



REPUBLIC OF NAMIBIA

MINISTRY OF HEALTH AND SOCIAL SERVICES

NATIONAL MALARIA POLICY



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MINISTRY OF HEALTH AND SOCIAL SERVICES

NATIONAL MALARIA POLICY

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FORWORD

Every year, malaria affects an estimated 300-500 million people worldwide, with over one million deaths. Ninety percent of these cases are in the sub-Saharan Africa. In Namibia malaria remains one of the major public health problem, with more than 600 000 cases recorded every year. Deaths due to malaria account for 15% of total child mortality. Although the disease affects all age groups, pregnant women and young children are at higher risk. Malaria epidemics were recorded in the years 1990, 1996, 1997, 2000 and 2001 resulting in significant mortality and morbidity. During the 2001 epidemic more than 500,000 cases and about 1728 deaths were reported.

The Ministry of Health and Social Services (MOHSS) considers malaria control a national priority. A dedicated programme, the National Vector-borne Disease Control Programme (NVDCP) was established in 1991 under the Primary Health Care. This programme is charged with the responsibility to ensure that malaria is brought under control. Needless to say, malaria poses many challenges every year. One of these challenges is the emergence of resistance of malaria parasites to chloroquine, and to a lesser extent, to sulphadoxine/pyrimethamine. Recent studies have shown that the efficacy of chloroquine and sulphadoxine/pyrimethamine has declined to less than 75% and 80-90% respectively. The results of these studies point to the need to review the current policy on malaria.

The ultimate goal of Ministry of Health and Social Services is to control malaria through preventing mortality, reduce morbidity and avoid the socio-economic loss due to malaria. The Ministry has therefore embraced the four basic malaria control strategies, namely, provision of early diagnosis and prompt treatment; implementation of selective and sustainable preventive measures, including vector control; early detection, containment and prevention of epidemics and strengthening capacities in basic and applied research. The success in achieving the desired goals depends mainly on political commitment as articulated in the Abuja Declaration and signed by our Head of State and strong partnership in planning and implementation of malaria interventions at different levels of health care system.

This revised policy on malaria aims at ensuring early diagnosis, and prompt treatment using effective medicines at every level of the health care delivery system. Correct and effective treatment of malaria will shorten the duration of illness; prevent the development of complications and deaths. By implementing the correct and effective disease control strategies, the Ministry strives to reduce the disease burden in the country thereby achieving the Abuja targets by 2010.

Hon. R. N. Kamwi, MP
Minister

PREFACE

Resistance of malaria parasites to conventional antimalaria medicines has been reported in many malaria endemic countries. The World Health Organization defines resistance as the ability of a parasite strain to survive, and/or to multiply despite the administration and absorption of a medicine in doses equal to or higher than those recommended but within the limits of tolerance of the subject. The purpose of a national antimalaria policy is to ensure prompt, effective and safe treatment of malaria disease through the selection of optimal regimens for different clinical situations and to minimize the selection pressure for resistance to antimalaria medicines. There are few antimalaria treatments available but these are further restricted by cost, side-effects and complexity of the dosage regimen.

In Namibia, resistance to chloroquine was first detected in the northwestern region in 1984. A survey carried out in Rundu in 1991 showed evidence of chloroquine resistance. This was corroborated by evidence from another study carried out in Outapi, in 1993 though these results cannot be relied upon. During antimalaria medicine efficacy studies, which were carried out at Katima Mulilo, Rundu and Outapi in 2002 to 2003 it was found that adequate clinical and parasitological response was less than 75%. The results of efficacy studies, which were carried out between February and June 2004, in the three sentinel sites, found that total failure of sulphadoxine/pyrimethamine exceeded 25% in Outapi only.

The ultimate goal of malaria control is to prevent mortality, reduce morbidity and avoid the socio-economic loss 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 epidemic and to strengthen capacities in basic and applied research. The success in achieving the desired goals depends on strong partnership with all stakeholders, in planning and implementation of malaria interventions.

Based on concrete evidence of marked reduction in the efficacy of commonly used anti-malarial medicines, the Ministry of Health and Social Services undertook a revision of the malaria control policy. This revised policy document contains new recommendations on the antimalaria medicines and treatment regimens, diagnostic tests, chemoprophylaxis for non-immune travelers and intermittent preventive treatment for pregnant women at various levels of health care system. The policy further articulates vector control interventions, roles and responsibilities of different levels of health care system and various sectors and partners. The policy is intended to serve as a guide to health workers and all partners involved in malaria control.

This policy document was developed with contributions from individuals. I thank members of the Malaria Policy Review Committee, the Antimalarial Medicines Efficacy Study Team members, the participants of the Consensus Workshop on the Malaria Policy and the Namibia Institute of Pathology. Finally I thank the World Health Organization and UNICEF for the technical and financial support.

Dr. K. Shangula
Permanent Secretary

LIST OF ACRONYMS

ANC	Antenatal Care Service
APPT	Activated Partial Prothrombin Time
AQ	Amodiaquine
ARDS	Adult Respiratory Distress Syndrome
BP	Blood Pressure
BTI	Bacillus thuringiensis Isrealinesis
CQ	Chloroquine
CVP	Central Venous Pressure
CXR	Chest X-ray
DDT	Dichloro-diphenyl-trichloroethane
DEET	N, N—diethyl-3-methyl-benzamide
DW	Dextrose in Water
EC	Emulsion Concentrate
ECG	Electrocardiography
FBC	Full Blood Count
ICU	Intensive Care Unit
IEC	Information Education and Communication
IM	Intra-muscular
IMCI	Integrated Management of Childhood Illnesses
IPT	Intermittent Prophylactic Treatment
IRS	In-door Residual Spraying
ITN	Insecticide Treated Nets
IV	Intravenous
KAP	Knowledge Attitude and Practice
LFT	Liver Function Test
LLINs	Long Lasting Insecticidal Nets
MoHSS	Ministry of Health and Social Services
NVDCP	National Vector-borne Diseases Control Programme
PHC	Primary Health Care
PI	Prothrombin Index
PT	Prothrombin Time
Q	Quinine
RDT	Rapid Diagnostic Test
RI	Resistance level one
RII	Resistance level two
SC	Suspension Concentrate
SP	Sulphadoxine pyrimethamine
U&E	Urea & Electrolytes
WHO	World Health Organization
WHOPES	World Health Organization Pesticide Evaluation Scheme
WP	Wettable Powder

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1.0 INTRODUCTION.

Malaria is a major public health problem in Namibia. The disease was the leading cause of illness and death from 1999 to 2002. The inhabitants of Caprivi, Kavango, Kunene, Oshana, Oshana, Oshikoto and part of Otjozondjupa and Omaheke regions, who constitute 65% of the entire Namibian population, are at risk of malaria. In Namibia malaria is seasonal with propensity to epidemic outbreaks. These outbreaks are related to high rainfall and warm climate.

