apart from finalization of BCC materials and printing for distribution to states/districts/inter-sectoral partners.

7. Funds

There is no separate budget allocation for AMM since it is an integral part of BCC/IEC component of the programme. Expenditure towards the AMM campaign should be met out of the funds released for BCC/IEC.

8. Monitoring and Evaluation

Evaluation of the activities at each level of implementation by observers will be an inherent component of the AMM campaign for:

- Demonstrating that particular intervention/medium reached an served its purpose;
- Obtaining guidance for programme decisions, policy review;
- Determining whether improvements in health outcomes are causally linked to a given intervention or a given behavioral change.

A checklist and one monitoring format described in following pages.

The DMO should compile the report for PHC and sent to the State Head Quarter every month for onwards submission to Directorate of NVBDCP.

Directorate of National Vector Borne Disease Control Programme

Monitoring Checklist of AMM Campaign

Checklist for central/state/District level observation of Anti-Malaria Month

1. Site of visit (name): State/District/Block/Municipal area/Municipal council town /Sub- centre/Sub-centre/Village. **……..**

2. Date of visit: **…….**

3. Name/designation of the person/s interviewed**:** **……**

4. Name of Programme Officer/Coordinator (State/District/Block/Municipal Area/ Municipal Council/Town/Sub-centre/Village**)** **…….**

5. Is there a calendar of activities for AMM as per the guidelines? **……**

6. Date and number of Advocacy workshop held (please attach list of participants, if available; agenda; recommendations and complimentary activities undertaken) **……**

7. Is there a State Task Force, District/Block/Urban Area/Coordination Committee, and Village Health Committee? Number of meeting held prior to AMM? Agenda? **.....**

8. Number of Inter-sectoral partners initiated advocacy meeting/any other activity for prevention control of malaria or other vector borne diseases; please gives name f the organization and details of the activity. **……**

9. Number of NGOs/FBOs/CBOs/Local Self-Government involved in AMM activities/ Details of the organizations and activities. **……**

10. Type of communication employed/disseminated for social mobilization; key themes; languages used; locations/ timing of implementation. **……..**

- **Electronic/multi media:**
- TV – national/regional/local
- Radio – national/regional/FM/local
- Music video/soap operas
- Any other

- **Print media:**
- Newspapers
- Pamphlets/leaflets/booklets
- Flip charts/flash cards
- Posters/stickers
- Any other

- **Other media:**
- Banners
- Hoarding
- Wall writing
- Bus panels/Train coaches
- Public announcements /miking /drum beating
- Any other

- **Inter-personal communication:**
- Group meetings
- One-on-one meetings
- Door-to-door visits
- Song & drama
- Street play/skits
- Exhibition/health mela
- Any Other

- Procurement source of communication materials (own/supplied)? If supplied, when received? Is the quantity adequate? ……..
- Is there adequate supply of anti-malaria drugs, other logistics? Any constraints? ……
- What is the IRS schedule? When and how the advance information was disseminated to the community? Has the first round of spray started/completed? Any constraints? ..... …….
- Any re-orientation training programme organized for health sector personnel including training for Block Extension Educator/ non-health sector personnel initiated? Type? Details ……
- Is there an adequate mobilization of DDGs/FTDs/MLVs other community volunteers as well as peripheral health workers? How it was achieved? ……..
- Any action/support required form State/Central Govt. If yes, please specify. …….

For Sub-Centre/Village levels the following queries may be added:

- Total population of the area; Number of BS [active/passive (including camps at weekly markets)]; BSE during the AMM? ……
- Number of fever cases given presumptive treatment, PRT, RT? ……
- Number of severe/complicated malaria cases in the last six months? Action taken? ……..

- Number of deaths, if any. Action taken …….

_____

Name & Signature of Observer

Designation

Directorate of National Vector Borne Disease Control Programme

Monitoring Format of AMM Campaign

1. **District : …….**
2. **Name of the Village : …….**
3. **Date of Visit : ……..**
4. **Name of respective Department**

   …….....
5. **Please put √ in front of activities organized at the respective village**

S. No.	Activity	Yes	No
1.	**Team visited at all corners**		
2.	**House to house contact**		
3.	**Identification of breeding places**		
4.	**Discussion Through interpersonal communication**		
5.	**Health education to school children**		
6.	**Preparation of blood slide**		
7.	**Distribution of IEC material**		
8.	**Slogan writing at appropriate places**		
9.	**Cultural programme , Nukkad natak etc.**		
10.	**Mobil oil in stagnant water**		
11.	**Temophose in tanka/Well etc.**		
12.	**Imparted health education and interpersonal communication**		
13.	**Meeting with key personnel**		

14.	**List of fever cases prepared and handover to MO**		

6. Observation at the time of visit of visit

Number of slogan written :
……..

