

MINISTRY OF HEALTH AND SOCIAL SERVICES

**National Policy and
Strategy for Malaria
Control**

November 1995



Republic of Namibia



WORLD HEALTH ORGANIZATION

Foreword

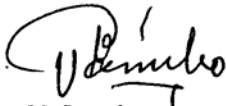
Each year, malaria affects an estimated 300-500 million people world-wide, with over one million deaths. Ninety percent of these cases are in sub-Saharan Africa. In Namibia, there are some 400,000 cases of malaria each year with 300-400 deaths (approximately 5-10% of total deaths), mostly amongst pregnant women and young children, but affecting all age groups.

The situation has grown worse in recent years, with the spread of chloroquine resistant falciparum malaria. Malaria, however, remains a treatable and preventable disease using currently available tools. The burden of malaria illness and death can only be reduced by applying these tools in the right place and at the right time, with emphasis on sustainability.

The MOHSS considers the control of endemic disease, including malaria, a priority, as outlined in the 1990 Policy Statement. To this end, the National Vector-borne Disease Control Programme (NVDCP) was established in 1991 and forms an integral part of the Primary Health Care (PHC) system in Namibia.

The National Policy and Strategy for Malaria Control describes the goals, malaria control strategies, and activities at all levels of the health care system. It is intended to inform both health workers and the general public as to the part they can play in the reduction of malaria morbidity and mortality to the lowest possible levels.

This policy will be subject to periodic revision based on new information emanating from applied research.


Dr. N. Iyambo
Minister of MOHSS



Preface

In Namibia, malaria remains the most serious problem of public health in terms of both morbidity and mortality. It is responsible for approximately 150 paediatric deaths each year, approximately 15% of total child mortality. In 1990, Namibia experienced an epidemic which claimed more than 300 lives in all age groups. Malaria is therefore a major health problem which requires urgent and effective control. It is under this climate that the National Vector-borne Disease Control Programme (NVDCP) was established in Namibia in 1991. This policy document does not provide a single solution to the problem of malaria but the goals and strategies are clearly defined.

The ultimate goal for malaria control is to prevent mortality and reduce morbidity and socio-economic losses due to malaria. The four basic malaria control strategies are: To provide early diagnosis and prompt treatment; To plan and implement selective and sustainable preventive measures, including vector control; To detect early, contain or prevent epidemics; To strengthen capacities in basic and applied research. Success in achieving this goal depends upon political support from the highest level.

Malaria control is not the concern of health workers alone. It requires the involvement of community members, educators and environmental workers, and in particular; water supply, sanitation, and community development must all work together in the fight against malaria. Community-based action for malaria control must be sustained and supported by intersectoral collaboration at district, national and international levels by monitoring, training and evaluation and by operational and basic research.

This policy statement forms the basis of the malaria control programme in Namibia. Once this strategy is implemented, better and more efficient use of resources will achieve the ultimate objective of malaria control: the prevention of death and reduction in the suffering from malaria.


Act Permanent Secretary
MOHSS



List of Abbreviations

DDT -	Dichloro-diphenyl-trichloroethane
DEET -	Diethyl toluamide
MOHSS -	Ministry of Health and Social Services
NVDCP -	National Vector-Borne Disease Control Programme
PHC -	Primary Health Care

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1. Background

Malaria is a major public health problem in Namibia, especially in the northern regions of the country. The first extensive survey on malaria prevalence and distribution was carried out between 1947 and 1951. This survey showed that 64% of the population in Okavango and 49% in the then Ovamboland were infected with malaria. It also showed that 90% of children in Okavango and 58% of the 2-5 year age group in Ovamboland were infected. The potential for malaria transmission was found to be high in the northern regions and low in the central and southern regions.

In August 1965, residual house spraying with DDT was started as a measure to control malaria. This resulted in a marked reduction in malaria infection in the general population. Malaria control activities, however, deteriorated during the war during the late 1980's, and coupled with several years of drought in the 1980's which will have reduced immunity in the population, led to the devastating malaria epidemic of 1990. Recently, malaria outbreaks have also begun to appear in both central and southern regions.

In 1991, the Ministry of Health and Social Services (MOHSS) launched a comprehensive programme to control malaria and other vector-borne disease. The programme was initially called the National Malaria Control Programme, but was later renamed the National Vector-borne Disease Control Programme (NVDCP) to include plague and schistosomiasis. Through this programme a number of activities have been undertaken to improve disease management, including training of health workers, intensification of house spraying and improved reporting through the Health Information System.

2. Current Malaria Situation in Namibia

Malaria is the leading cause of ill health and deaths among both children and adults, particularly in the northern regions where about 60% of the population lives. Malaria in Namibia is seasonal with the potential for epidemic outbreaks, which are related to exceptional rainfall.