For many years, residents of the northern regions suffered from a febrile condition locally known as “onyango” in the former Owambo. In 1990, Namibia experienced severe malaria epidemic following a good rainfall after many years of drought and absence of vector control activities. In 1991, the Ministry of Health and Social Services (MOHSS) launched the National Malaria Control Programme. Later, this programme was renamed the National Vector-borne Disease Control Programme (NVDCP) to include other vector-borne diseases, like plague and schistosomiasis. The MOHSS has since undertaken a number of activities to improve disease management and vector control through training of health workers and improved reporting through the Health Information System (HIS). Despite these efforts, the number of malaria cases continues to increase from year to year. This increase may be due to improved reporting following the introduction of a new and more efficient Health Information System and the expansion of PHC Services. Over the years, evidence of treatment failures with respect to chloroquine and sulphadoxine/pyrimethamine was observed. This was confirmed by studies to determine the efficacy of chloroquine and sulphadoxine/pyrimethamine in the treatment of malaria, which were carried out in Katima Mulilo, Rundu and Outapi hospitals from 2003-2004.

2.0 SITUATION ANALYSIS

2.1. DISEASE BURDEN.

Malaria accounted for 26.4% OPD cases, 21.6% admissions and 8.6% of all hospital deaths in 2002. During the past five years, an average 510 000 outpatient, 33,000 inpatient and 1 300 deaths due to malaria were registered through the Health Information System. The incidence of malaria varies from region to region, with the Kavango and Caprivi regions having the highest rates of malaria morbidity and mortality.

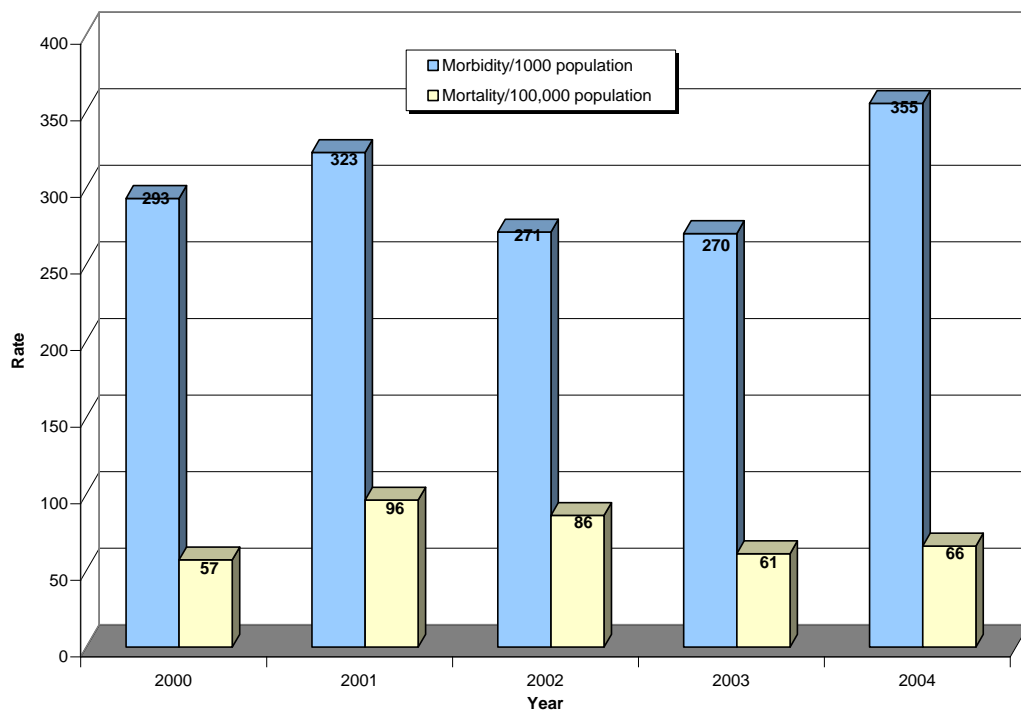
The malaria mortality rate varied between 61/100,000 and 96/100,000 during the past five years. A mean incidence of 255/1,000 population for the whole country in the years between 1995 and 2001 was recorded. The malaria incidence declined gradually to its lowest level in 1999, increased in 2000 and 2001 and dropped in 2002 and 2003. The trend in malaria incidence is similar to the mortality trend with the lowest mortality rate of 16/100,000 recorded in 1992 and the highest ever recorded mortality rate of 96.4/100,000 recorded in 2001. The high incidence and mortality rates in the years 1997 and 2001 were as a result of malaria epidemics that occurred in the northern part of the country. The low death rate recorded in 1992 is associated with the severe drought which occurred during the same year. The number of malaria cases and deaths is presented in Table 1.

Table 1. Malaria morbidity and mortality for 2000–2004.

Year	Out-patient		Subtotal	In-patient		Subtotal	Total	Deaths
	< 5 years	≥ 5 years		< 5 years	≥ 5 years			
2000	133 765	361 102	494 867	14 790	16 943	31 733	526 600	1 031
2001	127 589	410 923	538 512	13 185	30 533	43 718	582 230	1 728
2002	110 153	335 650	445 803	17 247	25 102	42 349	488 152	1 504
2003	122 723	345 536	468 259	5 759	12 511	18 270	486 529	1 106
2004	145 097	465 701	610 799	8 727	20 123	28 850	639 649	1 185

Source: HIS, MOHSS

Fig. 1. Malaria morbidity and mortality rates by year, 2000-2004.