Slogan is readable :
…….

Number of fever cases :
…….

Name of the key persons : …….....

Material used in writing :
……

Type of IEC material distributed : ……

Any other observations : ……

……

7. Comments on working of dept.

……

……

……

8. Recommendation / Suggestion

……...

……..

……..

Name & Signature

(Monitor)

ENTOMOLOGICAL SURVEILLANCE

Entomological surveillance in the programme is being carried out with 72 entomological zones and entomological set up at Regional Offices with over all monitoring & supervision by NVBDCP in the country. The guidelines for carrying out entomological work were circulated to all the zones from time to time from the Directorate of NVBDCP. The calendar of activities by the Entomological zones for the year should be drawn in December of the previous year and sent to the State Health Directorate with copies marked to Regional Office for Health and F.W. and Directorate of NVBDCP.

Visits by Entomological Teams and Frequency

All the districts under the Entomological Zones should be visited by the zonal team at regular intervals throughout the year.

i) In the Entomological zones which have two districts as jurisdiction, the visits should be made regularly in all the months selecting two PHCs in each district.

ii) (a) In the zones which have four districts as jurisdiction, the visits will have to be made in alternate months to each district as mentioned below:-

First & second district : The visits are to be made in the months of January, March, May, July, September and November.

Third & fourth districts : The visits are to be in the months of February, April, June, August, October and December.

(b) **The zones having three districts,** the most problematic district will be considered as a single unit for monthly visits while each of the other two districts will be visited in alternate months and two PHCs in each district will be visited.

iii) (a) **In zones having six districts,** the visits will be at quarterly intervals as follows:

First and second districts : January, April, July and October

Third and fourth districts : February, May, August and November

Fifth and sixth districts : March, June, September and December

(b) **The zones having five districts,** the most problematic districts, which may be one of the **"high risk"** areas, will be considered as the unit where 4 PHCs each with high SPR will be selected for monitoring the data at quarterly interval and in the other four districts two PHCs each will be selected. The zones which have more than six districts, only one PHC will be selected in such districts.

The entomological teams will be visiting 4 PHCs every month irrespective of the number of districts in their jurisdiction. The visits may be made to cover two PHCs during the first fortnight and the remaining two PHCs during the first fortnight and the remaining two PHCs during the second fortnight.

Time to be Spent in Each PHC

A minimum of three to four days will have to be sent in each PHC.

Selection of Index Villages and Duration of Monitoring of Data

The selection of PHCs as well as index villages will be based on:-

i) High incidence of malaria with predominance of ***P.falciparum*** infection, wherever prevalent

ii) Vulnerability to epidemics and

iii) High vector density

When once the index villages are selected, monitoring of entomological data will have to be continued for a minimum of three years but not exceeding five years. After collecting the stipulated data during the said period, the monitoring of data will be done from other problem PHCs. The zones which have been collecting data from a particular PHC for five years or more, should change the PHC.

Entomological Parameters to be Collected

i) **Vector Density**

Per man hour densities of mosquitoes by aspirator tube and flash light method will be monitored by spending 2 to 3 hours by two Insect Collectors in the morning hours. This should be done in all index villages.

ii) **Pyrethrum Spray Collection (PSC)**

Whenever mosquito densities are low or more mosquitoes are required, this method may also be used as supplementary to hand collection method. Blood meal sample for precipitin test may also be collected with this method.

iii) **Whole Night Collection**

The human bait collection from 6.00 p.m. to 6.00 a.m. may be done in one of the index villages in a district. This information should be collected positively during transmission season and at least once during every quarter on indoor as well as on outdoor human baits. Animal bait collection may be done simultaneously with the human bait once during transmission season and second time during non-transmission season. Hourly collection will be separately recorded for the entire 12 hours as per the Proforma-7 at Appendix- .

iv) **Recording of Abdominal Condition and Dissection of Mosquitoes**

All the female specimens of vectors and suspected vectors will be dissected for oocysts and sporozoites after classifying the abdominal condition. The dissection of mosquitoes of whole night human bait collection is separately indicated in the proforma. A good proportion (not less than 200 females) will also be examined for parity rate during a month.

v) **Susceptibility Test**

a) **Adult Test**

The susceptibility status of all vectors and suspected vectors should be determined at least once a year in all the districts. Priority should be given to those districts where no information has been collected during the preceding give years. The tests should be done with the

diagnostic doses of DDT, Malathion and Synthetic Pyrethriod. Whenever sufficient number of mosquitoes are collected, information of LT 50 values may also be collected by changing the time of exposure.