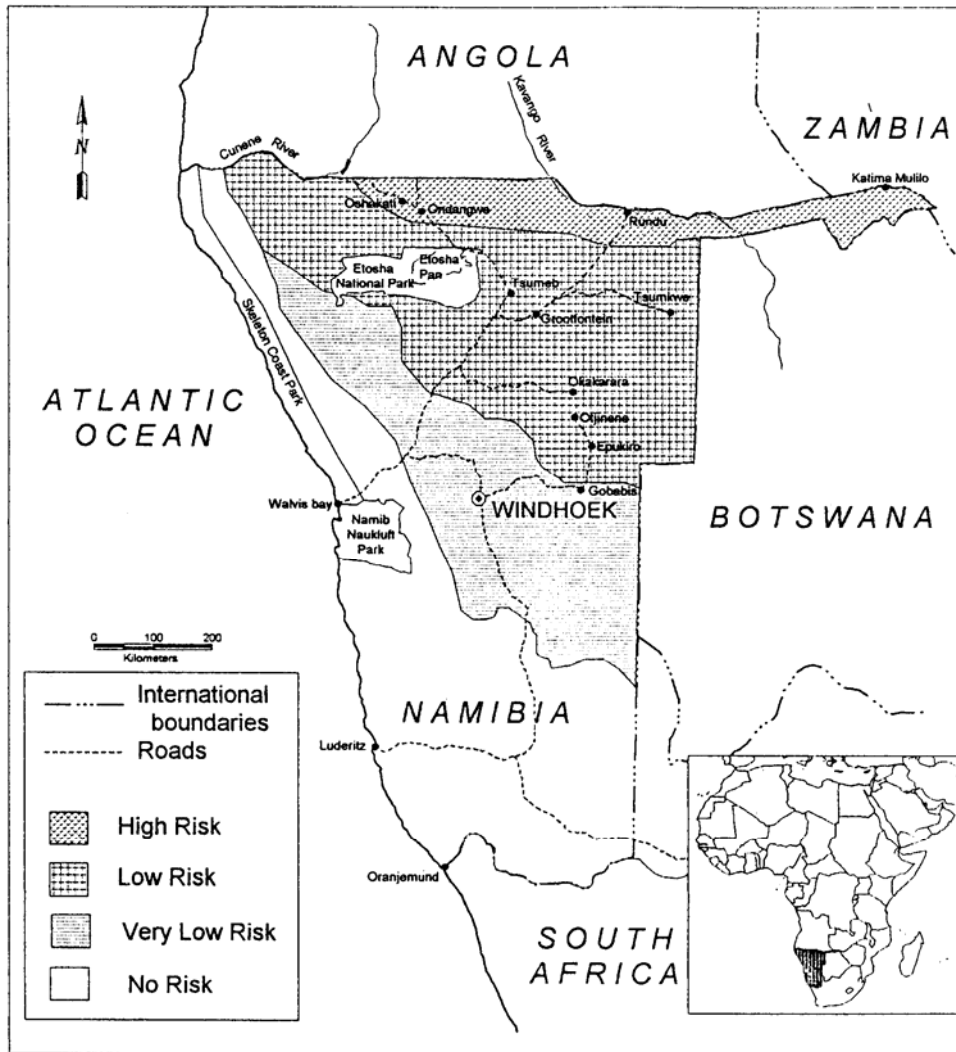
In a typical year, there are some 120,000 new cases of malaria in children under 5 years, accounting for some 20% of all out-patient diagnoses in this age group. Malaria is second only to upper respiratory tract infections as a cause of ill health in children. Malaria accounts for approximately 14% of all deaths recorded from children's wards, coming second only to diarrhoea. Malaria is also a leading cause of out-patient attendance for older children and adults, and a major cause of deaths.

The North-East Health Directorate (Kavango and Caprivi) has the highest rates of malaria illness and death. In 1994, malaria accounted for 51% of hospital admissions among children in the North-East Health Directorate, 22% in the North-West Health Directorate, 15% in Central Health Directorate and 1% in the South Health Directorate. The distribution of malaria out-patient attendances and deaths shows a similar pattern.

The malaria risk areas in Namibia are shown in Figure 1.

Despite significant improvement in disease management through a new national management policy, special health care staff training in diagnosis and treatment, and the development of the PHC approach, the number of malaria cases has risen steadily from year to year. This increase may be, at least in part, due to improved reporting following the introduction of a new and more efficient Health Information System and the vast expansion of PHC services. The situation is further complicated by the increasing resistance of falciparum malaria to chloroquine (currently up to 40%). Malaria remains the number one problem of public health importance in Namibia.

Figure 1: Malaria risk areas in Namibia



3. Factors Influencing Malaria Transmission in Namibia

3.1 Climate

The occurrence of malaria in Namibia is closely related to temperature, rainfall and humidity. Malaria endemicity is highest in the north-east, decreasing towards the west and south west. The rainy season in Namibia is from about November-April, with peak rains in February-March, however, rainfall is extremely variable from year to year. In the north-west (and parts of the central and south regions), malaria transmission is seasonal and follows the onset of the rains, with a peak between February and May. In these regions, low humidity and lack of standing water, especially in September and October interrupt the malaria transmission cycle. The north-east (Okavango and Caprivi) is characterised by high average temperatures, high rainfall and high humidity; conditions conducive to mosquito breeding and parasite development. There are also permanent rivers and malaria transmission is perennial with a seasonal peak during the middle to the end of the rainy season. As a result, malaria in the north-east tends to be more stable whereas in the north-west it is of a more unstable nature and there is the risk of epidemics. In contrast, the coastal regions and most of the south are free from malaria transmission due to the unsuitably dry weather conditions.

3.2 Mosquito breeding, feeding and resting habits

The three major malaria vectors of sub-Saharan Africa; *Anopheles arabiensis*, *Anopheles gambiae* and *Anopheles funestus* are all found in Namibia. *Anopheles arabiensis* has the widest distribution in the northern regions and is likely to be the principal vector. It breeds in a variety of habitats including rain puddles and oshanas (flat, low-lying areas subject to annual flooding). This species increases in number following the onset of the rains. It feeds on both man and animals, and feeds both indoors and outdoors. *Anopheles gambiae* is less common in Namibia. It breeds in similar habitats to *An. arabiensis* and tends to bite man more than animals. It feeds and rests indoors. *Anopheles funestus* breeds in more or less permanent water bodies, including streams, and is less dependent on rainfall. It is mostly found in the north east of the country. It feeds mainly on man, and feeds and rests indoors.

The breeding, feeding and resting habits of the vectors have important implications for malaria transmission and the selection of appropriate control measures. Indoor resting populations can be effectively controlled by residual house spraying. The malaria vectors in Namibia tend to feed at night and therefore personal protection measures such as bednets may be effective in preventing malaria transmission.

3.3 Drug Resistance

Plasmodium falciparum is the malaria parasite responsible for 97% of malaria infections in Namibia. *Plasmodium falciparum* has developed resistance to chloroquine, the drug of first choice in malaria treatment. In Namibia, resistance was first detected in Ovamboland in 1984. A survey carried out in Rundu in 1991 showed a level of resistance to chloroquine of about 6%, and evidence from a third study carried out in Ombalantu in 1993 further confirmed that chloroquine resistance is on the increase (up to 40%), reflecting a pattern seen world-wide.

The implications of drug resistance are serious because patients who do not respond to chloroquine will require a more expensive alternative drug. Despite resistance, chloroquine remains the drug of first choice in the treatment of uncomplicated malaria. Drug resistance must be monitored annually in Namibia.