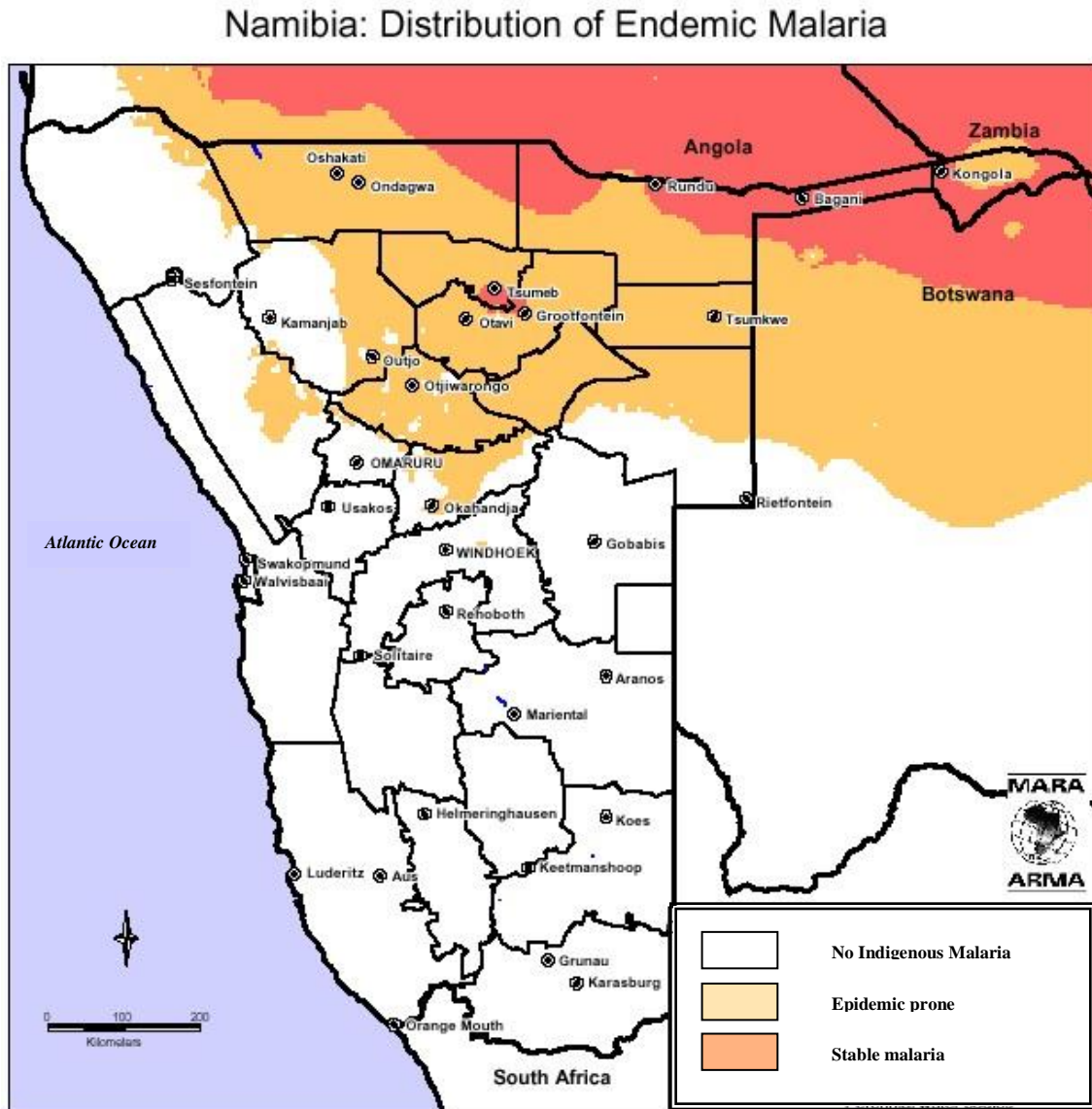


It is interesting to note that despite the reported increasing resistance of malaria parasites to chloroquine, and despite the increasing number of malaria cases, there has been no increase in the death rate since 2001 as reflected in Figure 1 above. This could be explained by improvement in case management. During the epidemic of 2001, the death rate has almost doubled although the increase in malaria cases was modest. However, a huge increase in malaria cases in 2004 was not accompanied by an increase in the death rate.

2.2. DISTRIBUTION OF MALARIA ENDEMIC AREAS IN NAMIBIA.

The malaria risk areas in Namibia are shown on the Map below. Although there is no indigenous malaria transmission in most parts of southern Namibia, malaria cases are commonly seen in the health facilities. These cases are mainly originating from neighboring malaria endemic areas or from individuals who contracted malaria during their visit to a malaria endemic area.

Map 1. Distribution of malaria affected areas.



The population which is at risk of malaria constitutes 65% of the entire population. The north-eastern regions have stable malaria. The northern parts of the country have unstable malaria and are prone to malaria outbreaks. Although no transmission occurs in the southern parts, there are imported malaria cases from malaria endemic areas.

2.3. FACTORS INFLUENCING MALARIA TRANSMISSION IN NAMIBIA.

2.3.1. Climate

The transmission of malaria in Namibia is closely related to temperature, rainfall and humidity. Malaria transmission varies from year to year. Malaria endemicity is highest in the northeastern part of the country, decreasing towards the west and south west and east. The rain season in Namibia stretches from November to April, with peak in February and March. However, the 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 April and May. In these regions, low humidity and lack of standing water, especially from August to October interrupt the malaria transmission cycle.

The Kavango and Caprivi regions are characterized by high average temperatures, high rainfall, high humidity and perennial rivers; conditions that are conducive for mosquito breeding and parasite development. Therefore, malaria transmission is relatively stable with a seasonal peak during the end of the rain season. As a result, malaria in these regions tends to be more stable whereas in the northwest, east and central part of the country it is of a more unstable nature with potential for epidemics. In contrast, the coastal regions and most of the south are free from malaria transmission due to the unsuitable climatic conditions.

2.3.2. Immunity against malaria.

Populations exposed to year-round malaria transmission acquire a degree of immunity against malaria infection. In these regions, the greatest impact of malaria disease is in children under five years and pregnant women due to the non-conferred or reduced malarial immunity. Furthermore, the predominantly seasonal nature of malaria transmission in Namibia prevents individuals from acquiring strong immunity to malaria. This exposes the whole population to the risk of severe disease, in the same manner as are tourists and visitors from non-malaria endemic parts of the country.

2.4. EFFICACY OF ANTIMALARIA MEDICINES.

Plasmodium falciparum is responsible for over 95% of malaria infections in Namibia. Increasing levels of *Plasmodium falciparum* resistance to chloroquine, which hitherto was the first line antimalaria medicine, were observed. The World Health Organization recommends change in malaria treatment policy once the total treatment failure rate reaches or exceeds 25% and adequate clinical response stands at less than 85% (clinical failure $\geq 15\%$).

Chloroquine resistance was first detected in the northwestern region in 1984. A survey carried out in Rundu in 1991 showed RII and RIII level of resistance to chloroquine of 12%. Evidence from another study carried out in Outapi, in 1993 showed that chloroquine resistance was on the increase although the results were inconclusive. During antimalaria medicine efficacy studies, which were carried out at Katima Mulilo,

Rundu and Outapi in 2002/2003 it was found that the treatment failure rate of Chloroquine was not significantly less than 25%. With regard to sulphadoxine/pyrimethamine, it was found that the treatment failure rate for SP exceeded the acceptable limit of 25% in Outapi and Rundu, while in Katima Mulilo the results were inconclusive. The treatment failure rates of SP, in the studies carried out between February and June 2004 in the three sentinel sites, were as follows:

- Katima Mulilo: 7%
- Rundu: 20%
- Outapi: 28%.

3.0. MALARIA VECTORS.

The three major malaria vectors of sub-Saharan Africa, namely, *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. *Anopheles gambiae* and *Anopheles funestus* were reduced by indoor residual spraying of house due to their indoor resting habit.

Anopheles arabiensis breeds in a variety of habitats including rain puddles and “iishana” (flat, low-lying areas which collect water during the rain season). This species increases in number following the onset of the rains. It feeds on both man and animals, and feeds both indoors and outdoors.

The breeding, feeding and resting habits of the vectors play a major role in malaria transmission and the selection of appropriate control measures. The malaria vectors in the country tend to feed at night and therefore vector control measures such as in-door residual spraying of house and use of insecticide treated nets are appropriate intervention measures.

THE POLICY CONTENT.

4.0 PURPOSE, GOAL AND OBJECTIVES OF THE POLICY.

The purpose of this policy is to ensure the provision of prompt, effective and safe treatment against malaria, to minimize the development of resistance and to reduce transmission of malaria.

4.1 GOAL.

The **goal** of this policy is to prevent deaths and reduce illness, social and economic losses due to malaria through progressive improvement and strengthening of local and national response capabilities.

4.2 OBJECTIVES.

- 4.2.1 To build capacity at national, regional and district levels for the planning, implementation, monitoring and evaluation of malaria control activities.
- 4.2.2 To promote the use of personal protection measures among population groups that are at higher risk with special emphasis on children under five years and pregnant women.
- 4.2.3 To strengthen malaria vector control interventions which are affordable and sustainable with particular emphasis on indoor residual spraying of houses and use of insecticide treated nets.
- 4.2.4 To improve access to quality case management services.
- 4.2.5 To develop and adapt implementation guidelines for effective delivery of malaria control services.
- 4.2.6 To promote the implementation of effective IEC strategy.
- 4.2.7 To strengthen the monitoring and evaluation system for malaria control.