In districts where the vector has been found to be resistant of DDT and Malathion test with Synthetic Pyrethroids may also be conducted. The impregnated papers of diagnostic doses will be supplied to entomological zones on request after procuring the same from W. H. O.

b) **Larval Test**

The larval susceptibility tests are conducted once a year in every district where larvicides/biocides are in use. If the test kit is not available in any entomological zone, the kit can be shared between the neighbouring zones till such a time that a new kit is made available. **The susceptibility tests shall be conducted on priority in the urban areas where organophosphorus compounds such as temephos and fenthion are being used as larvicides.**

vi) **Contact Bio-assay**

This test should be conducted during spray season at two weekly intervals to determine the residual efficacy of the adulticide. The zones which are not in possession of these kits (WHO) may indicate the same to the Directorate of NVBDCP and the kits will be supplied after procuring the same from WHO, along with other kits.

vii) **Aerial Bio-assay**

This test is conducted to determine the fumigant efficacy of insecticides, especially of o.p. compounds. The tests may be conducted at two weekly intervals following insecticidal spray.

Submission of Reports

The monthly technical (entomological) reports should be submitted in 11 entomological proformae every month (EF-I to EF-11). The reports should be sent by 10th of every succeeding month to the State Health Directorate, ROH&FW and Directorate of NVBDCP, Delhi.

The Annual Entomological Report may be sent by February of succeeding year.

Facilities for Entomological Team

The Entomological zones should be provided with **independent vehicle** for monitoring entomological data in different districts. Wherever such independent vehicle is not provided, the Zonal Malaria Officer may spare his vehicle to the Entomological Team for monitoring the data.

In no case, insecticide should be transported in the vehicle which is being used by Entomological Team simultaneously.

N V B D C P

List of the code no. of different vectors, insecticides and various for different proformae for entomological data computerization.

Species & Surfaces code for CMC

CODE NO.	MALARIA VECTORS	CODE NO.	TYPE OF SURFACE
01	*Anopheles culicifacies*	01	Mud plastered surface
02	*An. stephensi*	02	Cemented surface
03	*An. fluviatilis*	03	Wooden surface
04	*An. philippinensis*	04	Bamboo surface
05	*An. sundaicus*	05	Thatched surface
06	*An. dirus*	06	Others
07	*An. minimus*		
08	*An. varuna*	**CODE OF INSECTICIDE**	
09	*An. annularis*		
	FILARIA VECTORS	**CODE NO.**	**INSECTICIDE**
10	*C. quinquefasciatus*	DDT	DDT
11	*Mansonioides (M) annulifera*	MLN	Malathion
12	*M.uniformis*	BHC	BHC (HCH)
		DLD	Dieldrin
	JE VECTORS	FEN	Fenthion
01	*Culex vishnui*	PIP	Pirimiphos-methyl
02	*C. pseudovishnui*	DEL	Deltamethrin
03	*C.tritaenjorhynchus*	CYF	Cyfluthrin
04	*C. gelidus*	ICO	Lambdacyhalothrin
05	*C. fuscocephala*	TEM	Temephos
06	*C. whitmorei*	PRO	Propoxure
07	*C. epidesmus*	FTO	Fenitrothion
08	*C. bitaeniorhynchus*		
09	*Anopheles barbirostris group*		
10	*An. hyrcanus group*		
11	*An. subpictus*		
12	*Mansonioides (M) annulifera*		
	KALA-AZAR VECTORS		
01	*Phlebotomus argentipes*		
02	*P. papatasi*		
03	*P. sergenti (Vector of cutaneous leishmaniasis)*		

N V B D C P

COMPUTERISED ENTOMOLOGICAL DATA MONITORING MALARIA & FILARIA VECTOR MOSQUITO (ADULT) DENSITY.

State _____

1. District Code | | | | | | | | | |
2. PHC Name _____
   and population under spray
3. Locality _____
4. Date of collection | | | - | | | - | | | | |
5. Time of collection | | | | | Morn. | Eve.
6. Insecticide sprayed | | | |
   (code of insecticide)

	Population	Room	House	CS
7. Spray coverage %				

8. Date of spray | | | | | | | | |

Day Month Year

	Indoors	Outdoors
9. Time spent in hours		

HRS MTS HRS

10. Vectors of Malaria	Code	Male	Female	10 man-hour density
11. Other *Anopheles* (specify species)				
12. Vectors of Filaria				

N.B.- When in a PHC more than one insecticide is used, code of other insecticide(s) also to be written with plus mark.