3.4 Immunity to Malaria

Populations exposed to year round malaria transmission acquire a degree of immunity to malaria infection. The predominantly seasonal nature of malaria transmission in northern Namibia prevents individuals from acquiring strong immunity to malaria. In addition, pregnant mothers and young children from malarious areas will have a lower degree of immunity and are therefore more at risk of severe disease, as are tourists and visitors from non-malarious parts of Namibia.

4. Goals and Objectives

4.1 Goal

To prevent deaths and reduce illness and social and economic losses due to malaria through progressive improvement and strengthening of local and national capabilities.

4.2 Objectives

1. To build capacity at national, regional and district level for the planning and supervision of malaria control activities. This strategy aims to meet the target by the year 2001.
2. To promote the use of personal protection and vector control measures that can be applied and sustained, and are affordable to the community, through PHC.
3. To train health personnel in early diagnosis and correct management of malaria patients.
4. To develop guidelines on case management and vector control.
5. To establish a monitoring and evaluation system for malaria control activities and utilisation of the existing Health Information System.

4.3 Malaria Control Strategies

1. To provide early diagnosis and prompt treatment.
2. To plan and implement selective and sustainable preventive measures, including vector control.
3. To detect early, contain or prevent epidemics.
4. To strengthen capacities in basic and applied research to permit and promote the regular assessment of Namibia's malaria situation, in particular the ecological, social and economic determinants of the disease.
5. Malaria control should, wherever possible, be fully integrated into the Primary Health Care system, with the full participation of the relevant communities.

5. Control Activities

5.1. Disease Management

Early diagnosis and prompt and correct treatment of malaria will shorten its duration and prevent the development of complications and the great majority of deaths.

The disease management practices of malaria in Namibia are described in detail in the National Guidelines:

1. Diagnosis and treatment of uncomplicated (simple) malaria (Annex 1)
2. Management of severe and complicated malaria (Annex 2)

These address the criteria for diagnosis of malaria, the role of diagnostic tools (microscopy/clinical examination), treatment regimes, the malaria drug policy, the structure of the referral system and patient education. These guidelines are subject to periodic reassessment and revision as appropriate.

5.2. Disease Prevention

Assessment and analysis of the Namibian malaria problem is essential before an appropriate and effective control strategy can be designed and implemented. Information on illness, deaths, the malaria parasites, the mosquito vectors, the human population and the environment is required and must be regularly updated and assessed.

5.2.1. Personal Protection

(i) Nets

Use of mosquito nets at night will protect the individual from the bites of mosquitoes and other insect pests. The efficacy is increased when the material is impregnated with a pyrethroid insecticide. Impregnated bednets can provide protection to individuals and families, and may reduce malaria transmission in the community when used on a large scale. The beneficial effects of treated bednets have been demonstrated in other African countries including The Gambia and Tanzania.

(ii) Protective Clothing

Light-coloured protective clothing such as long sleeved shirts and trousers worn at night reduces mosquito bites.

(iii) Mosquito Repellents

* burning coils and pellets containing pyrethrum.

* insecticide aerosol cans.

* substances applied to exposed skin and clothing (those containing DEET are most effective).

(iv) Screening doors and windows

Mosquito-proofing of dwellings with netting over doors and windows can considerably reduce indoor biting.

5.2.2 Chemoprophylaxis

Chemoprophylaxis is only recommended at present for special risk groups, notably pregnant women, nonimmune travellers and nonimmune persons living in malarious areas for short periods e.g. labour force, police, army.

It is recommended that pregnant women, very young children, and the very old should carefully consider the urgency and need to travel to areas where there is transmission of *P. falciparum*, particularly where there is drug resistance.

(i) Pregnant women

The risk of severe or fatal malarial disease is greatest in areas of unstable transmission such as those encountered in Namibia, and can cause maternal death, abortion, still birth, premature delivery and low birth weight.

The drug of first choice in Namibia is chloroquine, two tablets weekly (300 mg base). This can be supplemented with Proguanil (100 mg/day)

(ii) Nonimmune Persons (e.g. travellers)

The WHO recommendation for travellers to Namibia and from non-malarious areas within Namibia is chloroquine and proguanil:

Chloroquine

Adults - 2 tablets weekly (300 mg base), beginning one week before travel, continuing once weekly while in the malarious area and for six weeks after leaving the malarious area.

Children - 5 mg/kg body weight taken at the same intervals as per adults.

Fully breastfed babies - half the recommended dose for children (2.5 mg/kg).

Partially breastfed babies (less than four feeds per day) the full recommended dose for children.

Proguanil

Adults - 2 tablets daily (200 mg base), beginning one day before travel, continuing daily while in the malarious area and for six weeks after leaving the malarious area.

Children - 3 mg/kg body weight taken at the same intervals as per adults.

Fully breastfed babies - half the recommended dose for children (1.5 mg/kg).

Partially breastfed babies (less than four feeds per day) the full recommended dose for children.

5.2.3. Vector Control

The control of vector mosquitoes is undoubtedly the best method of protecting a community against infection with malaria. Vector control measures are of particular relevance in areas where transmission is seasonal and unstable and vector breeding places are restricted.

Selective vector control, consisting primarily of residual house spraying with 75% DDT wettable powder at 2 g per square metre, will be carried out in the endemic regions of the North-West and North-East Health Directorates. In addition, residual house spraying will be carried out in high risk areas of Central and South Health Directorates e.g. Grootfontein, Tsumkwe, Opuwo, Otjinene, Epukiro. The spray round should begin four months before the start of the transmission season, in September.

An assessment of the epidemiological impact of the spraying programme should also be undertaken.

Evaluation of secondary insecticides, e.g. deltamethrin, should be completed in the event that the efficacy of DDT is reduced by vector resistance. There is no evidence of resistance at present.

In addition, control measures directed against mosquito larvae will be carried out in suitable situations e.g. urban areas and selected rural areas. These may include spraying of larval habitats with the insecticide Temephos, which can be safely added to drinking water, and source reduction by environmental management.

5.2.4 Community Participation

All disease prevention and control strategies depend on the co-operation and involvement of the community. This can be enhanced by raising public awareness through the use of mass-media, audio-visual materials and health talks. Education and training of local community members on malaria transmission, identification of mosquito breeding sites, potential interventions and areas of possible community involvement should be implemented. Local political support will greatly enhance the effectiveness of campaigns designed to increase community participation and awareness.

