



TRAINING MODULE

FOR

MULTIPURPOSE WORKERS



**Directorate of National Vector Borne Diseases Control Programme
Directorate General of Health Services,
Ministry of Health and Family Welfare.**

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INTRODUCTION

Health Service functionaries to be trained / oriented in malaria control by the Medical Officer (MO) of Primary Health Centre (PHC) are Multipurpose Workers ((MPWs Male & Female). In addition MO, PHC will have to train the persons from the community whose assistance in malaria control is crucial. Other supervisory paramedicals: Health Assistant (HA), Malaria Inspector (MI) / Lady Health Visitor (LHV), may assist MO, PHC in organizing this training programme. The training can also be carried out by District Training Team and other Training Centres in the area.

MPWs are group of health service providers who have direct link and interaction with the community at large and beneficiaries in particular. The important community members to assist in malaria control activities are persons manning AWW and ASHA, Private Practitioners and Non-Governmental Organizations (NGOs). Out of these AWW/ ASHA are very important to implement Early Diagnosis and Complete Treatment (EDCT) strategy of malaria control. They will also help in implementing Information, Education and Communication (IEC/Ex BCC) strategy with reference to vector control, referral service, etc.; These volunteers from the community and MPWs will have to work shoulder to shoulder with each other and to have this kind of harmonious working relationship. It is important to create an environment of perfect understanding. Each of these persons should not only .have clear concept of their roles but also be conversant with the roles of other members as well. They should know clearly what they are supposed to do .This requires team building at the peripheral level. It is, therefore, proposed to have Effective Team Training approach for the effective and efficient working and coordination of AWW / ASHA / MPWs. This will also help in identifying the expected collective roles in malaria control efforts. The duration of this training programme will be for 3 days. Each batch should have ideally 25 candidates. Early case detection and complete treatment should be the main topic of training though other areas like IEC and selective vector control will also be covered to the extent of personal protection methods.

EXPECTED ROLE OF MPW (MALE)

A. Early diagnosis and complete treatment

- To conduct a fortnightly domiciliary house-to-house visit as per schedule developed by Medical Officer in-charge of PHC.
- To collect blood smears (thick and thin) or perform RDT from fever cases or cases with history of fever during domiciliary visits to households and keep the records in M-1. To transport slide collected along with M-1 to Lab for examination. To provide treatment to positive cases as per the drug policy.
- To advise seriously ill cases to visit PHC/referral centre for immediate treatment. The cases will be referred after collection of blood smear and performing RDT.
- To contact all ASHAs/community volunteers 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 drugs to ASHAs/community volunteers 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. To arrange for transport of such cases from the flexi-pool of NRHM.

B. Integrated vector control

- The dumping places in each village, the address of public building or private houses where dumping is to be done and the quantity of insecticide to be dumped should be known by the MPW (male) to facilitate the process.
- MPW (Male) should give advance intimation to the residents a fortnight before the actual spray date.
- He should move with the spray team showing them all the houses and verify that they are carrying out spray inside all the dwellings as per instructions. He will 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. During spray operations, he will usually be entrusted with a platoon containing 2 squads (4 pumps). Normally it will take 6 to 7 days to cover a sub-centre population of 5,000, considering on an average a pump will spray 35 to 40 houses in a day, i.e. 4 pumps to cover 140 to 160 houses (a population of 700 to 800).
- He should ensure the following during the spray:
 - 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.
- He should see that SFWs maintain their diaries as per instructions and maintain proper account of insecticides.
- He will make a record of spray output showing insecticide consumed, squads utilized, human dwellings sprayed, missed, locked, refused and rooms sprayed/rooms missed in the proforma prescribed.
- In case of refusals or locked houses, he will contact persons concerned / panchayat personnel to get mopping up done to cover these houses.
- He should consolidate the spray data of each village and work out coverage and submit the same to the PHC.
- He will assist in planning re-impregnation and distribution of bed nets, oversee the activity and provide guidance for correct use.

C. Behaviour change communication (BCC)

He will educate the community about signs and symptoms of malaria, its treatment, prevention and vector control giving importance to the following points:

- Malaria is a dangerous disease which can cause death within 48 to 72 hours, if not treated. The risk is more in the case of pregnant women and young children.
- Malaria control measures are aimed at preventing the spread of the disease and all mosquitoes and other biting insects may not be killed immediately with the indoor residual spray.
- The insecticide and effort of the spraying involves lot of expenditure and the community members should give their full cooperation to get the spray done on all sprayable surfaces of their houses.
- The effect of insecticides last for about 3 months and therefore the sprayed surface should not be tampered by mud plastering or washing.
- To prevent breeding of mosquitoes, every householder must ensure that there is no water collection around their houses.
- It is necessary to get blood examined whenever any one suffers from fever to find out whether it is due to malaria. Government agencies provide free diagnostic and treatment services for malaria.

D. Recording and reporting

- To maintain record of fever cases diagnosed by blood slides/ RDTs in M-1 and prepare a Subcentre report (M-2) for all cases in the area, including those of ASHAs and submit it to PHC by 5th of the following month.

- 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

EXPECTED ROLE OF MPW (FEMALE)

MPW (Female) will be responsible for collecting blood smears from all antenatal and post natal cases under her care as well as from infants. She will, therefore, carry out the following functions:-

A. Early diagnosis and complete treatment

- During antenatal and postnatal follow-up visits, if the pregnant woman has fever or history of fever, collect thick and thin blood smears 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 malaria treatment as per drug policy. She will obtain the results of blood smears and give treatment to malaria positives. Primaquine should not be administered to pregnant women and during postpartum period of 45 days and also to infants (below one year of age).
- If any other member in the household has fever or history of fever, to collect blood smear for microscopic diagnosis and give treatment as per drug policy.
- To take / ensure that the blood smears are sent to the nearest Malaria Clinic/PHC laboratory on priority and obtain the results and give treatment within 24 hours of malaria positives
- To refer the seriously ill cases immediately to PHC/other nearest referral centre for proper treatment. 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.
- Contact all AWW/Community Volunteers/ASHAs of her area during the visit to the village and collect blood smears and M-2 forms for transmission to laboratory. If MPW - M post is vacant or MPW - M is on leave, the duties will be carried out by MPW (F).

B. Behaviour change communication (BCC)

- To educate the community about signs and 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 and 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.

EXPECTED ROLE OF ASHA AND COMMUNITY VOLUNTEERS

ASHA / Community level volunteer

The expected role and responsibilities of the ASHA/community volunteer are as follows:

A. Early Diagnosis & Complete Treatment

- Examine all fever cases presenting to her / him as per training provided, and conduct RDT and / or collect blood smears as instructed.
- Treat non-pregnant RDT positive cases as per training provided
- Dispatch blood slides of RDT negative cases to the laboratory, as per arrangement made by the local PHC, accompanied by form M-2.
- Receive and interpret blood slide reports from the laboratory.
- Treat blood smear positive cases as per training provided.
- Observe all safety precautions in conducting blood tests and treating cases as per training provided.
- To identify warning signs of severe malaria and to assist timely referral of such cases with adequate pre-referral care as per training provided. Help arrange for funds for such transportation of patients from NRHM pools when necessary.
- Advise and assist immediate referral of pregnant women with fever to nearest appropriate institution after conducting RDT and / or collecting blood slide as per training provided.
- Identify any unusual increase in the number of fever cases in the community and to provide prompt information of fever outbreak to the MPW/MO-PHC.

B. Integrated Vector Management

- Assist MPW of the village area in ensuring adequate mobilization of the community for acceptance of IRS before the rounds.
- Assist MPW in identifying sites near the village for dumping of insecticides.
- To assist the MPW in distribution and impregnation of mosquito nets

C. BCC

- Advise positive cases about the proper treatment, danger signs and prevention of malaria.
- Provide information to the community about signs and symptoms of malaria, its treatment, prevention and vector control.
- Participate in all the village level activities planned for the Anti-malaria month.

D. Recording & Reporting

- Maintain the record of fever cases in the M-1 form and submit the form to the designated MPW in a timely manner, as per arrangements made by the local PHC.
- Ask for replenishment of stocks of RDT, slides, lancets, medicines etc., so that stocks sufficient for at least month remain with her / him at any time.

TRAINING OBJECTIVES

On completion of the training programme, the MPWs will acquire knowledge and skills in early case detection and complete treatment. At the end of the training course, the participants should be able to :

- Realise the importance of malaria as a disease in the community.
- Recognise a suspected malaria case on the basis of signs and symptoms.
- Prepare thick and thin blood films and perform RDKs from fever cases.
- Administer correct dose of ACT or chloroquine + primaquine to all age groups for falciparum malaria if RDKs are positive, as per drug policy.
- Keep the records of the individual cases, their treatment schedule and stocks of drug.
- Recognise the severe and complicated malaria cases and advise them to attend the referral centre immediately.
- Educate the community regarding malaria transmission and prevention of mosquitogenic conditions.
- Motivate the people to take personal protective measures.
- Persuade the community in getting their households completely covered under every round of indoor residual insecticidal spraying.

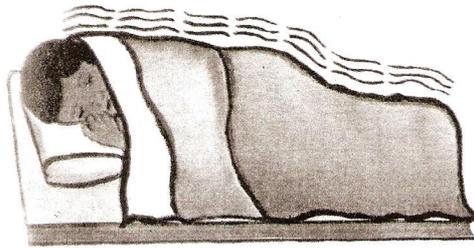
UNIT – 1: BASIC INFORMATION ON MALARIA

Introduction

Malaria is one of the major public health problems of India. At present, about 1.5 million cases of malaria with more than thousand deaths are reported every year in our country. The disease causing plasmodium parasite is transmitted from one human being to another by the bite of the female anopheles mosquito.

What are the symptoms of malaria?