N V B D C P

COMPUTERISED ENTOMOLOGICAL DATA MONITORING (ADULT)
DENSITY OF VECTORS OF JE AND KALA-AZAR

State _____

1. District Code
2. PHC Name _____ and total population of PHC
3. Date of collection (- - - - - -)
4. Time of collection — Morn. Eve.
5. Locality
6. Insecticide sprayed
7. Spray coverage % — Population, Room, House, CS
8. Date of spray — Day, Month, Year
9. Time spent in hours — Indoors, Outdoors
10. Vectors of JE — Code, Male, Female, 10 man-hour density
11. Vectors of Kala-azar — Code no., Density (P.M.H.)

N V B D C P

COMPUTERISED ENTOMOLOGICAL DATA MONITORING
SUSCEPTIBILITY TEST ADULT MOSQUITO FORM

State _____

DISTRICT CODE: | | | | | | | | | |

PHC NAME OR NAME OF LOCALITY _____ DATE OF TEST | | | - | | | - | | | | |

EXPOSURE PERIOD:

SPECIES CODE | | | SPECIES CODE | | | SPECIES CODE | | | SPECIES CODE | | |

	TT	D	% MORT	TT	D	% MORT	TT	D	% MORT	TT	D	% MORT
OC – CONTROL	:											
DDT 4%	:											
DL 0.4%	:											
OP – CONTROL	:											
MLN 5%	:											
FENITRO 1%	:											
CB – CONTROL	:											
PROPOXURE	:											
SP – CONTROL	:											
DELTAMETHRIN	:											
CYFLUTHRIN	:											
LAMBDACYHALOTHRIN												

TEMPERATURE : MAX : MIN :

RELATIVE HUMIDITY

TT = TOTAL TAKEN, D – DEAD, MORT = MORTALITY

N V B D C P

COMPUTERISED ENTOMOLOGICAL DATA MONITORING
SUSCEPTIBILITY TEST (LARVAL) FORM

State _____

DISTRICT CODE: | | | | | | | | | |

PHC NAME OR : NAME OF LOCALITY _____ DATE OF TEST | | | - | | | - | | | | |

EXPOSURE PERIOD: MINUTES | | | | |

	SPECIES CODE			SPECIES CODE			SPECIES CODE			SPECIES CODE		
	TT	D	% MORT	TT	D	% MORT	TT	D	% MORT	TT	D	% MORT
OP Control			**:**									
Fenthion	0.25 mg/1		:									
Fenthion	1.25 mg/1		:									
Fenthion	6.25 mg/1		:									
Fenthion	31.25 mg/1		:									
Temephos	1.25 mg/1		:									
Temephos	6.25 mg/1		:									
Temephos	31.25 mg/1		:									
Temephos	156.25 mg/1		:									
Other larvicides			:									

Temperature Maximum Minimum
Relative humidity

TT = Total taken, D – Dead, MORT = Mortality

N V B D C P

COMPUTERISED ENTOMOLOGICAL DATA MONITORING – DISSECTION FORM

State _____

DISTRICT CODE: [ ] DATE: MONTH YEAR: SPECIES CODE:

PHC NAME

ABDONMINAL CONDITION (GIVE NUMBER OF MOSQUITOES) UF F SG G

DISSECTION NO. DISSECTED [ ][ ][ ][ ] (GUT) NO + VE [ ][ ] (GUT) NO. DISSECTED [ ][ ][ ] (GLAND) NO.+VE [ ][ ] (GLAND)

OVARIAN DISSECTION NO. DISSECTED [ ][ ][ ][ ] NO NULLIPAROUS [ ][ ][ ][ ] NO. PAROUS P1 [ ] P2 [ ] P3 [ ] P4 [ ]

FILARIA NO. DISSECTED [ ][ ][ ][ ] NO. + VE FOR Mf [ ][ ]

NO.+VE FOR INFECTION WITH LARVAL STAGES I [ ] II [ ] III [ ] III ONLY [ ][ ]

AVG. NO. OF INFECTIVE LARVAE PER INFECTIVE MOSQUITO [ ][ ]