5.3 Prevention and Control of Epidemics

The ability to detect early, prevent and control epidemics is an essential component of malaria control. Forecasting of epidemics will be based on analysis of information identifying high risk periods, geographical areas and populations at risk. Relevant climatic indicators include rainfall, humidity and temperature. If conditions appear suitable for malaria transmission, special surveys of mosquito distribution and density will be conducted.

Health workers should be trained to recognise epidemic indicators and to make accurate, timely and complete reports. Indicators include number of acute fever episodes and also the quantity of drugs consumed.

A rapid response plan should be in place to act in the event of an epidemic. This should include the rapid mobilisation of appropriate vector control measures, coupled with the distribution of curative drugs. There should be a central reserve of drugs, insecticides and spraying equipment ready for rapid deployment in the event of an epidemic.

6. Operational and Applied Research

An operational research component will be built into the programme to improve the efficiency of operations, assess cost-effectiveness and find solutions to problems.

Research priorities include the following:

- * Stratification of geographical and ecological zones for malaria control.
- * Assessment of current diagnostic capabilities, particularly microscopy availability and quality at different levels of the health service.
- * Identification of problems in drug distribution and availability and suggestions for improvement.
- * Assessment of the functioning of the Health Information System.
- * In-depth analysis of hospital data to identify trends in different age groups and define population groups at risk.
- * Retrospective analysis of existing climatic, ecological and health data to help develop methods of epidemic forecasting.
- * Assessment of currently available control tools for their efficacy, cost-effectiveness, acceptability and usage in areas with different ecological and epidemiological characteristics.
- * Periodic assessment of parasite resistance to antimalarial drugs.
- * Monitoring of vector resistance to DDT.

- * Evaluation of alternative insecticides to DDT, e.g. Deltamethrin, Lambda-cyhalothrin.
- * Determination of vector status and the role of different mosquito species in malaria transmission, especially in high-risk areas.
- * Design and evaluation of integrated vector control strategies based on sound field research.
- * Classification of mosquito breeding habitats and determination of adult flight ranges, in order to determine the feasibility of larval control operations in selected situations.
- * Cost-effectiveness analysis of vector control and other preventive measures.
- * Assessment of economic and social gains of malaria control.

7. Training

The quality and quantity of the human resources available is currently inadequate and implementation of the National Malaria Control Policy will require training of staff to be undertaken at all levels of the National Health System, that is, community, district, regional and national levels.

Particular areas where training is required include malarial disease management for health workers, entomology, parasitology and vector control operations for staff involved directly in control, community-based prevention measures for community health workers and programme management and assessment for managers.

Technical assistance from short-term consultants will be needed to aid national facilitators to develop in-service training capabilities. Pre-service training overseas is a requirement for specialised central level staff.

The national curricula of health workers at all levels should include the principles of malariology, and in addition the national curricula in primary and secondary schools could include basic instruction in malaria and methods of self-protection.

8. Implementation Strategy

The policy is to be implemented through the National Vector-Borne Disease Control Programme (NVDCP) which will act as co-ordinator for the Regional Health Directorates.

8.1 Structure of NVDCP

At national level, the NVDCP is headed by a National Co-ordinator, assisted by a Chief Health Programme Administrator, two Programme Administrators, one responsible for entomology, the other for parasitology. In addition the Programme will receive technical and administrative support from four Environmental Health Assistants, a typist and driver. This structure is liable to change.

8.2 Roles and Responsibilities of Different Levels of the Health Care System

8.2.1 National Level

- Formulation of policies and strategies, setting of standards, preparing guidelines and co-ordinating activities
- Ensuring that available vector control methods and strategies are relevant to the local malaria situation
- Provision of technical guidance to lower levels, other institutions and agencies
- Seeking support and commitment at all levels
- Co-ordinating interregional and border issues, including exchange of information and resource utilisation
- Maintaining a database/information network on vector control and case management issues
- Identification of research priorities and their support and co-ordination
- Definition of responsibilities and lines of authority at different levels
- Monitoring and evaluation of the malaria control programme, including resource management and regular reporting
- Identifying training priorities, mobilising resources, and planning and participating in training activities
- Maintaining close interaction and collaboration with sectors within and outside health services

8.2.2 Regional Health Directorate

- Maintenance of close interaction with the central unit
- Co-ordinating and monitoring the local implementation of national policies and strategies
- Monitoring and evaluation of the malaria control programme, including management of local resources and regular reporting
- Supervision and assessment of operations
- Ensuring timely response to epidemics
- Undertaking and supporting training activities
- Entomological and epidemiological surveys under central level supervision
- Collaboration with neighbouring regions

8.2.3 District Level

- Supervision and support of clinics
- Training of Community Health Workers

8.2.4 Health Facility Level

- Provision of early and appropriate treatment
- Referral of more serious cases as per Case Management Guidelines
- Regular reporting of health statistics
- Provision of health education to individuals and to the community
- Mobilisation of the community to undertake mosquito control measures

8.2.5 Community Level

- Provision of timely malaria treatment

8.3 Intersectoral Collaboration

Often the social, economic and environmental problems posed by malaria extend beyond the responsibilities of the health services alone, and collaboration with non-health sectors is often required to ensure consistency of effort, efficient resource utilisation and avoidance of duplication of work.

8.4 Monitoring and Evaluation

Monitoring and evaluation are essential parts of programme management. The specific purposes of programme evaluation are:

- the measurement of progress and achievements
- detection and solution of problems
- to provide information required for policy revision and replanning interventions
- to assess sustainability
- to guide the allocation of programme resources.

Specific indicators for the assessment of disease management and disease prevention measures, including vector control, are included as Annex 3.

Annex 1

Guidelines for the diagnosis and treatment of uncomplicated (simple) malaria

Malaria is caused by a parasite (*Plasmodium*) transmitted by *Anopheles* mosquitoes. When a mosquito bites it sucks up the parasites present in the blood of an infective person and after about ten days, when the mosquito bites another person, this person will be infected with the disease. Symptoms occur about 10-30 days after an infective mosquito bite. The peak season of malaria in Namibia is from February to June, although transmission occurs more or less year round in the northeast. Malaria is found mainly in the northern areas of the country but it is worth remembering that a patient seen in the south may have recently visited a malarious area and become infected.