5.0. POLICY STRATEGIES.

This policy is consistent with malaria control approaches as recommended within the Global Malaria Control Strategy, which aims at reducing morbidity, mortality, social and economic losses due to the disease through the following strategies:

- 5.1. Providing early diagnosis and prompt treatment.
- 5.2. Planning and implementing selective and sustainable preventive measures, for example, vector control through indoor residual spraying of houses and use of insecticide treated nets.
- 5.3. **Strengthen weekly surveillance in order to prevent, detect and contain epidemics.**
- 5.4. Strengthening capacities in basic and **operational research, case management, vector control and personal protection** to permit and promote the regular assessment of the malaria situation, in particular the ecological, social and economic determinants of the disease.
- 5.5. Strengthening the integration of malaria control into the Primary Health Care **services**, with the full participation of partners and communities.

6.0. PREVENTION AND CONTROL.

6.1. IEC AND COMMUNITY PARTICIPATION.

The Ministry of Health and Social Services promotes community participation in accordance with its policy framework. Disease prevention and control depend on the co-operation and involvement of the community. Raising public awareness through the use of mass media, audio-visual materials and health talks can enhance their full participation. 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 undertaken. Local political support is critical to enhance the effectiveness of campaigns designed to increase community participation and awareness.

6.2 PERSONAL PROTECTION MEASURES

6.2.1 PERSONAL PROTECTION.

These are measures that reduce malaria infection through reduction of man-vector contact. These include use of protective clothing, mosquito repellents and screening of doors and windows. The Ministry of Health and Social Services advocates for mosquito-proofing of residences in malaria endemic areas to be made a requirement for construction of houses.

6.2.2 INSECTICIDE TREATED NETS.

Nets that are treated with insecticides can provide protection to individuals and families, and may reduce malaria transmission in the community when used on a large scale. There are two major types of nets, namely, insecticide treated nets and long-lasting insecticide nets. Insecticide treated nets need to be treated at least once a year to maintain their efficacy. The insecticides of choice are deltamethrin 1% SC at a dosage of 15-25 mg/m² and permethrin 20%-25% EC at a dosage of 200-500 mg/m².

Long-lasting insecticide treated nets are treated with chemicals during production and can withstand repeated washes without losing their efficacy. The use of long-lasting insecticides nets is highly recommended as they greatly reduce the cost and the operational difficulties associated with re-treatment of nets. Nets that are made of multi-filament synthetic materials (polyester, nylon) with a 156 mesh per square inch, 100 denier, and rectangular or conical shapes are recommended. The replacement of traditional nets will depend on the care by the owner. The long lasting insecticide nets will at least last for three to four years before replacement. Namibia as a signatory to the Abuja declaration on Roll Back Malaria exempts mosquito nets and netting materials from import duties.

6.3 VECTOR CONTROL

Control of malaria vectors is the best way to protect communities against malaria infection. Vector control measures such as indoor residual spraying of houses (IRS) and insecticides treated nets have the ability to reduce malaria incidence and prevalence.

In August 1965, indoor residual spraying of houses with 75% DDT was introduced for malaria vector control in Namibia resulting in a marked reduction in malaria infection in the general population 64% to 25% in Kavango and from 49.5% to 12% in the former Owambo. Malaria control activities, however, deteriorated during the war in the late 1980. In 1990, after several years of drought, absence of vector control activities and high rainfall, a devastating malaria epidemic erupted in the northern regions.

6.3.1 INDOOR RESIDUAL SPRAYING OF HOUSES.

In-door residual spraying of houses is a major vector control intervention in Namibia. The country adopts selective residual spraying of houses and shall maintain more than 80% coverage in order to achieve significant impact in reducing the malaria transmission. The spray campaigns begin four months before the transmission season and end before the rains are heavy. The appropriate period for indoor residual spraying of houses is between the months of October and January. The MOHSS will be responsible for spraying rural areas outside of municipal boundary. In urban areas, this responsibility falls under the respective local authority.

Geographic reconnaissance provides knowledge on the type of structures, distribution of health facilities and the availability of breeding sites in an area, which is a target for selective spraying. DDT 75% WP is the insecticide of choice for spraying traditional structures (mud or wood structures including canopies) at a dosage of 2 g/m² active ingredients. Deltamethrin 5% WP is the insecticide of choice for spraying modern structures (bricks or similar structures) at a dosage of 0.02 g/m² active ingredients.

Quality control.

The quality of the spraying operation and the persistence of insecticides on sprayed surfaces should be verified regularly through a sample bioassay test following the completion of the spraying operation. Mosquito vector surveillance should provide information on changes of vector density, vector behaviour and vector composition.

Monitoring resistance.

The development of resistance of the local vectors against commonly used insecticides should be monitored through a regular susceptibility study, preferably on an annual basis.

6.3.2 LARVAL CONTROL.

This method is very useful in situations where the vector breeding sites are limited and the application of larvicides could contribute in significant reduction in vector population. The ideal period for larviciding is before the rain season, when the vector breeding habitats are relatively few and localized. Temephos is the larvicide of choice for anopheline control applied at 100 to 150 ml/hectare. This chemical can be safely added to water bodies which are also used for animal and human consumption.

6.3.4 BIOLOGICAL CONTROL.

This method has never been used for the control of malaria in the country. However, the potential of using natural predators and enemies of mosquito larvae can still be explored. These include larvivorous fish, and bacterial larvicidides such as *Bacillus thuringiensis*.

6.4 CONTROL OF EPIDEMICS

The ability to detect early, prevent and control epidemics is an essential component of malaria control. The introduction of thresholds based on weekly surveillance data for malaria epidemic detection is expected to provide early warning for better preparedness and timely response at district and health facility levels.

Definition of malaria epidemic.

The number of malaria cases for a given week exceeding the 3rd quartile number of cases for the same week in a three to five years data set constitutes malaria epidemic.

6.4.1 FORECASTING.

This is done by analyzing weather data and forecasting favorable condition for malaria transmission. The most important indicators used for forecasting are high rainfall, humidity and temperature.

6.4.2 EARLY DETECTION.

The readily available and operationally feasible method for detecting malaria epidemics is the weekly monitoring of morbidity and mortality data from health facilities. As malaria transmission varies from place to place, the best level for monitoring the occurrence of malaria epidemics is the health facility. This requires proper training of health workers on the use of weekly monitoring system as specified in the Malaria Epidemic Preparedness and Response Guidelines.

6.4.3 PREPAREDNESS.

Namibia is an epidemic prone country due to the seasonal nature of malaria transmission. Preparedness forms an essential component of malaria control. It demands proper planning with respect to the number and category of health personnel for epidemic response, financial resources for epidemic control activities, sufficient stock of antimalaria medicines, medical supplies and insecticides, field equipment and vehicles. The buffer stock of medicines, medical supplies and insecticides should constitute between 20-30% of the annual requirement.

6.4.4 RESPONSE.

Once an epidemic is detected the data should be further disaggregated by village in order to identify the specific areas that are affected by the epidemic. A team of health workers must be sent to the affected villages immediately to investigate the underlying cause of the epidemics and provide treatment to all febrile cases. The investigations should include confirmatory tests in a sample of 50 febrile patients and if conditions suitable for malaria transmission prevail, conduct special surveys of mosquito distribution and density.

The medicine of choice for the treatment of suspected malaria cases in an epidemic situation is artemether/lumefantrine, with the exception of pregnant women and children weighing less than 5kg. Indoor residual spraying of houses may be used in the control of epidemics, especially in the early phase. During the epidemic, the health facility should send regular weekly reports to the district office and update the latter on measures taken. The regional and district levels receive and analyze weekly data in their respective catchment areas and provide support to the lower levels.