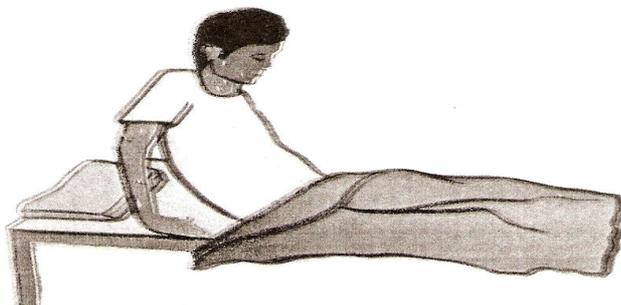
- *Patient chills or shivering followed by high fever daily or on alternate days*



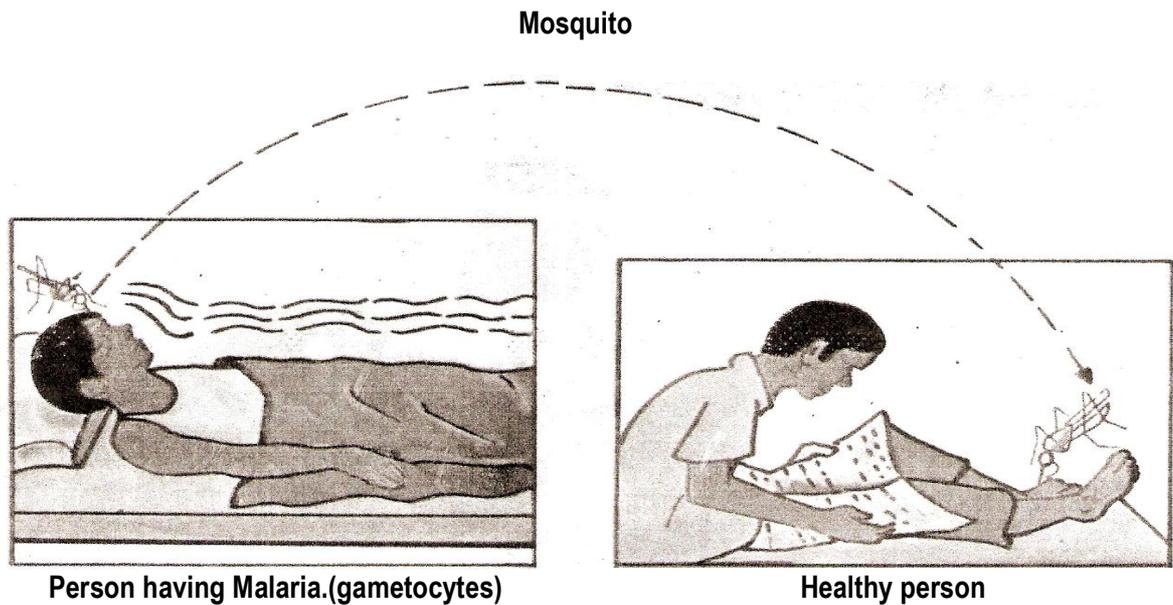
- *The patient may also complain of headache, body ache and vomiting.*



- *Fever comes down with profuse sweating.*



How is malaria transmitted?



**MALARIA IS NOT DIRECTLY PASSED FROM MAN TO MAN
ONLY MOSQUITOES TRANSMIT MALARIA,
CONTROL MOSQUITO BREEDING**

Patient complains of :

- Headache
- Bodyache
- Vomiting

Fever comes down after profuse sweating

Untreated cases may have:-

- i. Enlarged spleen
- ii. Anaemia
- iii. Weakness

If malaria parasite (*P.falciparum*) affects the brain, the cerebral malaria may lead to unconsciousness followed by death specially amongst children and pregnant women

A malaria worker should always remember that:

**MALARIA ALWAYS CAUSES FEVER AND THEREFORE ANY FEVER SHOULD BE
SUSPECTED TO BE DUE TO MALARIA IN ENDEMIC AREAS**

Mosquito

There are three common types of Mosquitoes.

1. **Anopheline mosquito:**

- wings with dark spots
 - sits at an angle of 45 degree with the resting surface
 - breeds in clean water
 - transmits malaria
- The female mosquito usually bites every third day to suck blood so that it can develop gonads and lay eggs.
 - Female Anopheline mosquito picks up malaria parasite when it bites a patient, having gametocytes in their peripheral blood.
 - It takes about 10-14 days for the development of malaria parasite (sporozoites) in the mosquito.
 - At the end of this period the mosquito is capable of infecting the man by biting to take blood meal.
 - Whenever the infected mosquito bites another person, it introduces the parasite in the healthy person. (along with saliva)
 - The person bitten by an infected female mosquito will develop signs and symptoms of malaria after 7 to 12 days.

2. **Culex mosquito**

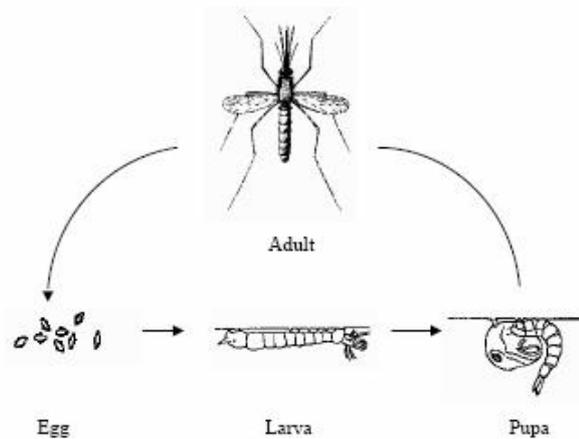
- nuisance mosquito
- breeds in dirty waters
- no dark spots on wings (plane dark wings)
- appears hunchback when sits
- transmits filaria / JE

3. **Aedes mosquito**

- dark ornamental mosquito with white spots
- breeds in clean water in containers /wells/ overhead tanks
- bites during day time
- bite is very painful
- transmits viral disease (Dengue/DHF/Chikungunia)

**MALARIA IS NOT DIRECTLY PASSED FROM MAN TO MAN
FEMALE ANOPHELINE MOSQUITOES ONLY TRANSMIT MALARIA
THEREFORE
PROTECT YOURSELF FROM MOSQUITO BITES
CONTROL MOSQUITO BREEDING**

Mosquitoes have four stages in their life cycle, namely, egg, larva, pupa and adult.



Life cycle of *Anopheles* mosquito

The female anopheles mosquito lays eggs on the surface of water in various sites like animal hoof prints, rain pools, streams, swamps, canals, rivers, ponds, lakes and rice fields. A larva hatches from the egg after about 1-2 days. The larva floats parallel to the water surface for breathing air. When disturbed, the larva quickly swims towards the bottom but soon needs to return to the surface to breathe. It feeds by taking up food from the water. The larva stage lasts about a week. The pupa is shaped like a comma and it is a non feeding stage. The pupa stage lasts for two to three days after which the skin of the pupa splits when the adult mosquito emerges.

Some mosquitoes prefer to bite human beings rather than animals, while others prefer to take animal blood. Those who prefer to bite human beings are dangerous as they are more likely to transmit malaria from person to person.

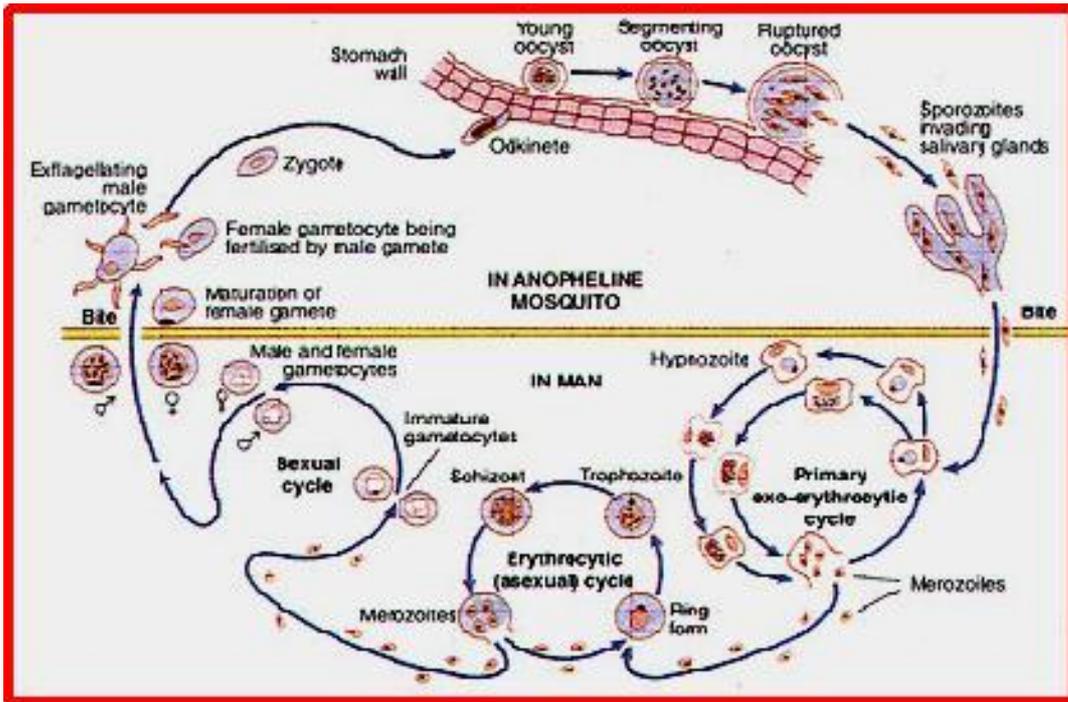
Most anopheles mosquitoes bite during night time; some bite shortly after sunset while others bite later, around midnight or the early morning. Some species of anopheles mosquitoes enter houses to bite whereas others bite mostly outside. After the mosquito takes a blood meal she usually rests for a short period. Mosquitoes that bite inside houses usually rest on walls, under furniture or on hanging clothes after they bite. Mosquitoes that bite outside usually rest on plants, in tree holes, on the ground or in other cool dark places.

Malarial Parasite

The name of the parasite causing malaria is plasmodium. In India, two types of plasmodia are responsible for almost all cases of malaria.—They are *Plasmodium vivax* (*P. vivax*) and *Plasmodium falciparum* (*P. falciparum*). *P.falciparum* is responsible for almost all the deaths due to malaria. *P. vivax* causes debilitating illness, but death due to vivax malaria is very rare.