Guidelines for Community Health Nurses

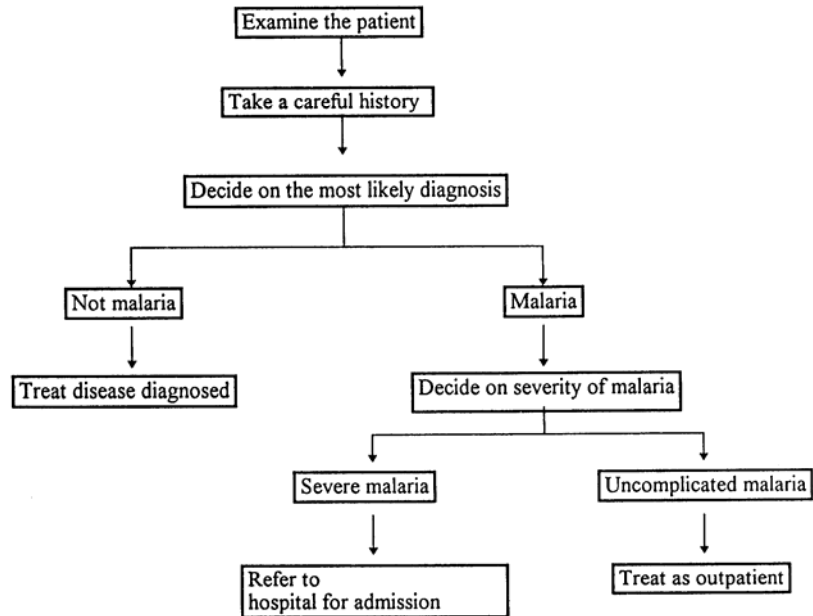
In Namibia, most patients are managed by nurses working in the community, usually in clinics or health centres, without access to doctors. These guidelines are intended for use by community health nurses, irrespective of qualifications, for the diagnosis and treatment of malaria.

All health staff should have a good understanding of the preventive aspects of malaria (including residual house spraying and other mosquito control activities and also personal protection measures such as bednets). It is also important to stress to patients that it is vital to obtain prompt and correct treatment of malaria, as soon as the first attack of fever occurs, and preferably within the first 12-24 hours.

1. Assessment of the patient

It is important to decide whether the symptoms are due to malaria or another disease. If the disease is malaria the severity should be assessed; can the patient be safely treated as an outpatient or will the patient need referral to hospital for admission? It is also possible that the patient has malaria and another illness at the same time.

Figure 1: Assessment of the patient



Symptoms of malaria

The symptoms of malaria include fever, headache and pains in the joints. Often patients are weak, dehydrated and sleepy. They may also be confused. They often have dizziness, nausea, vomiting and/or diarrhoea. Some, especially children, may have a cough.

Patients with many common conditions other than malaria may experience some of these symptoms. Therefore, if a patient presents with what seems to be malaria, it is important to take a careful history and examine the patient properly before deciding on the treatment. Other conditions that cause fever and can therefore be mistaken for malaria include: measles, acute tonsillitis, acute otitis media, influenza, pneumonia, meningitis, tuberculosis, relapsing fever, and urinary tract infection.

If malaria is diagnosed, the severity should be assessed before the decision is made whether the patient is treated as an outpatient or should be referred to hospital for admission. If a patient cannot take oral medication due to vomiting, or is showing signs of severe and complicated malaria (see page 7), the patient must be referred immediately.

A careful case-history should be taken and the following should be determined:

1. Geographical history - place of residence, recent travel.
2. Drugs taken - antimalarials and others
3. Symptoms - their duration and time course
4. Previous illnesses and treatment
5. Previous blood transfusions
6. Is the patient pregnant?
7. Have there been any other illnesses in the family?
8. Other clues e.g. dog bites, head injuries, alcohol or drug overdoses

Before deciding on which antimalarial drug to use, always ask if the patient has already received treatment for the illness. For example the patient may have already received a course of chloroquine and this will influence the choice of treatment at this stage.

Always look for signs of dehydration because patients are often vomiting, may have diarrhoea, and are usually sweating from high fever. This is especially important in children.

2. Treatment of uncomplicated (simple) malaria

As soon as you have assessed your patient and decided on treating them for uncomplicated malaria, treatment should begin immediately.

The drug of first choice for treatment of uncomplicated malaria is chloroquine.

Chloroquine

Total Dosage

The total dose should be 25 mg base/kg given in three doses over three days.

Day one: 10 mg chloroquine base/kg

Day two: 10 mg chloroquine base/kg

Day three: 5 mg chloroquine base/kg

The maximum dose irrespective of the patient's weight is 1500 mg total. Doses should be calculated as mg/kg body weight. It is therefore important whenever possible to weigh the patient. This is particularly important in children.

Table 1 shows the dosage schedule of oral chloroquine based on tablets of 150 mg base

Table 1: Dosage schedule of oral chloroquine

	0 hours	24 hours	48 hours
Adults*	4 tablets 600 mg	4 tablets 600 mg	2 tablets 300 mg
Children	10 mg/kg	10 mg/kg	5 mg/kg

* 60 kg and above

For example a 15 kg child would receive $15 \times 10 = 150$ mg chloroquine base for the first and second doses. This could be given orally as one tablet or as 15 ml of syrup. For the third dose the child will receive $15 \times 5 = 75$ mg chloroquine base which could be given as 1/2 tablet or as 7.5 ml of syrup.

Whenever possible a child's dose should be calculated after weighing. The child's age should only be used for calculating dosage if no scales are available to weigh the child.

Table 2 is a guide for use in calculating the dosage of chloroquine using the child's age, however it is important to note that this is for children of normal weight. Children who have a weight that is very low for their age should be given a dose for a younger age. If the child is very big for its age it may be necessary to use a larger dose, but such children are not common in Namibia. Table 2 is based on tablets of 150 mg base or syrup at 50 mg base per 5 ml.