7.0. CHEMOPROPHYLAXIS AND INTERMITTENT PRESUMPTIVE TREATMENT

7.1. NON-IMMUNE TRAVELERS

Chemoprophylaxis is only recommended for special groups who are at risk of contracting malaria, non-immune travelers and individuals living in malaria endemic areas for short periods e.g. labour force, police, and army. Non-immune travelers to malaria endemic areas are advised to take chemoprophylaxis before they undertake the journey. The recommended prophylaxis for travelers to Namibia and people from non-malaria endemic areas within Namibia who visit malaria endemic areas is mefloquine 250mg weekly for adults and 5mg/kg for children. Mefloquine is contra-indicated in individuals with a history of psychiatric disorders or epilepsy, children who weigh less than 15 kg and pregnant women. Doxycycline 100mg daily could be used as an alternative to mefloquine. Doxycycline is contraindicated in children less than 8 years and in pregnant women.

Table 2. *Recommended doses of mefloquine by body weight.*

Body weight (kg)	Dosage (mg)	No. of tablets
15-19	62.5	1/4
20-30	125	1/2
31-45	187.5	3/4
Over 45	250	1

Chemoprophylaxis should be initiated one week before travel and must be taken during the entire stay in malaria endemic area and continued for 4-6 weeks after return.

7.2. INTERMITTENT PREVENTIVE TREATMENT (IPT).

The risk of severe or fatal malaria is greatest in areas of unstable transmission and can cause maternal death, abortion, still birth, premature delivery and low birth weight in infants. Sulphadoxine/pyrimethamine is recommended for intermittent preventive treatment during first and second pregnancies. This regimen is beneficial in low to high transmission areas. Two doses of SP should be given after quickening and at least four weeks apart up to 36 weeks of pregnancy. Sulphadoxine/pyrimethamine shall be provided to pregnant women in their 1st and 2nd pregnancies. Chemoprophylaxis is not recommended for third and subsequent pregnancies, as it does not confer additional protection against malaria. In areas where the prevalence of HIV is documented to be greater than 10%, a third dose of SP should be given four weeks after the second dose.

Table 3. *Schedule for intermittent presumptive treatment with SP.*

Gestation period	26-28 weeks	34-36 weeks
Dosage	3 tablets	3 tablets

8.0. CLINICAL MANAGEMENT OF MALARIA.

Early diagnosis with prompt and correct treatment using effective anti-malarial medicines will shorten the duration of illness and prevent the development of complications and death from malaria disease. It is important, therefore, to define concepts that will serve as guiding principle for malaria case management.

8.1. CASE DEFINITIONS.

Uncomplicated malaria.

A patient with positive laboratory test for malaria parasites and presenting with **fever**, and with one or more of the following symptoms and signs¹

- rigors and chills,
- loss of appetite
- vomiting
- headache
- general body myalgia, and
- diarrhea,

In children, in addition to the above, the following may be observed:

- general irritability and fretfulness,
- excessive crying,
- cough,

Complicated/Severe malaria

A patient with *P. falciparum* parasitemia with one or more of the following symptoms and signs²;

- excessive drowsiness
- altered consciousness or coma
- multiple convulsions
- prostration
- severe pallor
- presence of jaundice
- passing of dark urine
- passing little or no urine
- difficulty in breathing
- circulatory shock and
- bleeding tendencies

¹ In the absence of laboratory facilities, the diagnosis of uncomplicated malaria can be made based on symptoms and signs

² In the absence of laboratory facilities, the diagnosis of severe malaria can be made based on symptoms and signs.

Clinical diagnosis

This is the establishment of malaria diagnosis in patients presenting with symptoms and signs suggestive of malaria without the use of any laboratory facilities.

Effective Treatment

Effective treatment is the clearance of clinical signs, symptoms and malaria parasites from patient's blood following the administration of complete course of antimalaria treatment.

Treatment failure

This is the persistence of symptoms and signs of malaria and the presence of parasitemia despite completion of a full course of treatment correctly.

Laboratory diagnosis

This is the confirmation of the presence of malaria parasites in a patient presenting with symptoms and signs suggestive of malaria using a laboratory test. This could be either microscopy or rapid malaria diagnostic test.

Malaria death

This is a death resulting in a patient with symptoms and signs suggestive of severe malaria disease and laboratory confirmed *P. falciparum* infection.

8.2. CASE MANAGEMENT.

8.2.1. Uncomplicated Malaria.

After careful review of the efficacy, cost, simplicity of course of treatment and safety of the alternative antimalaria medicines, the following treatment regimen were found to be the best options. Other combination such as Artemether + Sulphadoxine/pyrimethamine or Artesunate + Amodiaquine, are not lasting alternatives due to the growing decline in the efficacy of Sulphadoxine/pyrimethamine and the possible cross resistance that may develop against Amodiaquine with other 4- aminoquinoline.

ADULTS AND CHILDREN ABOVE SIX (6) MONTHS.

The first line antimalaria medicine for uncomplicated malaria at all levels of the health care delivery system is Artemether/lumefantrine. All malaria patients can receive this medicine combination with exceptions of pregnant women and children who weigh less than 5 kg. This is a six-dose treatment that is administered over a three days. The treatment should be taken with food if possible to enhance absorption. Treatment should preferably be administered on the basis of body weight rather than on basis of age.

Table 4. Dosage of Artemether/lumefantrine by age-group and body weight.

Age group	Weight (in kg)	DAY 1		DAY 2	DAY 3
		1 st Dose	After 8 hours	Give twice a day	Give twice a day
6mon-2yrs	5 -14	1 tablet	1 tablet	1 tablet	1 tablet
3yrs-7yrs	15–24	2 tablets	2 tablets	2 tablets	2 tablets
8yrs-10yrs	25-34	3 tablets	3 tablets	3 tablets	3 tablets
≥ 11yrs	≥ 35	4 tablets	4 tablets	4 tablets	4 tablets

Artemether/lumefantrine is not recommended in children under 6 months of age or less than five (5) kg body weight.

CHILDREN BETWEEN 2-6 MONTHS.

Children between the ages of two and six months will receive Sulphadoxine/pyrimethamine ½ a tablet as first-line antimalaria medicine for uncomplicated malaria. If no improvement is observed within the first 24-48 hours, quinine must be given as the second line antimalaria medicine.

In areas where marked decline in the efficacy of Sulphadoxine/pyrimethamine has been demonstrated quinine should be used. Safety profile for Artemether/lumefantrine in children between 2-6 months is currently being determined.

In instances where there is no improvement after administration of arthemeter/lumefantrine, oral quinine must be given for uncomplicated malaria. The use of quinine must be supported by history indicating that arthemeter/lumefantrine was taken correctly and that the presence of malaria parasites was confirmed by laboratory investigations.

Table 5. Dosage of quinine tablets in adults and children.

	Dose	Frequency	Duration
Adults	10mg per kg	every 8 hours	7 days
Children	10mg per kg	every 8 hours	7 days

8.2.2. Management of severe/complicated malaria.

Parenteral quinine is the medicine of choice for the treatment of complicated/severe malaria. Parenteral quinine should be replaced with oral quinine as soon as the patient's general condition allows.

ADULTS.