The malarial parasite undergoes development in human beings and mosquitoes. The cycle begins when an infected anopheles mosquito bites a person and injects the parasites. Only female

anopheles mosquitoes can carry the parasite and infect human beings. Male *Anopheles* mosquitoes feed only on plant juices and nectar and cannot transmit malaria.



UNIT – 2: NATIONAL MALARIA CONTROL STRATEGY

Malaria Control programme in India

During the year 1953, the incidence of malaria in India was estimated at around 75 million cases, with about 8 lakh deaths. In that year, the Government of India launched the National Malaria Control Programme (NMCP) to combat the malaria menace. The programme was highly successful and within 5 years, the annual incidence dropped to 2 million cases. Encouraged by this success, the programme was converted to National Malaria Eradication Programme (NMEP) in 1958. By 1961, the incidence dropped to a mere 50,000 cases a year. Then, the programme started suffering serious setbacks due to various problems, and cases started rising again. In the year 1995, Malaria Action Programme (MAP) was taken up in high risk areas. The National Malaria Eradication programme was renamed as National Anti Malaria Programme (NAMP) in 1999. In 2004, the programme was integrated with other vector borne diseases control and was named as the National Vector Borne Disease Control Programme (NVBDCP).

National malaria control strategy

The aim of malaria control is to reduce morbidity and mortality of malaria to the lowest possible levels. It comprises all activities undertaken to reduce the burden of malaria in a given population. It includes early diagnosis and prompt, effective treatment of malaria cases and prevention of malaria. The three pronged strategy is as follows:

1. Early case Detection and Prompt Treatment

- Passive surveillance of cases using microscopy and RDT
- Appropriate, complete radical treatment of *P. falciparum* and *P. vivax* cases, with special emphasis on ACT for *P. falciparum* in drug resistant areas
- Referral and management of severe and complicated cases of malaria.

2. Integrated Vector Control

- Use of Indoor Residual Spray (IRS) with insecticides recommended under the Programme
- Use of bed nets treated with insecticide (ITNs) with paradigm shift towards adoption of LLINs
- Use of larvivorous fish and biocides in water bodies

3. Other measures

- Community participation
- Involving NGOs in programme strategies
- Inter-sectoral co-ordination

Main strategies of Malaria control programme in high burden areas

The main strategies of malaria control in high burden areas are:

- Universal access to care in each village of the high burden areas with ASHA or other community volunteer trained in the use of RDT and ACT.

- Universal protection of high risk populations with Indoor Residual Spray (IRS) and/or Insecticide Treated Bed Nets (ITN / LLIN) with scaling up of LLIN use which will become the main tool in future.

Three interventions of proven value are now being introduced at a large scale into the program, each of which has benefits tangible even to the lay person, and thus having high likelihood of acceptability and utilization:

Diagnosis. In places where microscopy results are available within 24 hours, microscopy will continue to be used. If there is likely to be a delay beyond 24 hours in high burden areas, rapid diagnostic tests (RDT) for *P. falciparum* are now available. These tests can be conducted at the most peripheral levels by community health workers/volunteers with simple training.

Treatment. Chloroquine will be used in all vivax malaria cases and also for falciparum cases in low endemic and drug sensitive areas. Artemisin based Combination Therapy (ACT) is now available for treatment of falciparum cases in North eastern states and 50 other districts and many blocks which are high burden areas with reported chloroquine resistance. ACT is nearly 100% effective which is not associated with any major side effects.

Bed nets. In the place of conventional insecticide impregnated bednets which required periodic reimpregnation, Long Lasting Impregnated Bed Nets (LLIN) which do not require reimpregnation and last for 3 - 5 years, would soon be available.

Accredited Social Health Activist (ASHA). A fourth component of the program which would be highly accepted is the establishment of trained ASHAs at village level. Under the National Rural Health Mission (NRHM), every village/large habitat will have an ASHA chosen from the community itself. She is an honorary volunteer, receiving performance-based incentives for promoting all health related interventions. She is given a drug kit containing AYUSH and allopathic formulations for common ailments. The NVBDCP recommends payment of incentive to ASHAs at the rate of Rs. 20/- per case tested and up to a maximum of Rs. 200/- per month. However, the state governments may modify the scheme within their allotted budget amounts.

UNIT – 3: MALARIA DIAGNOSIS AND SURVEILLANCE

Uncomplicated malaria can become severe malaria within 1 - 2 days of onset of symptoms. Early diagnosis and effective treatment will halt the progression of the disease, thereby preventing deaths from occurring.

Strategy for early diagnosis

- Prompt diagnosis of all *P. falciparum* cases with Pf RDTs at present (Kits for detecting both *P. falciparum* and *P. vivax* are likely to be available in future).
- All villages will be identified as “Slide villages” or “RDT villages” as determined by expected time taken for microscopy results to be available.
- In RDT villages, slide will be sent to the laboratory only if RDT result is negative.
- All slides will be sent as soon as possible after they are collected, even if a single slide has to be sent at a time.
- Trained ASHAs and other community volunteers will be the backbone of malaria case detection, treatment and referral in the peripheral areas.
- Emphasis will be given to passive case detection in fever cases reporting to health workers or volunteers; active case detection will continue to be done particularly in areas where there are no volunteers and also when outbreaks occur.

Suspected malaria cases

A person having malaria almost always has fever. Usually, the person gets sudden high fever and chills. The fever may come every day or every other day. Usually there is headache and body ache also. There may be vomiting. A patient with fever in endemic area during the transmission season or who has visited an endemic area without any other obvious cause of fever is considered a case of suspected malaria. Malaria should be suspected in all cases of fever when not associated with the following symptoms:

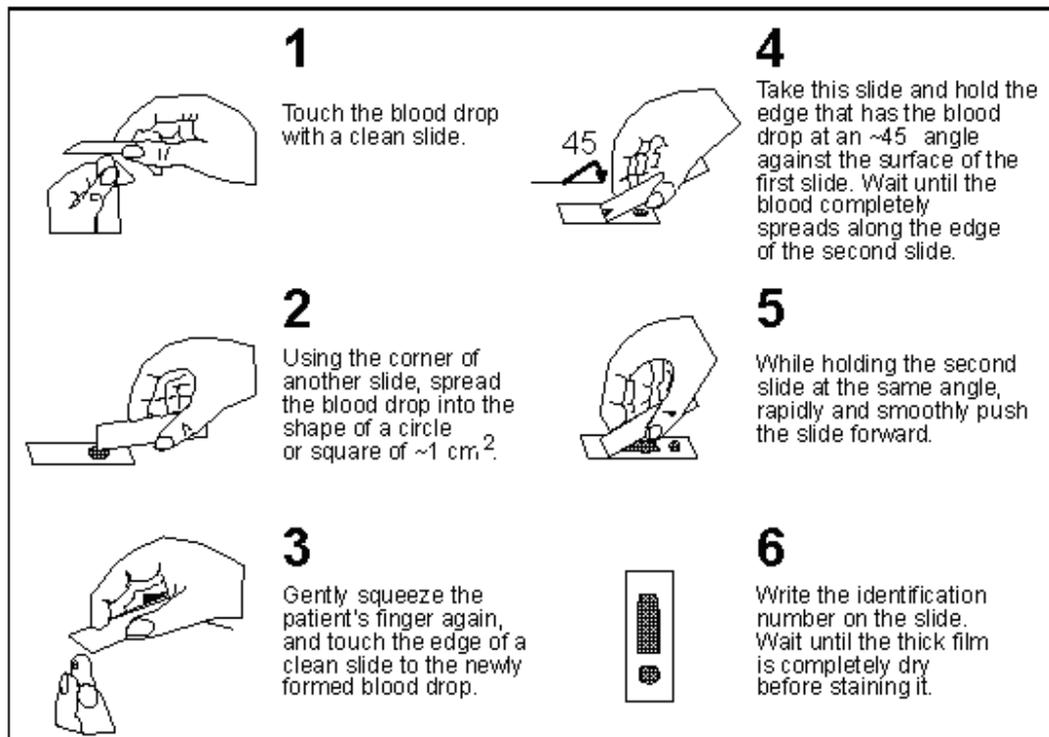
1. Cough and other signs of respiratory infection
2. Running nose and other signs of cold
3. Loose motions
4. Pelvic inflammation
5. Skin rash suggestive of eruptive illness
6. Skin infections e.g. boils, abscess, infected wounds
7. Burning sensation while passing urine
8. Painful swelling of joints
9. Discharge from ear

However, none of these symptoms can exclude malaria with certainty. Any volunteer, health worker or health professional observing a case of suspected malaria must immediately do Rapid Diagnostic Test (RDT) and also prepare blood smear for examination of malarial parasites. This may result in an overuse of blood tests in the beginning. Over a period of time, ability to discriminate between “suspected malaria” cases and “all fever” cases will develop and the number of unnecessary blood tests carried out is likely to reduce.

Drawing blood from a finger prick and preparation of blood smear

For preparation of blood smears the items required are Clean glass slides, Disposable Lancet, Spirit or Cotton swab for cleaning the finger, Cotton, Clean piece of cotton cloth, Slide box for 25 slides, Lead pencil, Register and MF form. After the patient information has been recorded on the appropriate form, the blood films are made as per the following steps:

Preparation of a thin and thick blood film on the same slide



Write with a pencil the slide number on the thin film.

When to use RDT and do blood smear examination

If a microscopy result can be made available within 24 hours to the person treating the patient (in practice on the same day of taking blood smear or the next day), only microscopy is done. Antimalarial treatment is given only on the basis of a positive slide-result.

In inaccessible areas, where microscopy result cannot be made available within 24 hours, Pf RDTs are at present supplied. An RDT is done in front of the patient and a slide is also taken. If it is positive, the patient is treated for falciparum malaria, and the slide is discarded. 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.