Table 2: Dose of chloroquine for children by age

Age	Chloroquine tablets		Chloroquine syrup	
	First and second dose	Third dose	First and second dose	Third dose
Less than 6 months	½	¼	7.5 ml (1 ½ teaspoons)	3.75 ml (¾ teaspoon)
6 months - 1 year	¾	½	10 ml (2 teaspoons)	7.5 ml (1 ½ teaspoon)
1-3 years	1	½	15 ml (3 teaspoons)	7.5 ml (1 ½ teaspoons)
4-6 years	1 ½	¾	20 ml (4 teaspoons)	10 ml (2 teaspoons)
7-9 years	2	1		
10-13 years	3	1 ½		
>13 years	4	2		

It should be emphasised to the patient that the full course of treatment should be completed.

Chloroquine should be given orally. If the patient is vomiting, oral chloroquine should still be tried first. Vomiting can often be controlled if fever is reduced by tepid sponging and fanning. An antipyretic, preferably paracetamol, should be given if the patient has an axillary temperature of 38 °C or higher. A patient who has a problem with vomiting should be observed for 30 minutes after taking oral chloroquine. If the patient vomits the chloroquine three times, they should be referred to a hospital.

Patients should be informed of the signs and symptoms of increasingly severe and complicated malaria and also of the side effects of the antimalarial drugs used (Chloroquine can cause side-effects including nausea, itching, dizziness and blurred vision). Patients should be aware of the need to return at any time if their clinical condition worsens, or if any other signs or symptoms develop which might be attributed to the treatment.

Remember to treat other associated problems for example fever (paracetamol, tepid sponging, fanning) and dehydration (oral rehydration).

3. Management of treatment failures.

A patient who has had malaria diagnosed and been given a course of chloroquine should, if possible, be checked again one or two days after completing treatment. In some cases the patient may still be sick. There are several reasons why this can happen:

1. The original diagnosis of malaria may have been wrong and the patient is still suffering from another disease which still requires treatment. The patient should be reassessed and a blood smear examined if possible.

2. The patient may not have taken chloroquine correctly or may have vomited. The patient should be asked when the tablets or syrup were taken. If it is felt that the patient did not take the complete course a new course should be started and the need to take the medication as prescribed should be emphasised.
3. The patient may have chloroquine resistant malaria. If you are reasonably sure that the patient has malaria and has taken the complete course of chloroquine without improvement you can assume that the malaria is chloroquine resistant. The patient should be referred.
4. If the fever has returned to normal but the patient feels unwell, treat symptomatically and observe the patient over the next few days.

The treatment of chloroquine resistant malaria requires a single dose of Sulphadoxine-Pyrimethamine (Fansidar). The dosage is given in Table 3. If sulphadoxine-pyrimethamine is not available at clinic level, refer the patient.

Table 3: Dose of Sulphadoxine-Pyrimethamine (Fansidar)

Age	Tablets
6-12 months	½
1-3 years	½
4-6 years	1
7-11 years	1 ½
12-15 years	2
>15 years	3

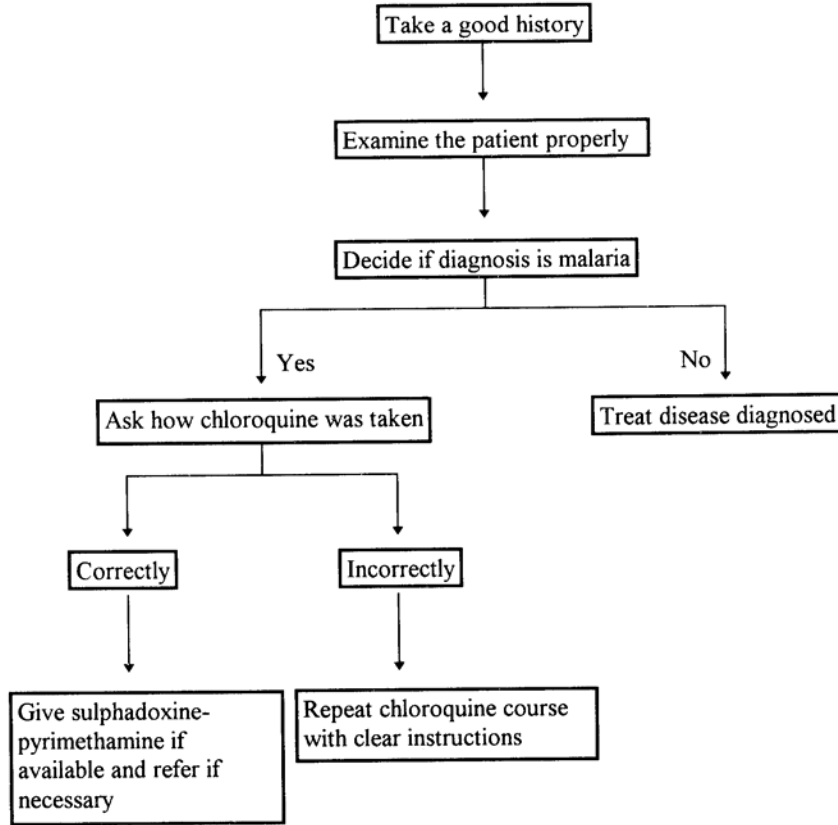
Sulphadoxine-Pyrimethamine (Fansidar) is not recommended for pregnant women or children under the age of 6 months. In both these cases if chloroquine resistant malaria is suspected, second line of treatment is oral quinine.

Microscopy

A patient with suspected malaria should if possible have the diagnosis confirmed by microscopic examination of a blood smear. When microscopy facilities are not available, a patient requiring transfer to hospital should have a smear taken before transfer for examination on arrival. Sometimes malaria parasites are not seen in the smear even though the patient does have malaria. However, if the smear is negative one should look harder for other diseases which may cause symptoms like those of malaria, especially when the patient is very ill. Borellia should be looked for while routinely looking for malaria on blood smears.

In patients with severe and complicated malaria, quinine should always be used. See Guidelines for the Management of Severe and Complicated Malaria. All patients with severe and complicated malaria must be transferred to hospital without delay.