P1 ……4 = PAROUS 1, 2, 3, 4
F = FULL FED
G = GRAVID
UF = UNFED
SG = SEMI GRAVID

N V B D C P

COMPUTERISED ENTOMOLOGICAL DATA MONITORING
WHOLE NIGHT VECTOR BITING COLLECTION

State _____

DISTRICT CODE: | | | | | | | | PHC NAME | | | | | | | | | | |

DATED | | | - | | | - | | | | |
DAY MONTH YEAR

NO. OF HUMAN BAITS | | | NO. OF ANIMAL BAITS | | |

WEATHER CONDITIONS (TICK MARK) – WINDY ☐ RAIN ☐ NO WIND ☐ FOG CLOUDY ☐

NIGHT HOURS OF COLLECTION	VECTORS COLLECTED PER HUMAN BAIT				VECTORS COLLECTED PER HUMAN BAIT				ADES COLLECTED PER BAIT	
	INDOOR		OUTDOOR		INDOOR		OUTDOOR		HUMAN ANIMAL	
	VECTORS CODE-WISE		VECTORS CODE-WISE		VECTORS CODE-WISE		VECTORS CODE-WISE		INDOOR	OUTDOOR
18-19 HOURS										
19-20										
20-21										
22-23										
23-00										
00-01										
01-02										
02-03										
03-04										
04-05										
05-06										

N.B. – Per HUMAN OR ANIMAL BAIT COLLECTED VECTOR NIGHT HOURWISE TO BE WRITTEN BELOW THE CODE OF VECTOR (IN VERTICAL DIRECTION)

N V B D C P

COMPUTERISED ENTOMOLOGICAL DATA MONITORING
SPACE SPRAY TOTAL CATCH (PYRETHRUM SPRAY)

State _____

1. DISTRICT CODE: PHC | | | | | | | NAME _____ Date | | | - | | | - | | | | |
   Day Month Year

2. Time of collection | | Morn. | | | Eve.

3. Date of last spray and code of insecticide | | | - | | | - | | | | | | |

4. Place of Collection | | Human Dwelling | | M.D. | | Cattle Shed

5. Total Number of Mosquitoes colleted species wise

Malaria Vectors		Other Anophelines		Culicine		Kala-azar vectors			
Code	No. collected	Name or Code	No. collected	Name or Code	No. collected	Code	No. collected		

Weather Conditions:- Windy | | Rain | | Dry | | Cold | | Hot | |

N V B D C P

COMPUTERISED ENTOMOLOGICAL DATA MONITORING
SPACE SPRAY TOTAL CATCH (PYRETHRUM SPRAY)

State _____

District code _____ : Date: Month: Year: Species code: Surface code:

PHC name _____ :

Insecticide sprayed (write code) : | | | Date sprayed : Exposure period:

Abdominal condition (Female):	Full fed:		Gravid:		Unfed:	
Control:	No. exposed:		No. Dead:		% Mort:	
On contact surface:	No. exposed:		No. Dead:		% Mort:	
Temperature:			Relative Humidity:			

N V B D C P

COMPUTERISED ENTOMOLOGICAL DATA MONITORING
MOSQUITO LARVAL COLLECTION FORM

State _____

1. District code
2. Name of | | | | | | | Locality _____
3. Name of PHC_____
4. Date of collection | | | - | | | - | | | | |
   Day Month Year
5. Distance from nearest house (in metres) | | | |
6. No. checked

Breeding places	**No. found positive with species of mosquito (code)**	
	Vector mosquito (Code)	Other mosquito species (Give name)
- Sullage water drains		
- Cess pits		
- Cess pools		
- Septic tanks		
- OHT		
- Cisterns (Fresh water)		
- Barrels		
- Earthen pitchers/containers		
- Rejected Tyres/Utensils		
- Ornamental tanks		
- Wells-unused		
- Wells-used		
- Fresh water channels		
- Irrigation canals		
- Seepage water		
- Rice fields		
- Lakes		
- Pit/low lying water collections		
- Rain water collection		

N V B D C P

COMPUTERISED ENTOMOLOGICAL DATA MONITORING
ANALYSIS OF BREEDING PLACES POSITIVE WITH MOSQUITO BREEDING

District code _____ Locality _____ State_____ Date of collection _____
P.H.C. name _____
Per dip density in +ive breeding places

Sullage water drain	Septic Tank	Cesspits	Cesspools	OHT	Cistern/Barrel	Ornamental Tank	Wells	Irrgn. Canal	Seepage Water	Rice Field	Lake	Rain Water Collcn.	Rejected Tyre Utensil

ANOPHELES

Vector
Species code
L-I-II
L-II-IV
Pupa

CULEX

Spec:
L-I-II
L-II-IV
Pupa

AEDES

L-I-II
L-II-IV
Pupa