If the RDT is negative, the person may be having vivax malaria or fever due to any other cause. In this case, the slide is sent to the laboratory and the result is awaited. If the slide is positive for *P.*

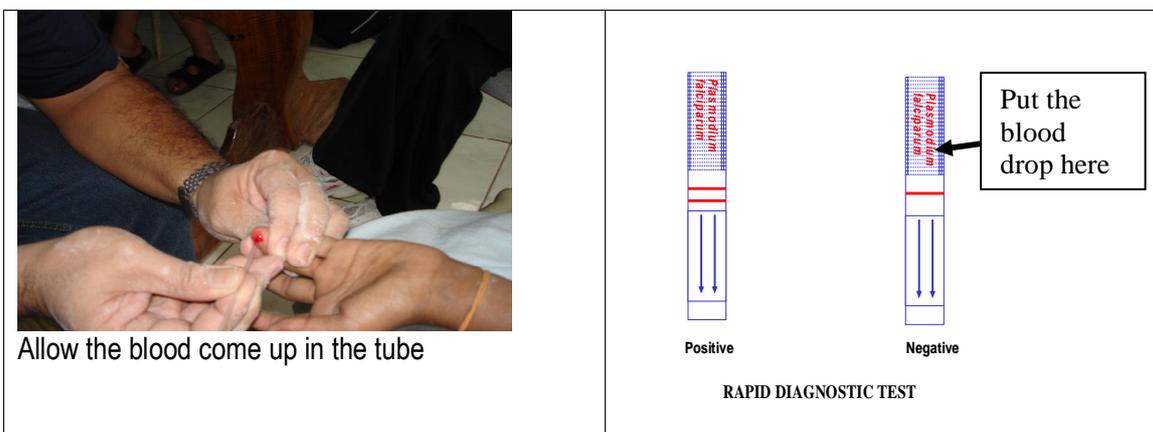
vivax, then the appropriate treatment is given. If negative, the patient should be referred to the PHC for necessary treatment.

RDTs should be used in PHCs and other health facilities only in emergencies in the absence of the laboratory technician.

Rapid Diagnostic Test (RDT)

The Rapid Diagnostic Test (RDT) is done with the Rapid Diagnosis Test Kit (RDK). This kit is regularly supplied by the government through the nearest Primary Health Center. The kit contains the following materials:

1. Spirit swabs - one swab for one patient
2. Lancets - one lancet for one patient
3. Small glass tube (capillary tube) - one for each patient
4. Test strips - one strip for one patient
5. One multiple-well plastic plate - common for all tests
6. Test tube – one test tube for one patient
7. Buffer solution or reagent solution - a special liquid for doing the test, in a dropper bottle, common for all tests



Procedure

- Take informed consent for conducting the test
- Arrange all equipment for RDT and taking blood slide
- Check that the test kit is within its expiry date. If not, do not use it.
- Open a foil pouch and check that the powder inside it is still blue. If not, discard the test and use another 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 bottle containing the liquid and the dropper.
- Place a new test tube in the multiple-well plate.
- After drawing blood from a finger, touch the tip of the small glass tube to the blood drop on the finger and let a small amount of blood 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 on the strip in the place that was covered by the paper.
- Put the used small glass tube in waste box.
- Using the dropper, place 4 drops of liquid from the bottle into the new test tube that you had placed in the multiple-well plate.
- Place the test strip containing blood in this test tube with the arrow pointing down, with the tip of the strip dipped in the liquid.
- Wait for about 15 minutes. During this time, prepare the thick and thin blood smears on a slide.
- Observe the test strip after 15 minutes. You will find one of the following situations:
 - No red line appears on the test strip - this means that the test strip is not working. Discard it and repeat the test carefully with a new test strip, starting with the first step.
 - A single red line appears - this means that the patient does not have falciparum malaria. Send a slide to the laboratory to check if the patient may have the less dangerous form, *P. vivax* malaria. The patient is to be given paracetamol, pending results of microscopy.
 - Two red lines appear- this means that the patient has falciparum malaria. Treat the patient for falciparum malaria with ACT and primaquine, in dosage schedule given in the chapter on “malaria case management”. There is no need to send the blood slide to the laboratory.

After the test has been read, put the test strip and test tube into the waste box along with all used swabs and the used lancet. Since the RDK may come from different companies at different times, there may be small differences in the contents and in the manner in which the test is done.

The advantage of RDT is that it is easy to learn, there is no need for a laboratory, and it takes only 15 minutes to get the result and patients can be treated early. The Rapid Diagnostic Test (RDT) is thus very useful for detecting the dangerous form of malaria (falciparum) early and saving lives. It is supplied by the Government of India free of cost.

Since the RDK may come from different companies at different times, there may be small differences in the contents and in the manner in which the test is done. The PHC staff will be able to clarify on this issue.

RDKs should be stored in a cool, dry place indoors and should not be exposed to sunlight. The RDT may not give you correct results if it is exposed to sunlight or if it becomes wet.

Safety precautions while doing blood tests

Blood from patients can contain organisms that can cause different diseases like HIV/AIDS, hepatitis etc. Therefore any material which has been contaminated by blood, such as swabs, lancets, used and discarded slides, test strips and test tubes should be handled with care. They should be collected in a waste box having a lid which is kept away from children. When the box is full, it should be buried in a deep pit in the ground away from wells and other sources of water.

Protecting the patient and self while doing blood tests

- Wash your hands thoroughly with soap and water before you draw blood.
- Always use a fresh lancet for each test.
- Do not touch the sharp tip of the lancet before or during the process of drawing blood.
- Do not touch blood with bare fingers at any time.
- Take care to ensure that you do not prick yourself accidentally with a used lancet.
- After the test is over, wash your hands again thoroughly with soap and water.
- Dispose of all used materials in the waste box and handle the waste box carefully.

Preidentification of “Slide villages” and “RDT villages”

Any village where reliable slide transportation and reporting mechanism is established for getting microscopy results by the next day for slides sent on a particular day can be termed a “slide village”. There is requirement of using slides and microscopy in such villages. In all villages where such a rapid mechanism cannot be established, RDTs should be made available and these villages will be termed “RDT villages”; both RDTs and slide will be used in these villages as described in preceding paragraphs.

Every health care provider (MPW/ASHA/community volunteer) must know whether the particular village is a “RDT village” or “slide village” and act accordingly. Slides are important in “RDT villages” also, for example, if one out of 10 RDTs are positive, the other 9 cases will depend upon the slide result for diagnosis. Even in “RDT villages” slide transportation and reporting mechanisms have to be made quick and strong, as patients and providers will be waiting for slide results in order to give the necessary correct and complete treatment. In the process, the ASHA might be repeatedly harassed for the results by the patient or attendant.

Mechanisms to expedite slide transportation and reporting

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 be 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. For obtaining the results from the laboratory, all these measures may be utilized and in addition, telephones (landline/mobile/SMS in local language) may be used. 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.

It should also be ensured that the slide numbering system and data entry are simple enough for the ASHA/community volunteer to comprehend and act. The reporting should also be clear and unambiguous for the ASHA/community volunteer to read and interpret correctly. If any reporting is done over the phone, special attention should be paid for identification of the patient correctly. The ASHA/community volunteer must all care to ensure that the slides are protected from any damage en route.

Active case detection (ACD) and passive case detection (PCD)

Quality care is expected to attract more patients to come early to the health worker and will therefore increase passive case detection (PCD). In villages where there is no trained provider for early diagnosis and effective treatment, active case detection (ACD) must be implemented with fortnightly visits by the MPW and necessary treatment given.

Outbreak detection and response

MPWs will monitor fever and suspected malaria cases to detect outbreaks early. ASHA/volunteers will also be trained to immediately report any “unusual” increase in fever cases to the nearest subcentre (MPW) or PHC (by phone) or even by going personally

Role Play Exercises

Exercise-1 (Householder X Health Workers)

The trainees are divided into groups. The first group members will act as householders while the second group members will act as health workers making domiciliary visits. In the role play, the health worker will put four questions in a prescribed order regarding the incidence of fever. He will collect thick and thin smears from the fever cases and note the particulars in M-2. He will also calculate the dose of Chloroquine according to age and administration of the drug so as to ensure that the drug is swallowed in his presence. Every trainee will have to role play the role of a health worker and subsequently as a householder for the other batch.

Exercise-2 (Health Worker X Lab. Technician)

The trainees are divided into batches, one batch will act as laboratory technician while the other batch will act as health worker.

In the role play, the health worker will hand over the blood smears along with M-2 of his area and also from his neighboring ASHA/AWW/ NGOs.

The Lab. Technician will check the blood smear, its quality and compare the blood smear numbers with M-2 brought by the health worker. He will advise to rectify the defects in making an ideal blood smear and entries in M-2.

The Health Worker will enquire from the Lab. Technician whether the blood smears dispatched on the previous Wednesday along with M-2 from self and other voluntary organizations were received intact.

The Lab. Technician will verify the records and furnish the information as well as needful advice regarding the receipt of blood smears dispatched from the periphery on every Wednesday.

The Health Worker will collect the results of blood smears examined and list of positive persons for administering radical treatment.

The Health Worker will also calculate the replenishments of drugs, microslides blood smear preparation materials and forms for each ASHA/AWW/ NGO in the area.

Exercise-3 (Drug administration to positive case)

The trainees are divided into two batches. One batch will act as drug administrator for radical treatment while the second batch will act as malaria positive case. The drug administrator will inform the malaria positive case about the treatment schedule or RT and will impress upon him the need for compliance of full course of treatment. He will determine the course of treatment. He will calculate the requirement of 4-aminoquinoline and 8-aminoquinoline according to the age and administer the first day's dose so as to ensure that the drug is swallowed in his presence. (mock play with a glass of water, etc.) he will inform the time of his next day's visit for administering the second dose and so on.

He will enquire from the married women in the reproductive age group found positive whether she is pregnant. It should be remembered that pregnant women, infants and chronically ill old persons should not be given primaquine. Such cases should be referred to the PHC medical officer for advice.