Figure 2: Management of a patient who is unwell within 2 weeks after receiving a course of chloroquine



Criteria for referral

Any patient who is unable to ingest oral medicine should be referred immediately. In cases of fever in pregnancy, patients should be referred after the first dose of antimalarial drugs. Similarly, anyone suffering from one or more of the following symptoms must be immediately referred to the nearest hospital:

- Coma, drowsiness or any change in the level of consciousness
- Generalised convulsions
- Severe anaemia (Hb 7g/dl or less and haematocrit 20% or less)
- Prostration and extreme weakness
- Jaundice
- Oliguria
- Renal failure
- Hypoglycaemia
- Fluid, electrolyte and acid-base disturbances
- Pulmonary oedema or difficulty in breathing
- Circulatory collapse and shock
- Bleeding tendency
- Hyperpyrexia (temperature = 39°C).
- Hyperparasitaemia (parasite count more than 5% parasitised red blood cells)
- Malarial haemoglobinuria

Patients most at risk of developing severe and complicated malaria include:

1. Young children (above age 6 months if mothers are semi-immune), with highest mortality at age 1-3 years
2. Pregnant women, especially primigravidae
3. Non-immune travellers
4. People who have been living away from high endemic areas for years

Chemoprophylaxis is recommended for pregnant women, and non-immune tourists, visitors and migrant workers. Chloroquine and proguanil remain the antimalarial drugs of choice (see Tourist Guidelines).

Annex 2

Guidelines for the Management of Severe and Complicated Malaria

Basic Principles

1. Recognise severe malaria
2. Reduce parasitaemia
3. Control or prevent seizures
4. Stabilise blood sugar
5. Rehydrate
6. Evaluate renal status
7. Control anaemia
8. Treat associated infections
9. Ensure good nursing care
10. Avoid useless or dangerous treatments

Recognition of Severe and Complicated Malaria

You should immediately suspect severe malaria in patients with:

- Coma, confusion, convulsions.
- Severe anaemia and extreme weakness

Other signs may be:

- | | |
|------------------------------|-------------------------------------------------|
| Hypoglycaemia | Hyperpyrexia (Temperature above 39 °C) |
| Haemoglobinuria | Bleeding tendency |
| Circulatory collapse (shock) | Renal failure |
| Dark urine | Respiratory difficulties (pulmonary oedema) |
| Jaundice | Hyperparasitaemia (>5% parasitised blood cells) |

These may occur singly or more commonly in combination in the same patient. People most at risk from severe and complicated malaria include children (especially those aged between 6 months and 6 years), pregnant women (especially primigravidae) and nonimmune adults.

Be aware that malaria may not be the only disease. All patients with severe and complicated malaria must be treated in a hospital. Always make a blood smear but begin therapy based on clinical evidence if there is a delay in getting the laboratory result. Consider alternative diagnosis if there is a negative slide, however a negative slide does not always mean there is no malaria.

Initial Management of Severe Malaria.

1. Clear airway and position semiprone or on side
2. Weigh the patient and calculate dosage
3. Begin antimalarial chemotherapy
4. Make rapid clinical assessment
5. Take blood for; diagnostic smear, blood sugar and haematocrit.
6. Assess state of hydration
7. Give prophylactic anticonvulsant
8. Measure and monitor urine output
9. Plan intravenous fluid management including; diluent for antimalarials, glucose therapy and blood transfusion
10. Consider central venous pressure catheter
11. Treat pyrexia
12. Consider lumbar puncture
13. Treat other infections
14. Avoid the following drugs: dexamethasone or other steroids, osmotic diuretics, heparin, dextran, prostoglandins and adrenalin.

General Management

Good nursing care is very important in the management of a patient with severe malaria. In cerebral malaria, proper nursing care of the unconscious patient cannot be over-emphasised.

The following must be monitored:

1. If parasitological confirmation of malaria is not readily available, a blood film should still be taken and treatment made on the basis of the clinical presentation.
2. Antimalarial chemotherapy must be given parenterally but oral treatment should be substituted as soon as reliably possible. Dose must be calculated on a mg/kg of body weight basis. It is important to weigh the patient, particularly in children.
3. Careful attention must be given to fluid balance. A urine output of less than 400 ml/24 hours in an adult or less than 7 ml/kg/24 hours in a child may mean the fluid intake is not enough or the patient may be developing renal failure. Monitor urine output constantly and look for the appearance of black urine. Accurately measure the mass of the patient on a daily basis as this will give an indication of the fluid balance.
4. An increase in respiratory rate or increased difficulty in breathing could indicate pulmonary oedema.
5. Reduce high body temperatures ($>39^{\circ}\text{C}$) by vigorous tepid sponging and fanning. Antipyretics (paracetamol) may also be given. If temperatures remain high for 24 hours despite antimalarial treatment, review diagnosis and treatment.
6. A rapid initial check of blood glucose level and frequent monitoring for hypoglycaemia are important. If blood glucose is less than 2.2 mmol/litre correct with intravenous 50% dextrose. Pregnant women receiving quinine are particularly prone to hypoglycaemia.
7. Laboratory measurements should include regular checks on haematocrit, glucose, urea, or creatinine, and electrolytes.
8. Administer a prophylactic anticonvulsant. Check temperature and glucose.
9. Monitor the level of consciousness. If this deteriorates: check blood glucose, review diagnosis, perform lumbar puncture to exclude other causes of coma.
10. Regular monitoring of temperature, respiration rate, blood pressure, level of consciousness and other vital signs is essential. If blood pressure falls review the fluid balance, consider septicaemia and look for haemorrhage.

Specific Management Problems

1. Anaemia

Use haematocrit to consider transfusion but clinical indicators are more important; shock, cardiac failure, response to oxygen and colloids.

Use furosemide (20mg) if adequate renal function.

Remember to include blood transfusion in fluid balance calculations.

2. Hypoglycaemia

Diagnosis by dextrostix, clinical signs and trial of therapy.
If hypoglycaemic give: Dextrose 50% 50 ml for adults, 1.0 ml/kg children.
If hypoglycaemia reoccurs:- repeat treatment.
Too much hypertonic glucose may cause pulmonary oedema and hypokalaemia.

3. Pulmonary Oedema

Prevent.
Oxygenation and decrease central venous pressure.
Patient propped upright.
Give patient diuretic such as furosemide 40 mg.
If due to fluid overload: control fluid intake, give diuretic, venosect.
Dialysis.

4. Renal Failure

Exclude dehydration (Hypovolaemia).
Carefully infuse isotonic saline until CVP 0-5 cm H₂O.
Other drugs: Dopamine and furosemide.
Peritoneal Dialysis (indicators for dialysis: Anuria/Oliguria despite rehydration and diuretic challenge, persistent acidosis, pulmonary oedema/fluid overload, multiple organ failure, hyperkalaemia, uraemic syndrome).