Give quinine 20 mg/kg body weight (loading dose) diluted in 10 ml isotonic fluid/kg by intravenous infusion over 4 hours. Then give maintenance dose of quinine 10 mg/kg over 4 hours diluted in 10 ml isotonic fluid/kg by intravenous infusion, 8 hours after the start of the loading dose. Repeat maintenance dose every 8 hours. When the patient is able to swallow, change to oral quinine. Give quinine 10 mg/kg every 8 hours. Complete a 7-day treatment course. The maintenance dose must not exceed 1 800 mg over 24 hours.

CHILDREN.

Give quinine 20 mg/kg body weight (loading dose) diluted in 10 ml isotonic fluid/kg by intravenous infusion over 4 hours. Then give maintenance dose of quinine 10 mg/kg over 2 hours diluted in 10 ml isotonic fluid/kg by intravenous infusion, 12 hours after the start of the loading dose. Repeat maintenance dose every 12 hours. When the patient is able to swallow, change to oral quinine. Give quinine 10 mg/kg per os every 8 hours. Complete a 7-day treatment course.

Intramuscular administration of quinine is only recommended in instances where intravenous administration is not possible. For intramuscular administration of quinine, use same dosage as in the case of intravenous administration. Dilute quinine in normal saline to a concentration of 60-100mg/ml.

A loading dose of quinine should not be used if the patient has received quinine, quinidine or mefloquine within the preceding 12 hours.

In some case where the response to quinine is not adequate (if parasitemia persists after three days of treatment), quinine should be combined with a course of *doxycycline* for 7 days except for pregnant women and children under 8 years of age. In the case of pregnant women and children under the age of 8 years, a course of *clindamycin* for 5 days should be used.

In selected situations where patients may not respond to quinine, parenteral artemether at a dose of 3.2mg/kg intramuscular as loading dose should be given, followed by 1.6mg/kg daily for a minimum of three days or until the patient can take oral therapy to complete a seven days course.

Pre-referral treatment of severe malaria from the Clinics and Health Centers to the Hospital will consist of initial dose of intramuscular quinine. This will be repeated every eight (8) hours until referral is effected. If administration of intramuscular quinine is not possible, artesunate suppositories 10mg/kg can be used for pre-referral treatment. These drugs should be made available in the primary health care facilities.

8.2.3. *Malaria in Pregnancy.*

Uncomplicated Malaria.

Quinine is indicated for all stages of pregnancy as use of SP and artemether/lumefantrine is not recommended. Quinine should be given at a dosage of 10mg/kg body weight eight hourly for seven days.

Where quinine or other antimalaria medicines are considered inappropriate, artemether/lumefantrine can be used. In such cases artemether/lumefantrine should be administered under close supervision and the pregnancy outcomes should be monitored. Safety profile of this drug in pregnancy is still under investigation. In the event of treatment failure with arthemether/lumefantrine, quinine should be used.

Severe Malaria.

Quinine is indicated for the treatment of severe malaria in pregnancy in any trimester. If the response to quinine is not adequate, a course of five days clindamycin should be used for pregnant women and children under eight years. Doxycycline is contraindicated in pregnancy and children younger than 8 years.

8.3. HIV AND MALARIA.

Several cross-sectional, retrospective and longitudinal studies in African children and adults found no interaction of major clinical importance between HIV and malaria. However, it has been reported, that malaria makes HIV worse in pregnant women and may increase the risk of transmission of HIV to their babies. It is recommended that confirmed HIV/AIDS patients, should use insecticide treated nets as a means of reducing the risk of contracting malaria in endemic areas. It is also recommended that early treatment of fevers be initiated and where possible, rapid diagnostic tests be used to confirm malaria diagnosis and provide prompt treatment.

9.0. INSTITUTIONAL FRAMEWORK

9.1 ORGANIZATIONAL STRUCTURE OF NATIONAL VECTOR-BORNE DISEASE CONTROL PROGRAMME.

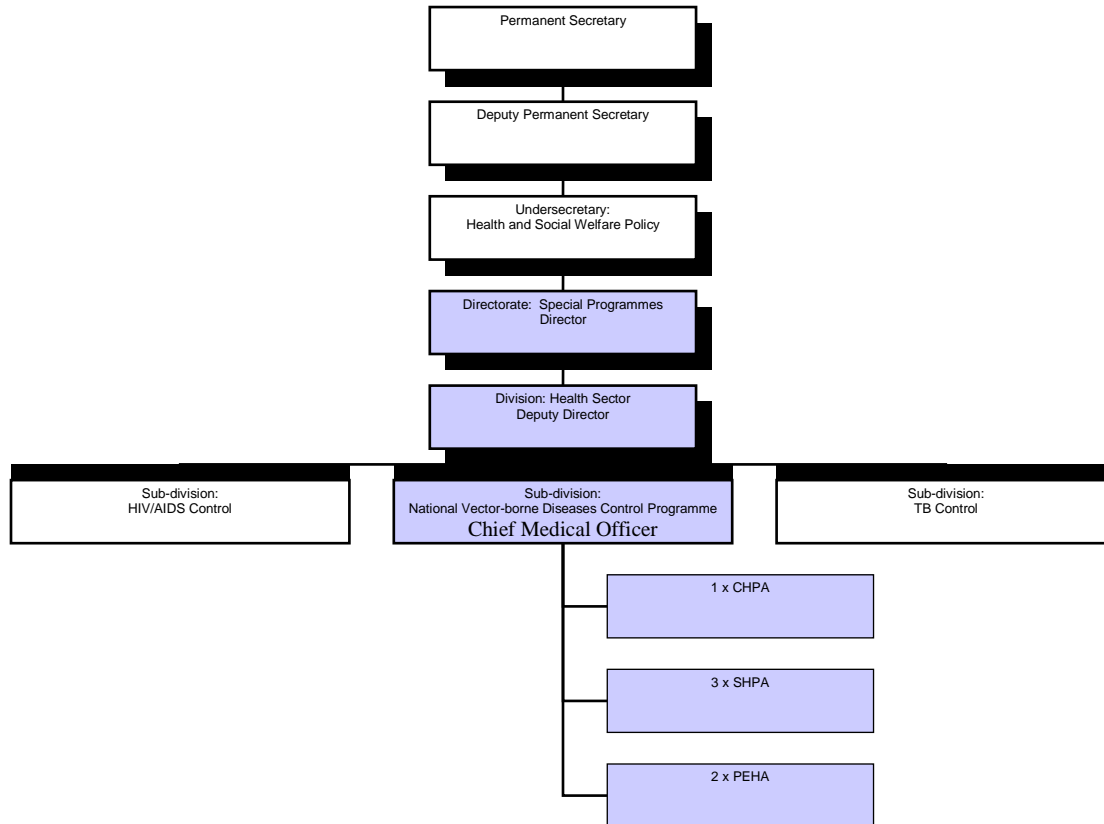


Fig. 2. Structure of the NVDCP.

At national level, the NVDCP is headed by a Chief Medical officer, assisted by a Chief Health Programme Administrator, three Programme Administrators, one responsible for entomology, one for case management and the last one for parasitology. In addition the Programme will receive technical and administrative support from two Principal Environmental Health Assistants. At the regional, district and local levels, the programme is fully integrated in the Primary Health Care system.