UNIT – 4: MALARIA TREATMENT

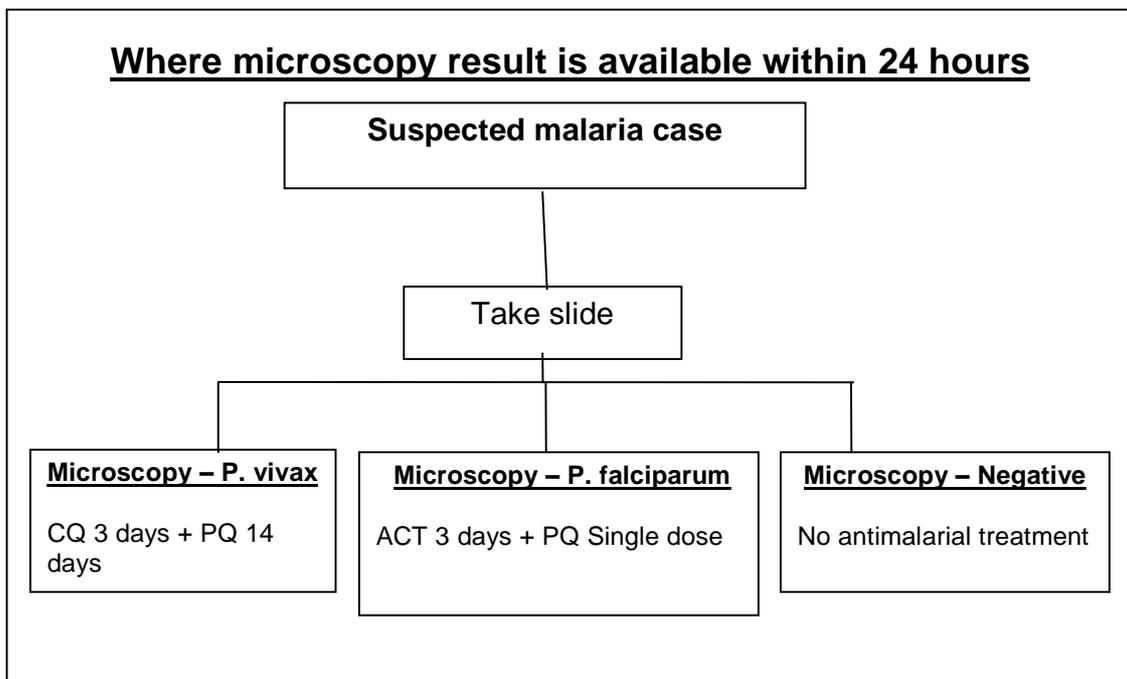
All fever cases diagnosed as malaria by either RDT or microscopy should be promptly given effective treatment. The medicine chosen will depend upon whether the patient has vivax malaria or falciparum malaria as diagnosed by the blood test. The first dose should always be given in the presence of the health volunteer/worker. The blister pack with remaining tablets is given to the patient/caretaker to take home with clear instructions.

If the patient is a child under 5 years or pregnant, ask the patient to wait for 15 minutes after taking the first dose. If it is vomited within this period, let the patient rest for 15 minutes, and then give the first dose again i.e. open a new blister-pack and discard what remains of the old. If the patient vomits the first dose again, it is considered a case of severe malaria, refer the patient immediate to the nearest Block PHC/ CHC/ Hospital.

Explain to the patient / caretaker that

- If the treatment is not completed as prescribed, the disease may manifest again with more serious features and would be more difficult to treat.
- To report back if there is no improvement in the condition after 24 hours or the condition becomes worse

Figure: Fever Diagnosis and Treatment Algorithm

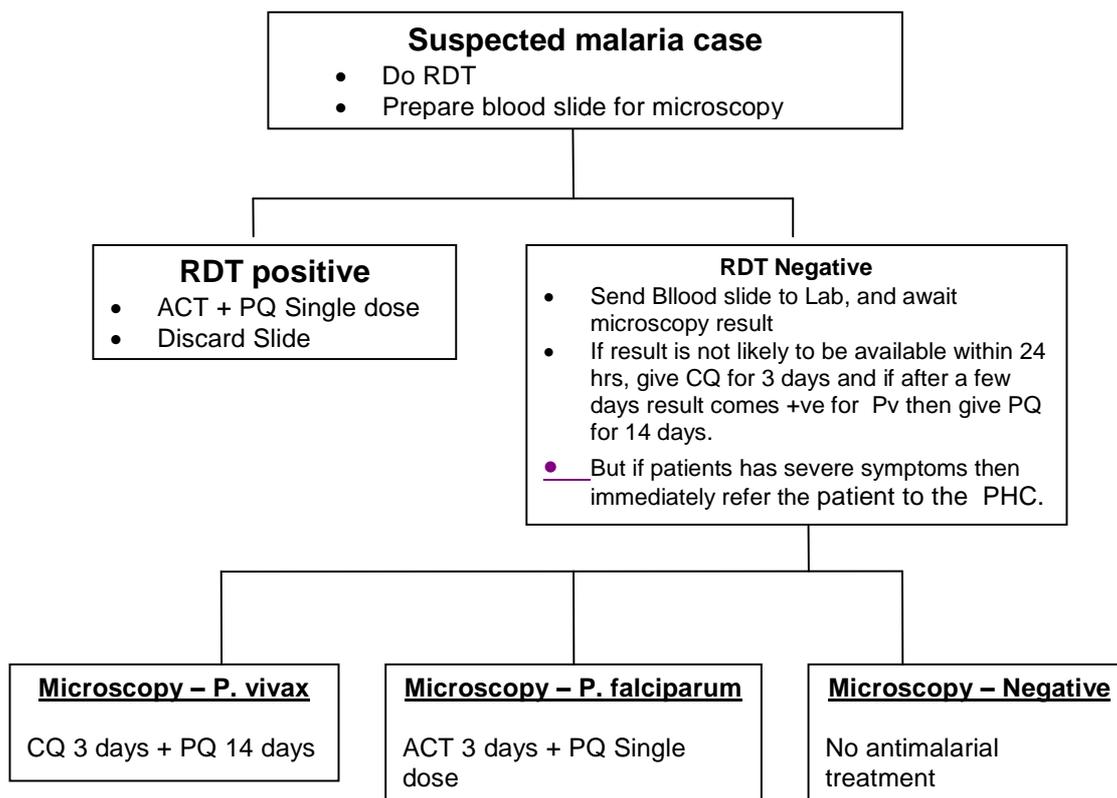


ACT - Artemisinin-based Combination Therapy (Artesunate + Sulfadoxine-Pyrimethamine)

CQ - Chloroquine

PQ - Primaquine

Where microscopy result is not available within 24 hours



Note: PQ is contra-indicated in pregnancy and in children under 1 years.

Treatment of falciparum malaria

If the RDT or microscopy gives a diagnosis of falciparum malaria, the patient should immediately be treated with Artesunate (AS) + Sulfadoxine-Pyrimethamine (SP) and Primaquine (PQ Large tablet – 7.5 mg) as follows:

| Age | Day 1 | | | Day 2 | Day 3 |
|------------------|--|-----------|-----------------|-----------|-----------|
| | AS tablet | SP tablet | PQ large tablet | AS tablet | AS tablet |
| Less than 1 yr | ½ | ¼ | 0 | ½ | ½ |
| 1-4 years | 1 | 1 | 1 | 1 | 1 |
| 5-8 years | 2 | 1 ½ | 2 | 2 | 2 |
| 9-14 years | 3 | 2 | 4 | 3 | 3 |
| 15 yrs or more | 4 | 3 | 6 | 4 | 4 |
| Pregnancy | Do not treat. Refer to hospital | | | | |

AS tablets are given for three days and SP tablets are given on the first day only. All tablets for a day should be taken together and swallowed with water. In addition, primaquine (PQ Large) tablets should be given on the first day. primaquine prevents falciparum malaria from spreading to others. Primaquine tablets should be taken after a meal, not on an empty stomach. Children less than one year old and pregnant women should not be given primaquine.

As pregnant women having falciparum malaria cannot be given AS and SP and require different medicines, they should not be treated by MPWs. Also, falciparum malaria in pregnancy can be dangerous for the woman and for the unborn child. Therefore, all pregnant women who are RDT positive should be asked to go to the nearest PHC or hospital immediately, without delay.

Treatment of vivax malaria

Vivax malaria is diagnosed by microscopic examination of blood smear at the laboratory. Chloroquine (CQ) is effective in killing the malaria organisms in the blood and immediately curing vivax malaria. If the report is positive for vivax malaria, the patient should be contacted and treated with two drugs, as follows:

| Age | Day 1 | | Day 2 | | Day 3 | | Days 4 to 14 |
|----------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|-----------------|
| | CQ tablet | PQ small tablet | CQ tablet | PQ small tablet | CQ tablet | PQ small tablet | PQ small tablet |
| Less than 1 yr | ½ | 0 | ½ | 0 | ¼ | 0 | 0 |
| 1-4 years | 1 | 1 | 1 | 1 | ½ | 1 | 1 |
| 5-8 years | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| 9-14 years | 3 | 4 | 3 | 4 | 1½ | 4 | 4 |
| 15 yrs or more | 4 | 6 | 4 | 6 | 2 | 6 | 6 |
| Pregnancy | 4 | 0 | 4 | 0 | 2 | 0 | 0 |

Primaquine should not be given to children less than 1 year of age and pregnant women.

CQ is given daily over 3 days, as showing in the dosage chart. All tablets for a day should be taken together. They should be swallowed with water. However, some vivax malaria parasites are hidden in the liver, and are not killed by CQ. These organisms may come out in the blood stream after a few weeks or months, and again cause malaria. So, it is important to give another medicine that can kill such hidden parasites. Primaquine is a medicine which is effective in killing such organisms. Primaquine (PQ small - 2.5 mg) tablets should be given daily for 14 days, as shown in the dosage chart. All tablets for a day should be taken together. They should be swallowed with water.