5. Acidosis

Improve oxygenation.
Correct dehydration or hypovolaemia.
Urgent correction by aspiration of gastric fluid.
Glucose therapy.

6. Circulatory Collapse

Correct Hypovolaemia.
Take blood culture. Start broad spectrum antibiotics e.g Benzylpenicillin and gentamicin.
Change antibiotics according to results of blood culture.
Maintain CVP between 0-5 cm H₂O.
Consider Dopamine.

7. Management of Dehydration

Careful rehydration with isotonic saline.
Frequent examination of: JVP, Blood Pressure, Chest.
Use CVP measurements if possible (0-5 cm H₂O).
If after rehydration, urine output over 24 hours is less than 4 ml/kg of body weight furosemide can be given intravenously: initially 2 mg/kg, then doubled to 4 mg/kg, then 8 mg/kg.

8. Management of Convulsions

Diazepam: 0.15 mg/kg slow intravenous injection max 10 mg
0.5-1.0 mg/kg intrarectally.

ANTIMALARIAL TREATMENT PROTOCOL

1. **DAY 1 (day of admission)**
 - a. **LOADING DOSE**

500 ml of isotonic intravenous fluid (see note 1 below)
+ Quinine dihydrochloride 20 mg/kg over 4 hours
Then wait for four hours. Rehydrate if necessary.

Do not give a loading dose if the patient has received quinine within the preceding 24 hours, or mefloquine within the preceding 7 days.
 - b. **After 8 hours**

It is now 8 hours since the beginning of treatment. Now give:
500 ml intravenous fluid
+ Quinine dihydrochloride 10 mg/kg over 12 hours

Then give:
500 ml intravenous fluid
+ Quinine dihydrochloride 10 mg/kg over 12 hours
2. **DAY 2**

Give two infusions at 12 hourly intervals identical to the second infusion on Day one:
500 ml of intravenous fluid
+ Quinine dihydrochloride 10 mg/kg over 12 hours
3. **DAY 3**

If the patient is awake and able to take oral fluids, stop the infusion and give:
Quinine sulphate tablets 10 mg/kg three times a day.
If the patient has not awakened or is unable to take oral medication, give drugs and infusion as on day two.
Continue as above (parenteral or oral depending on clinical condition) until day 7.
4. **DAY 7**

If no ring forms: stop treatment after completing Day 7 treatment.
If ring forms are still present: treat until Day 10.
5. **DAY 10**

If no ring forms: stop treatment after completing Day 10 treatment
If ring forms still present treat until day 14
6. **DAY 14**

If no ring forms: stop treatment
If ring forms still present, check: Was adequate dose given? Was treatment taken as directed?

Mild side effects of quinine include nausea, uneasiness, dysphoria and blurring of vision - cinchonism. Severe toxicity includes: hypotension, blindness, myocardial conduction disturbances, deafness, coma, hypoglycaemia.

Note 1

The choice of intravenous fluids is:

Dextrose saline (0.18% saline + 4% dextrose) or

Dextrose 5% or

Normal saline (0.9% saline).

Fluid should be isotonic.

If the patient requires more fluid than the perfusion fluid (for the quinine) then use an additional source of fluid. Do not increase the speed of quinine infusion.

Use saline for rehydration, dextrose is not appropriate for rehydration.

Dextrose 10% does not reduce the risk of hypoglycaemia. It is better to use 5% dextrose or saline or dextrose saline solution and be constantly aware of the risk of hypoglycaemia.

Note 2

In cases of renal failure give the same treatment as recommended for 48 hours and then:

5 mg/kg of intravenous quinine 8 hourly. Fluid balance is essential and should be calculated using clinical indices and fluid balance charts.

Note 3

The dose of quinine for children should be the same as adults, calculated by weight, however the fluid required should be:

50 ml/kg/day for the initial 10 kg

then in addition

20 ml/kg/day for the next 10 kg (10-20 kg)

then in addition

10 ml/kg/day for any kg over 20 kg.

Unless there is evidence of under perfusion or over perfusion in these cases fluid should be titrated depending on the clinical condition.

Laboratory investigations

1. Thick and thin blood films for malaria parasites (check for Borrelia at the same time)
2. Blood glucose (best to use a "stix" method)
3. Haemoglobin
4. Haematocrit

Other useful tests include:

Serum urea and electrolytes, serum creatinine, lumbar puncture to exclude meningitis, if features of clinical dysfunction are present.

Annex 3: Selected Indicators

i. Selected Indicators for Disease Management.

- * Number of patients with acute febrile illness seen at health facilities
- * Proportion of febrile patients among total patients seen at health facilities
- * Number of clinical cases of malaria recorded in each health facility as a proportion of the catchment area population
- * Proportion of clinical cases that are laboratory confirmed
- * Number of treatment failures at selected health facilities
- * Number of patients with severe and complicated malaria at selected health facilities
- * Number of deaths due to malaria
- * Proportional malaria mortality rate in hospitals
- * Case fatality rate among malaria in-patients
- * Quantity of antimalarial drugs (by item) received and used in each health facility
- * Frequency of routine supervisory visits made by regions
- * Proportion of staff in health facilities who have received training

ii. Selected Indicators for Disease Prevention

a. Indoor Residual Insecticide spraying

- Insecticide dosage
- Percentage of structures sprayed
- Proportion of population covered by spray activities
- Timing and duration of spray round
- Cost
- Working status of transport and equipment
- Amount of insecticide used
- Frequency of national level supervisory visits
- Proportion of spraymen and Environmental Health Assistants who received training for vector control

b. Entomological Monitoring

- Indoor and outdoor resting and feeding behaviour
- Insecticide susceptibility status
- Vector longevity
- Human biting rate
- Adult mosquito density
- Larval habitat surveys

c. Epidemic Forecasting

Namibia is prone to malaria epidemics which are related to seasonal variation in climatic factors including rainfall, temperature and humidity. Regular monitoring of these variables, along with health data may help in the prediction and hence prevention of epidemics.

- Average daily temperature
- Rainfall - amount/number of rainy days
- Large-scale human migration
- Weekly monitoring of: febrile disease, deaths and drug usage