9.2 ROLES AND RESPONSIBILITIES OF DIFFERENT LEVELS OF HEALTH CARE.

National Level

- i. To formulate policies and strategies, set standards, prepare guidelines and coordinate malaria control activities.
- ii. To ensure that vector control methods and strategies are relevant to the local malaria situation.
- iii. To provide technical guidance to lower levels, other institutions and agencies.
- iv. To coordinate interregional and cross-border issues, including exchange of information and resource utilization.
- v. To maintain a database and information network on vector control and case management.
- vi. To identify research priorities and their co-ordination.
- vii. To define responsibilities and lines of authority at different levels.
- viii. To monitor and evaluate the malaria control programme.
- ix. To identify training priorities, mobilize resources and plan training programme.
- x. To foster support and commitment by, and maintain close interaction and collaboration with sectors within and outside health sector.

Regional Level

- i. To maintain close interaction with the national level.
- ii. To coordinate and monitor implementation of national policies and strategies.
- iii. To plan, monitor and evaluate malaria control interventions and submit regular reports to the national level.
- iv. To monitor malaria situation and respond to epidemics promptly.
- v. To train staff in malaria control interventions.
- vi. To conduct entomological and epidemiological surveys under the auspices of the national level.
- vii. To raise awareness among community members on malaria.
- viii. To develop appropriate IEC material on malaria case management, vector control and personal protection measures according to the local needs.

District Level.

- i. To Supervise and support health centers and clinics.
- ii. To train community health workers on malaria recognition and prevention.
- iii. To monitor malaria situation and to respond promptly to epidemics.
- iv. To plan, monitoring and evaluate malaria control interventions.
- v. To promote use of insecticide treated nets.
- vi. To plan and carry out indoor residual spraying of houses.
- vii. To mobilize communities to participate in malaria control activities.
- viii. To carry out any other activities consistent with sound malaria control.

Health Facility Level.

- i. To establish early diagnosis and administer appropriate treatment.
- ii. To refer more serious cases in accordance with Case Management Guidelines.
- iii. To monitor malaria situation and respond to epidemics promptly.
- iv. To give health education on malaria to individuals and communities.
- v. To mobilize communities to participate in malaria control activities.
- vi. To carry out any other activities consistent with sound malaria control.

Community Level.

- i. To provide treatment to individuals at community level.
- ii. To disseminate information related to malaria such as the importance of seeking treatment early, use of insecticides treated nets by children under five years and pregnant women and other personal protective measures.

9.3 DIAGNOSIS AND MANAGEMENT OF MALARIA AT DIFFERENT LEVELS OF CARE.

Primary Care Services.

Diagnosis:

This level includes clinics, Health Centers, outreach/mobile clinics where services are rendered by nurses. Since there are no laboratory facilities at this level, diagnosis will be based on clinical symptoms and signs.

At this level, use of rapid diagnostic tests is recommended for pregnant women, children older than five years, and severely sick patients during the malaria transmission season in all malaria endemic regions. Children under the age of five will be treated based on clinical assessment or by using IMCI approach where applicable. In addition, confirmatory tests must be used in all patients during low transmission season or in areas where there is no malaria transmission. Health centers without facilities for microscopic diagnosis must use rapid diagnostic tests for malaria confirmation.

Management:

This level includes outreach/mobile services, clinics, and health centers. These facilities will have access to first and second line medicines. At this level all patients with uncomplicated malaria will be provided with the first line medicines. Diagnosis is made on the basis of clinical signs and symptoms. All cases with signs and symptoms of severe malaria with or without positive laboratory test for malaria will be provided with pre-referral treatment of intramuscular quinine and referred to district hospital.

Secondary Care Level.

Diagnosis:

This level consists of District Hospitals that have access to a medical doctor. District hospitals have access to confirmatory tests provided by the Namibia Institute of Pathology which can also perform other tests like random blood sugar, urea and electrolytes, bilirubin and other liver enzymes to support management of severe malaria.

Management:

At this level all antimalarial medicines, diagnostic and management facilities are available. Most severe malaria cases can be managed at this level. Patients with complications that cannot be managed at this level will be referred to a regional referral hospital.

Tertiary Care Level.

Diagnosis:

This level consists of intermediate and national referral hospitals. At this level, diagnosis should always be supported with laboratory results provided by the Namibia Institute of Pathology, which have the capacity to carry out specialized investigations to support management of severe malaria and its related complications.

Management:

These facilities include the intermediate and the national referral hospitals. These hospitals are equipped with better facilities, staff and all antimalaria medicines that will enable the staff to manage complications of severe malaria effectively.

9.4 INTERSECTORAL COLLABORATION

The social and economic impact of malaria led to the realization that malaria control can no longer be regarded as a responsibility of the health sector alone. Various initiatives, notably, The Abuja Declaration on Malaria and the Roll Back Malaria Initiative were undertaken to foster intersectoral collaboration. The Ministry subscribes to these initiatives and promotes collaboration with the following institutions amongst other.

- i. Ministry of Basic Education, Sport and Culture with a view to integrate malaria control in the primary and secondary schools curricula.
- ii. Ministry of Works Transport and Communication with a view to ensure that construction of new roads does not create new breeding sites for malaria vectors and that new houses are provided with door and window screens.
- iv. Ministry of Finance to waive import duties on bed nets and insecticides.
- v. Ministry of Women Affairs and Child Welfare with a view to distribute bed nets to pregnant women and children under the age of five years.
- vi. Ministry of Environment and Tourism with a view to disseminate information on malaria prevention among tourists.
- vii. Meteorological services to provide information on weather forecast to the National Vector-borne Disease Control Programme.
- viii. Training institutions to develop appropriate training material on malaria control and conduct operational research.
- ix. Non-governmental Organization to broaden community participation in malaria control.

- x. United Nations Agencies, European Union and Africa Development Bank to provide technical and financial support to the Ministry of Health and Social Services for malaria control programme.

10.0 MONITORING AND EVALUATION.

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

- To measure progress and achievements.
- To detect and solve problems.
- To provide information for policy revision and re-planning of interventions.
- To assess sustainability.
- To guide the allocation of programme resources.

It is recommended that the programme develop a detailed monitoring and evaluation plan to ensure that programme implementation is in line with the plan of action. Lessons learnt from M&E exercises will be incorporated into programme planning to improve performance.

10.1. Performance Indicators

The following indicators will be used to monitor and evaluate programme performance:

1. Number of service providers trained to carry out IRS
2. Number of service providers trained in epidemic monitoring and control
3. Number of regions with trained personnel in malaria control
4. Number of health laboratory workers trained in malaria microscopy
5. Number of MOHSS staff trained in entomology, parasitology and epidemiology
6. Number of health workers trained in malaria case management
7. Number of persons trained in computerized data management
8. Coverage of long-lasting insecticide treated bed nets among pregnant women and under five children in endemic areas
9. Percentage of pregnant women sleeping under ITNs
10. Percentage of under five children sleeping under ITNs
11. Percentage of unit structures covered with IRS targeted areas
12. Percentage of population protected with IRS in targeted areas
13. Proportion of clients correctly diagnosed and treated for malaria
14. Percentage reduction in malaria morbidity and mortality

10.2 Operational and applied research.

An operational research component forms an integrated in the programme to improve the efficiency of operations, assess cost-effectiveness and find solutions to problems.