Both, CQ and PQ should be taken after food, never on an empty stomach, because they sometimes cause pain and vomiting when taken on an empty stomach.

Treatment of mixed infections with both *P. vivax* and *P. falciparum*

Sometimes, the laboratory report on the slide test may show that the patient has both types of malaria, vivax and falciparum. In this case, the patient should be treated with three drugs, AS, SP and Primaquine (PQ small), as shown in the dosage chart. Pregnant women having both types together should not be treated but should be sent to the hospital immediately.

| Age | Day 1 | | | Day 2 | | Day 3 | | Days 4-14 |
|------------------|--|-----------|-----------------|-----------|-----------------|-----------|-----------------|-----------------|
| | AS tablet | SP tablet | PQ small tablet | AS tablet | PQ small tablet | AS tablet | PQ small tablet | PQ small tablet |
| Less than 1 yr | ½ | ¼ | 0 | ½ | 0 | ½ | 0 | 0 |
| 1-4 years | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 5-8 years | 2 | 1 ½ | 2 | 2 | 2 | 2 | 2 | 2 |
| 9-14 years | 3 | 2 | 4 | 3 | 4 | 3 | 4 | 4 |
| 15 yrs or more | 4 | 3 | 6 | 4 | 6 | 4 | 6 | 6 |
| Pregnancy | Do not treat. Refer to hospital | | | | | | | |

Diet

Malaria patients may not feel hungry at all but may be permitted to eat any food they are able to eat without any restrictions. .

Fever cases which are negative for malaria by both RDT and microscopy

When RDT is negative, the blood slide is sent to the laboratory. Paracetamol tablet is given to the patient for relief from fever, while one waits for the report from the laboratory. If the patient is appearing to be very sick, but is RDT negative, it is best to send the patient to the nearest hospital.

If the laboratory report on the blood test is also negative, the patient must be informed that she or he does not have malaria, and that there must be some other cause of fever. The patient may seek further guidance from the PHC or hospital.

Recording of treatment

The result of RDT or slide should be entered by ASHA/ MPW in M-1 form. In case of blood slide, the date of receipt of result is to be entered. This will indicate the time lapse between the date of slide collection and receipt of results. If RDT has not been performed then simply a cross (X) should be marked. Depending upon the species, ASHA/MPW will decide the anti-malarials to be administered and these will be entered in M-1 form. The date of starting and completing the treatment will also be entered.

Severe and complicated malaria cases

Severe malaria may be suspected, if the patient does not get relief from symptoms of malaria within 48 hours, and/or headache/fever continues to increase. When the patient with fever without any complications comes to the MPW, they should invariably instruct the patient that if he/she does not get relief within about 48 hours and / or headache / fever continues to increase, the patient should report to nearest PHC / CHC / hospital. The following criteria will be used for such referral:

- Persistence of fever after 48 hours of initial treatment.
- Continuous vomiting and inability to retain oral drugs.
- Headache continues to increase.
- Dry, parched skin, sunken face
- Too weak to walk in the absence of any other obvious reason.
- Confusion, drowsiness, blurring of vision, disorientation
- Convulsions, muscle twitchings
- Bleeding disorders
- Suspicion of severe anaemia
- Yellow coloration of eyes

Such patients should be referred immediately to the nearest PHC/CHC/Hospital. Serious complications can arise in *P.falciparum* infection over a short time and lead to death, if not treated promptly and adequately.

In children, febrile convulsions, repeated vomiting and dehydration are common if the temperature is high, therefore 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 severe anemia may develop rapidly. They are also at high risk of abortions.

Preidentification of referral centres

Every volunteer / health worker should know from the MO-PHC as to which is the hospital to which a case of severe malaria should be referred as this is so very important to ensure that the patients do not waste time by going to the wrong places.

Common problems for reluctance to go to hospital and solutions

| Problems | Possible solutions |
|---|---|
| Attendant is not convinced about the seriousness of the illness | The harm that can occur if treatment is delayed must be explained. Local examples of patients with similar illness who suffered from complications or died because of delay in going to the referral centre may be cited. |
| Attendant/patient is scared of the treatment and tests that are carried out in the hospital | The attendant/patient should be explained clearly that the injections, IV treatment and some of the tests do cause some pain but are helpful in the |

| | |
|---|--|
| | recovery of the patient |
| Attendant/patient does not have faith in the services provided at the referral hospital. They have heard of bad outcomes in other patients with similar illness | Local examples of the patients who have recovered fully following a timely referral may be given. |
| The attendant/family has heard that the staff in the hospital is rude and they do not care | Someone in the community who knows someone in the referral facility can also be useful |
| The attendant/family is worried about the expenses in the hospital for diagnostic tests and treatment and those incurred on transport and food | It should be explained that poor patients can get free treatment or may be charged very nominally. If needed, credit may be arranged. |
| The attendant/patient is worried about who will look after the children and other members of the family if the attendant/patient were to be shifted to a hospital | The possibility of another family member or a neighbour looking after those who are left at home should be discussed. In the absence of relatives, help from neighbours or the community may be sought |
| There are difficulties in transporting the patient | Community support can be requested for rendering help. |

UNIT – 5: VECTOR CONTROL – INDOOR RESIDUAL SPRAY

Vector Control Methods

Interventions using vector control methods are related to three major control measures:

Adult mosquito control

- Indoor residual spraying (IRS)
- Insecticide treated nets
- Space spraying

Reducing human-vector contact

- Insecticide-treated mosquito nets (ITN)
- Improved housing
- Repellents and mosquito coils

Larval control

- Source reduction
- Larviciding
- Larvivorous fish

Indoor Residual Spray (IRS)

In rural areas, high-risk populations must be protected by either IRS or bed nets. In such contexts, bed nets will be preferred in those areas where IRS is operationally difficult to execute satisfactorily.

Before and more usually after biting, most of the mosquitoes rest on walls, ceiling or in other dark areas inside the house. If the surfaces they rest on have been sprayed with residual insecticide, the mosquitoes may eventually pick up a lethal dose and be prevented from transmitting the parasite to another person. Even though the indoor residual spray may not kill the mosquitoes instantaneously, it will reduce their life so much that the malaria parasite cannot develop in the stomach of the mosquito sufficiently to spread the disease to another person.

Correct spraying requires the careful preparation of the rooms to be sprayed. In particular, all food, cooking utensils, bedding and clothes must be protected from the insecticide by taking them outside the house before spraying starts; and all portable furniture and any pieces of furniture leaning against the walls should be removed so that the walls and all sides of all the pieces of furniture can be sprayed.

Generally, all the interior walls and ceilings are treated. In addition to permanent human dwellings, field huts where people sleep during the planting or harvesting season should be sprayed. The underside of furniture, back of the doors, outside eaves and porches must be treated. Human

dwelling 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.

Spray Technique

The required quantity of insecticide should be issued to the squads each day by the supervisor after checking balance stocks available from previous day's supplies. The insecticides used under the NVBDCP are available as wettable powders. For IRS, the insecticides in use are DDT 50% WP, Malathion 25% WP and synthetic pyrethroids (WP). Malathion 25% WP is used in areas with DDT resistance. Three rounds of spray with malathion are done as against two rounds of spray with DDT.

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 quantity of the insecticide used per 10 litres of water will depend on the insecticide used and is given in table below:

| S. No. | Insecticide | Quantity of insecticide added to 10 L water | Area (in sq.m) covered by 10 L suspension |
|--------|--------------------------|---|---|
| 1. | DDT 50% WP | 1 kg | 500 |
| 2. | Malathion 25% WP | 2 kg | 250 |
| 3. | Deltamethrin 2.5% WP | 400 g | 500 |
| 4. | Cyfluthrin 10%WP | 125 g | 500 |
| 5. | Lambdacyhalothrin 10% WP | 125 g | 500 |
| 6 | Alphacypermethrin 5%WP | 250 g | 500 |

The required quantity of the insecticide is measured with a plastic mug and put inside 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 barrel of the stirrup pump is put in the bucket containing the spray suspension. One man operates the pump and the other man sprays. In the case of compression sprayers, only one sprayer is required for the spray process. The spray lance should be kept 45 cm (18 inches) away from the wall surface. The swath should be parallel. Spray is applied in vertical swath of 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 should 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 fine 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 daily summary of spray operations should be maintained by the field supervisor and verified by the health workers showing the areas covered, percentage room coverage and insecticide consumption in the tables as below:

Protective measures

The removal or physical protection of all foodstuffs and cooking or eating utensils is imperative. In addition, inhabitants should be advised not to enter a sprayed room until the spray is dry, and to sweep all floors before allowing free entry into the house. This is particularly important for families with small children or indoor domestic animals that may have greater contact with the floor.

The use of protective devices and safe working practises is essential to avoid or reduce the contamination of spraymen, packers and mixers with the insecticide. In most spraying programmes in which insecticides of low acute toxicity (such as DDT) have been used, it is sufficient to wear overalls, broad-brimmed hats to cover the neck of the overalls, gloves and shoes or boots (the openings of which should be covered by the long trousers of the overalls). More toxic or more irritating insecticides require more elaborate protective devices such as light masks, goggles, visors and respirators.

Packers and mixers have a higher risk of contamination and should therefore use rubber gloves, masks or respirators and protect their eyes with a visor made of transparent plastic attached to the hat. Squad leaders must enforce safe practises and the appropriate use of protective devices. They must be familiar with early signs of intoxication and monitor members of their squad for any sign of poisoning.

Basic precautions to prevent unnecessary contamination include:

- Hands and face should be washed after filling each pump charge.
- Eating, drinking and smoking should be forbidden, except after washing and before starting to spray.
- Spraymen should not be exposed to insecticide for more than six hours each day.
- Overalls and hats should be washed daily, especially if they have been heavily contaminated.

- Spraymen must take a shower at the end of each day's work.

Empty insecticide containers must be collected by the team supervisors and brought to the central storage area for proper disposal by qualified staff. It is also essential to follow the recommendations for the disposal of larger metal containers. Reuse of containers is always dangerous.

Acceptability of IRS and Community Participation

Involvement of Panchayats in successful IRS is essential. 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 so as to facilitate the villagers to extend full cooperation in getting the spray inside human dwellings.

UNIT – 6: INSECTICIDE TREATED BEDNETS AND OTHER VECTOR CONTROL MEASURES

Ordinary untreated mosquito nets provide limited physical barrier between mosquito and man; mosquitoes may still bite through the net or get inside the net following improper use. Mosquito nets treated with insecticides provide better and effective protection by keeping away mosquitoes as well as killing them.

Insecticide treated bed nets can be either conventional ITNs or Long Lasting Impregnated Nets (LLINs). Conventional ITNs must be treated once or twice a year (depending on the duration of the transmission season). LLINs are mosquito nets, whose fibres have been impregnated with insecticide by a special technique, so that the insecticidal effect is maintained through about 20 washes, or as long as the net can withstand daily usage, i.e. 3-5 years.

It can be assumed that an average household has 5 members (2 adults and 3 children). It is then possible for one bed net to cover on average 2.5 persons and two bed nets to cover an average household. Thus, for a given village the number of bed nets is usually equal to the number of households multiplied by 2 or the total population divided by 2.5.

In addition to distribution to targeted high-risk villages, bed nets should be given to pregnant women in high risk areas and to special groups such as children in tribal schools and hostels.

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.

The following activities should be completed by the health worker and Community health volunteers like ASHA prior to the distribution of the mosquito nets:

- Survey of the area
 - number of households
 - number of persons in each household
 - number of pregnant women and children under 5 years of age
 - number of mosquito nets in use
 - knowledge, attitude and practices
- Identification and involvement of
 - community representatives
 - self help groups
 - women's organizations
 - NGOs
- Preparation of the list of beneficiaries
- communication among the community for the regular and proper use of mosquito nets; for ensuring that especially pregnant women and young children sleep under a mosquito net; insecticide treatment of the bed nets and proper care of the bed nets

- Selection of site(s) and persons for insecticide treatment of the nets. Training of personnel and necessary items required for insecticide treatment should be arranged

Health workers at health facilities and community health volunteers should provide key information on use of bed nets 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. 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.

How to Treat the Net – 10 Steps for Mass Retreatment

- Mass treatment is done at fixed/designated sites.
- Insecticide treatment is recommended for synthetic nets (nylon, polyester), as treatment of cotton nets is not cost-effective and effect of insecticide is not long lasting.

Step 1: The necessary equipment consists of mosquito nets, insecticide, basin, measuring container, rubber gloves and 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: 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) is ½ liter (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 will not be used for food, drinks, medicines etc.

Step 4: The amount of insecticide needed to treat a net depends on type of insecticide used. Follow instructions on the container, sachet or packet. Generally, 10 –15 ml of insecticide is required to treat one net. Store the 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: Always treat 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 net and allow excess liquid to drip back. Do not wring the treated net.

Step 7: Let the net dry flat in the shade on plastic sheets. Later, the net can be hung up in the shade to complete drying.

Step 8: Following treatment of all available nets, the 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 bury in a hole away from habitation, animal shelters, drinking water sources, ponds, rivers, streams.

Step 9: 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 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 off water used for washing / rinsing in the toilet or in a hole away from habitation, animal shelters, drinking water sources, ponds, rivers, streams. The net 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 must be treated twice a year in areas that have a lot of mosquitoes all year long.

Some Useful Tips

- Use the insecticide-treated net every night, all year round, even if mosquitoes are not seen / heard.
- 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.

Mosquito nets may be treated at the household (home treatment) or community (mass treatment) levels. Mass treatment by trained personnel may be provided by dipping centres and mobile teams.

Distribution of the nets

Efforts should be made to distribute insecticide impregnated bednets before the transmission season. While distributing bednets the following points should be considered:

- Generally, for a targeted village, the required number of nets should be distributed in one single operation.

- If sufficient nets are available, they can be delivered according to household size
- Villagers are informed of the date and place of delivery in the village at least two weeks in advance. Each household is asked to send only one representative.
- The ITNs/ LLINs are given to the householders, who acknowledge receipt with a thumb-print or a signature.
- The delivery is done by volunteers, who are trained on the spot and supervised by MPHWS.
- MPHWS uses the opportunity to interview some people queuing, know people's concerns regarding impregnated LLINs and answer them. He/she holds a talk, when the queue is at its largest, refers to the concerns he has heard and motivates people for correct use of the LLINs.
- After the session is over, MPHWS plans follow-up activities with ASHA, AWW especially periodic home visits with one-to-one communication.

Transport of ITNs/ 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.

Post Distribution Activities

Periodic visits will 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 a most important measure. Arrangements will also be made for re-impregnation of conventional nets annually or bi-annually prior to the high transmission season (s)

Other vector control measures

Breeding places of mosquitoes

Mosquitoes breed in

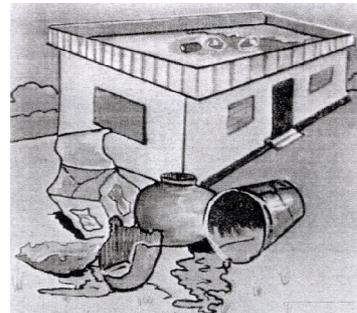
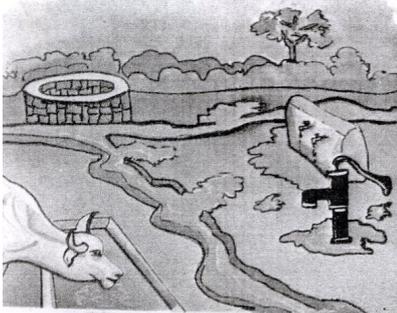
- Earthen pots
- Water storage
- Cattle troughs
- Broken discarded containers pots/tyres with water collection
- Desert coolers and overhead tanks
- Wells
- Burrow pits
- Water collections near taps/Hand pumps/ wells
- Any other fresh water collection including roof tops, rain water collections
- Drain/canals/culverts/ditches/ponds/park/paddy fields
- Seepage water form canals/ streams
- River pools / forest pools / water reservoirs.

Where do mosquitoes breed?

Inside and around the houses

Earthen pots
 Broken discarded tins / pots, etc.
 Coolers
 Water collection near tap or hand pumps
 Blocked drains

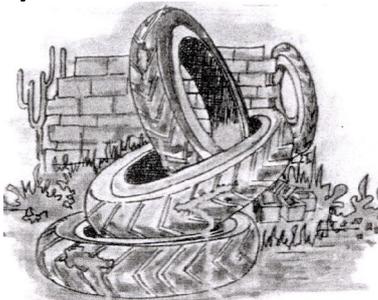
water tanks
 Wells
 Cattle troughs
 Stagnant water in kitchen garden



Cart wheel ruts
 Hoof prints
 Tyre marks

Seepage water from canals or stream
 Discarded containers
 Riverbed pools

tree holes
 Low-lying areas
 Dead Canals



In the villages

Drains on ditches -
 Puddles -
 Rainwater Pools- -
 Culverts -
 Roadside ditches -

Ponds
 Channels
 Small Canals
 Paddy fields
 Wells



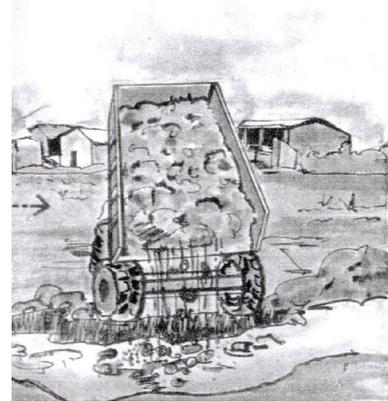
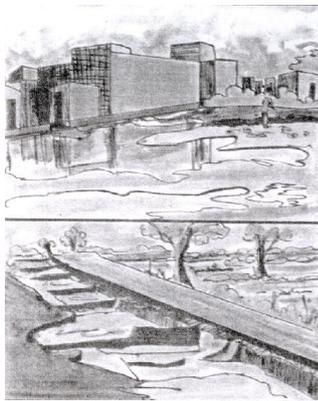
How do we control mosquito breeding?

Empty water from all utensils/ pots/ tins/ cans every week.

Drain troughs, small water collections in coolers and barrels and water collections near hand pumps, taps, etc.



Fill and level depressions in kitchen garden, courtyard, roof, open space in the village. Level or pave roads to avoid hoof or cart wheel ruts, fill ditches by the side of road and canals



Close all water containers with tight lids. Similarly overhead tanks and wells should have standard cover

Release small mosquito eating fishes (larvivorous fish) in small ponds.

Methods of controlling Mosquito Breeding

1. Close water container with tight fitting lids.
2. Empty water form all utensils, tins, cans, pots, etc. every week
3. Drain troughs small water collections in coolers, barrels near hand pumps, tanks and wells.
4. Fill up and level depressions in kitchen gardens. Court yards, roofs, open spaces in villages roads, ditches along the roads and canals.
5. Release mosquito eating fish in ponds and pokhers.

Larvivorous fish

Fish have been widely used in public health, since as early as 1903. One of the most successful and widely used biological control agent against mosquito larvae is the top water minnow or mosquito fish *Gambusia affinis*. Fish other than *Gambusia* which has received the most attention as a mosquito control agent is *Poecilia reticulata*, the common guppy.

Fish have been extensively used for mosquito control in the urban malaria scheme under the National Anti Malaria Programme. In recent years some of the states have extended the use of fish *Gambusia* and *Poecilia* to rural areas in suitable breeding places as a supplementary measure for vector control. All the states have also been advised to upscale the use of fish as biological control method in rural areas. The following guidelines have been prepared to guide the states in the use of fish for vector control.

Advantages of use of Fish

- These fishes are self-perpetuating after its establishment and continuous to reduce mosquitoes larvi for long time.
- The cost of introducing larvivorous fish is relatively lower than that of chemical control.
- Use of fish is an environment friendly method of control.
- Larvivorous fish such as *Gambusia* and *Poecilia* prefer shallow water where mosquito larvae also breed.

Characteristics of Larvivorous Fish

- Should be small in size to survive in shallow water.
- Should be surface feeders and carnivorous.
- Should be able to survive in the absence of mosquito larvae.
- Should be easy to rear.
- Should be able to withstand a wide range of temperature and light intensity.
- Should be hardy and able to withstand transport and handling.
- Should be insignificant/useless as food for other predators.
- Should have preference for mosquito larvae over other types of food available at the water surface.

Hatcheries

- Fish hatcheries should be established at state, district headquarters, CHC/PHC and subcentre levels and other places so that adequate quantities of the fish are available for supply.
- There should be a constant supply of fresh water so that the required level of water in the tank does not drop.
- Submerged vegetation such as hydrilla, vallisneria should be available in the tanks.
- Salinity of water should not exceed 20 grams per litre. These fish may survive salinity up to 52 gms. per litre. But it cannot reproduce at this salinity level.
- Hatchery should not be subjected to strong water current and should be protected from heavy rains and floods.
- Entire tanks should be brick made, lined with good quality of cement plaster, thickness of wall about 0.5 m.
- The tank should be divided into two portions of equal size of 5 m X 4 m with central separator of 0.5 m thick.
- Area – sufficiently big for construction of 2 tanks of 5 m X 4 m (one for laying young ones and other for holding mature full grown fish).
- Depth of water in the hatchery should be 1.5 m.
- Proper outlet at the bottom of tank should be provided.
- Overflow outlet about 5 cm below inlet protected with proper wire mesh to prevent escape of fish.
- Floor of tank 0.5 m thick with slope from the partition towards sides.
- Proper inlet at 1.25 m height.
- Bottom of tank covered with uniform thickness of sand for about 10 cm.
- The bottom should be seeded with organic matter about 2 kg/m².
- The tank should be allowed to mature for 10–15 days.
- Minimum 25% of water should be replaced once a week.
- The fishes should be transferred from the tank to avoid over population.
- In case of scarcity of natural food, artificial food such as waste flour (atta) may be given. Chlorination of water beyond the tolerance levels, or presence of insecticides can be lethal to the fish.

Chemical larviciding

Chemicals are used in breeding sites that cannot be drained, filled or where other larval control methods are too expensive or impossible to use. They are indicated only for vectors which tend to breed in permanent or semipermanent water bodies that can be identified, and where the density of the human population to be protected is sufficiently high to justify the treatment. Thus, larviciding is restricted to urban areas, labour or refugee camps and development projects.

The residual effect of larvicides varies considerably depending on the water quality and type of the breeding place, but is relatively short for most larvicides. Most treatments must be repeated at fairly short cycles which may vary from 2-10 weeks. Temephos and Fenthion are the commonly used larvicides. However, one should consult the MO-PHC to know their correct use before they are used.

Screening

House protection with screening of windows, eaves and doors is an effective method of reducing human-vector contact, if properly implemented and maintained.

Repellents, mosquito coils and protective clothing

The use of repellents and protective clothing are useful for people who are outdoors during peak vector biting periods. Most repellents have a very short duration of effect and are costly. Mosquito coils and mats are popular, especially in urban areas. Cloths that cover most of the body, i.e. long sleeve jackets and shirts, trousers and soaks can provide a certain level of personal protection from mosquito biting.

UNIT – 7: COMMUNITY PARTICIPATION

A list of actions that communities must be encouraged to take is given below.

Early Diagnosis and Treatment

- Spreading word about availability and reliability of RDT & ACT
- Spreading word about need of early reporting for testing and treatment of fever cases
- Facilitating quick transport of slides to the laboratory

Insecticide Residual Spray

- Informing people about necessity of IRS
- Spreading the word about dates of spray
- Accompanying spray teams to convince residents about the necessity of IRS

Bednet Distribution and Reimpregnation

- Informing people about consistent and correct use of bed nets
- Determining convenient dates for impregnation work
- Providing labor for impregnation

Referral Services

- Arranging vehicle for patients with severe malaria to be transported to referral institution

UNIT – 8: BEHAVIOUR CHANGE COMMUNICATION (BCC)

The community members must be educated on the following to achieve malaria control

Whole community

- Any fever could be malaria
- Malaria can be dangerous and therefore should be treated in time
- MPW can test and tell immediately if any one has the dangerous kind of malaria or not
- MPW has free medicines which are very effective against all types of malaria
- Go immediately to the MPW or trained ASHA/community volunteer 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

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
- In the case of ITNs - Bring this net back to me every six months, I will dip it in insecticide for you.
- In the case of LLINs - This is a special and expensive bed net. If you wash this infrequently (once every few months), the effect of the net will last for 3-5 years.

Before and during the IRS round

- Make sure you are available when the spray team comes 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, or mud plaster/paint over it

Patients with a positive RDT

- You have malaria of the dangerous kind
- Taking ACT tablets in the correct dose will cure
- 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 the hospital. Mention the name of the hospital which will give free and correct treatment.

Patients with a negative RDT

- You do not have malaria of dangerous kind, but it could still be malaria
- The slide will be sent for testing and results will be made known to you in _ days time
- You can take these paracetamol tablets in advised dose 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, report to the PHC/hospital

UNIT – 9: RECORDING AND REPORTING

Until now MPWs were involved in active case detection by house to house visit. Over the years shortage of these MPWs had led to poor surveillance activity in the programme. The integration with NRHM and induction of ASHAs as the first point of contact with the health care delivery, has called for further modification of reporting requirements.

Monitoring

Case Detection and Management Forms - M-1, M-2, M-3 and M-4.

- M-1 : Report of Surveillance by ASHA/ MPW/ Health facility
- M-2 : Laboratory Request for Slide Examination
- M-3 : Record of slide Examination in PHC Laboratory
- M-4: Fortnightly Report of Cases From Subcentre/ PHC/ District/ State

Integrated vector Control Forms - VC-1, VC-2, VC-3 and VC-4

- VC-1: Primary record of IRS
- VC-1S: Wall Stencil
- VC-2: District IRS output Form
- VC-3: Primary record of bednet delivery and impregnation
- VC-4: Bednet Delivery and Impregnation form

An overview of these records and reports is provided below. The relevant formats should be referred to.

Case Detection and Management

M-1: Fortnightly Report of Fever Cases by ASHA/ MPW/ Health facility

M-1 is the primary case record for all suspected malaria cases. It is actually a list of all fever cases. This form is to be filled by any health worker (MPW) / trained volunteer (ASHA/AWW) who is directly involved in case detection and treatment.

In M1, each row corresponds with one patient's 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 will be assigned a code for entry. In exceptional cases where a fever case is a visitor to the village, 991/ 992 is filled in the respective column.

Type of blood collection is filled as A or P for active case detection (ACD) / passive case detection (PCD) respectively. For all purposes the ASHA/ CHV/ MO PHC will be passive agencies. 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 by house visits by MPW 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, number of tablets, referral and deaths if any are to be sequentially entered in the form.

Slide number is started fresh at the beginning of each year and continued over the subsequent months. Any positive test result is to be marked in red with a tick (✓). Entries up to Col 13 are filled for all patients at the time of first contact. 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 and Col 14 to 18 are filled accordingly on receipt of results.

The lower part of the form consists of record of supplies. Opening balance at the beginning of the month, stock received, stock used and closing balance should be entered by ASHA or other service providers after physical verification of stocks. The MPW/ASHA/ CHV will fill M-1 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 M-1, the MPW will enter the summary of cases. The MPW will compile M4-SC by compiling the M-1 of all ASHAs and adding details from his/ her own M-1.

M-2: Laboratory Request Form for Slide Examination

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 the laboratory for further examination. Areas where RDTs are not supplied also rely on microscopy for diagnosis.

M-2 is the Laboratory Request Form for slide examination. It 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 M-1. It is to be sent to PHC lab whenever required, e.g. if 2 slides collected by an ASHA in a day and are needed to be examined, they are entered into M-2 and sent to the PHC laboratory. The result of microscopy and feed back on smear quality are filled by the laboratory technician (LT). All efforts should be made by LT to examine the slides on the day of receipt or the following day and results sent back to ASHA/ CHV/ MPW on the same day as examination of blood slides. The results obtained are entered into M-1 by ASHA/ CHV/ MPW.

M-4: Fortnightly Report of Cases

It is a village-wise/ provider-wise / subcentre wise monthly consolidation of all M-1 forms belonging to a subcenter/ PHC area. The M-1 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 M-4. During compilation the MPW will fill out aggregates of each health care provider in the subcentre area in one row and in the last row enter the compilation of his own M-1. The report is made in triplicate and 2 copies are forwarded to PHC on the 25th of the month for the 1st fortnight and 10th of the following month for the 2nd fortnight.

Vector control

VC-1: Primary Record of IRS

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 number, 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 VC-1 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.

VC-1S: Wall stencil

Wall stencil (VC 1S) is to be written by SFW on each house after the house has been sprayed; date, round, insecticide and squad number are mentioned on the stencil as applicable. In SR/ TR the number of rooms sprayed / total number of rooms is entered.

VC-3: Primary record of bed net delivery and impregnation

The Primary record of bed net delivery and impregnation (VC-3) 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 number of nets available at the household level.

The top left corner of the form pertains to information on the dates of survey, impregnation and 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). Columns 7 and 8 pertain to the actual no. of ITNs/ LLINs distributed in the village in the current year. The total number of ITNs (available in columns. 5 and 7) in each house impregnated in the current year is entered in column 9. Based on the number of bed nets available, distributed and impregnated the number of effective bed nets in each house hold is estimated in column 10. The top right corner is a summary of bed net coverage in which percentage of houses with at least two effective nets is entered. The stock status of synthetic pyrethroids is summarized in the lower part of this form.

VC-4: Bednet Output Form

Bednet Output Form (VC-4) is a village/ subcentre/ PHC wise compilation of bednet impregnation and distribution activities. The village level VC-3 is submitted by MPW (M) to the PHC at the completion of bed net distribution and impregnation activities.