Research priorities include the following:

1. Re-stratification of geographical and ecological zones for malaria control.
2. Assessment of current diagnostic capabilities, particularly microscopy and RDTs.
3. Identification of problems in quantification, procurement, distribution and availability of antimalaria medicines.
4. In-depth analysis of hospital data to identify population groups at risk.
5. Retrospective analysis of existing climatic, ecological and health data to help develop methods of epidemic forecasting.
6. Assessment of control tools for their efficacy, cost-effectiveness, acceptability and usage in areas with different ecological and epidemiological characteristics.
7. Regular assessment of parasite sensitivity to antimalaria medicines.
8. Classification of mosquito breeding site in order to determine the feasibility of larval control operations in selected situations.
9. Cost effectiveness analysis of vector control and other preventive measures.
10. Assessment of economic and social gains of malaria control.
11. Evaluate the importance of clinical signs and symptoms in improving the diagnosis of malaria.
12. Quality assurance of vector control intervention.
13. Knowledge Attitude and Practice (KAP) study to assess community perception and attitude to the spraying programme.

11.0 RESOURCE IMPLICATIONS.

The revised policy will have significant resource implication on the Ministry's budget. This is mainly the result of higher cost of the newly introduced antimalarial medicines and diagnostic test. The orientation of health workers will also require additional funds for the first year of the policy implementation. Besides, the introduction of new diagnostic tests at clinic and health center levels may some impact on already stretched staff time.

11.1 HUMAN RESOURCE DEVELOPMENT.

Although the Ministry has strived to build up the required human resources for the malaria control programme at various levels, there are still gaps. Priority areas where training is required include case management, parasitology, public health, entomology, vector control, emergency preparedness and response, monitoring & evaluation, and programme management.

Technical assistance on various aspects of malaria control will be needed to assist the Ministry to strengthen interventions and develop in-service training capabilities. Postgraduate training overseas is highly required for specialized central level and key regional 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 should include basic instructions in malaria and methods of self-protection.

11.2 DRUGS, MEDICAL SUPPLIES AND OTHER RESOURCES.

In addition to the currently used drugs, i.e. SP, quinine, etc and medical supplies (IV fluids) for the management of sever and complicated malaria, the introduction of artemether lumefantrine and RDTs will have significant resource implications. There will also be an added cost involved to introduce the new policy to health workers at various levels. While most of these expenses are expected to come from government, significant amount of resources still need to be mobilized from other partners.

The financial resources needed for the implementation of the policy are shown in the Table 6.

Table 6. Resources required for five year period of implementation.

Description of Item	Estimated one year cost(N\$)	Estimated Five-years cost (N\$)
Artemether lumefantrine	53,014,500.00	278,727,750.00
Malaria Rapid Diagnostic Test	2,731,050.00	13,655,250.00
Training of health workers on case management	1,774,245.00	3,548,490.00
Training of health workers on vector control	893,750.00	1,787,500.00
Training of spray personnel	2,376,000.00	11,880,000.00
Long and short-term trainings	220,000.00	1,100,000.00
Procurement of microscopes & lab supplies	103,125.00	206,250.00
IEC materials	646,800.00	3,234,000.00
Total Cost	61,759,470.00	314,139,240.00

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4. Dr. D. Tiruneh, Medical Officer, World Health Organization
5. Dr. Lichtman, Internist, Windhoek Central Hospital
6. Dr. Peeha, Pathologist, National Institute of Pathology
7. Mr. P. W. Rite, Pharmacist, Pharmaceutical Services
8. Mr. S. Katokele, Senior Health Programme Administrator, NVDCP.
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ANNEXES

ANNEX 1: GUIDELINES FOR DIAGNOSIS AND TREATMENT

PRIMARY CARE LEVEL.

1. Diagnosis

At this level, diagnosis is based on clinical symptomatology. However, microscopy or rapid diagnostic test may be used where applicable. In establishing the diagnosis of malaria, due consideration must be given to place of residence of the patient and whether the patient traveled shortly before that to malaria endemic areas. Signs and symptoms that may suggest presence of malaria include:

- Fever
- Flue-like illness
- Sweating
- Headache
- Shivering or rigors
- Abdominal pain
- vomiting, diarrhea
- Muscle pain
- Cough
- Jaundice
- Anemia
-

Other diseases such as meningitis, hepatitis, typhoid fever, tick bite fever, and influenza must be excluded as they mimic malaria. In case of doubt, the patient must be referred to the next higher level for proper diagnosis and management.

2. Treatment

The first drug of choice is artemether/lumefantrine at a dosage indicated in the following table.

Table 1. Dosage of Artemether/lumefantrine by age-group and body weight.

Age group	Weight (in kg)	DAY 1		DAY 2	DAY 3
		1 st Dose	After 8 hours	Give twice a day	Give twice a day
6mon-2yrs	5 -14	1 tablet	1 tablet	1 tablet	1 tablet
3yrs-7yrs	15–24	2 tablets	2 tablets	2 tablets	2 tablets
8yrs-10yrs	25-34	3 tablets	3 tablets	3 tablets	3 tablets
≥ 11yrs	≥ 35	4 tablets	4 tablets	4 tablets	4 tablets

Artemether/lumefantrine is not recommended in children under the age of 6 months or less than five (5) kg body weight.

CHILDREN BETWEEN 2-6 MONTHS.

Children between 2-6 months will receive Sulphadoxine/pyrimethamine, ½ a tablet for uncomplicated malaria. If no improvement is observed within the first 24-48 hours,

quinine must be given. Give quinine plus clindamycin if parasitemia persists. The dosages of quinine and clindamycin are as follows:

- Quinine: 10mg/kg 8 hourly for 7 days.
- Clindamycin: 10mg/kg every 8 hours for 7 days.

A high fluid intake should be encouraged. Paracetamol may be given for fever. Non-steroidal anti-inflammatory medicine must be avoided. Advise the patient to return if he/she is vomiting or if there is no improvement following treatment.

3. Referral

Reasons for referral to secondary level of health care include:

- 3.1. Malaria in pregnancy
- 3.2. Vomiting
- 3.3. Symptoms and signs of severe malaria:
 - altered consciousness, coma
 - excessive drowsiness,
 - prostration,
 - multiple convulsions,
 - severe pallor,
 - low blood pressure,
 - presence of jaundice,
 - passing of dark urine (coca cola urine),
 - difficulty in breathing,
 - passing little or no urine
- 3.4. Failure to respond to treatment

SECONDARY LEVEL.

1. Diagnosis:

At this level, diagnosis will be based on clinical signs and symptoms listed above and/or confirmation with laboratory tests. Microscopy and rapid diagnostic tests are recommended to establish diagnosis of malaria. For correct patient management, the following laboratory tests must be done:

- Urea or creatinine
- FBC
- Arterial blood gases
- Blood glucose
- Parasite count

2. Treatment.

- The drug of choice for the treatment of uncomplicated malaria is artemether/lumefantrine.
- If the patient is vomiting or is unable to take oral medicines or has signs and symptoms of severe malaria, he/she need to be put on intravenous fluids and intravenous quinine immediately.
- Give a loading dose of iv quinine 20 mg /kg as an infusion over 4 hours followed by 10 mg/kg every 8 hours as an infusion over 4 hours until the patient is able to take oral quinine to complete 7 days treatment course. Avoid loading dose if the patient was recently treated with quinine or mefloquine.
- The iv fluid can be in the form of 200ml 5% DW or 0.9% Saline. Use rehydration or Maintelyte as maintenance iv fluids.
- Quinine can cause severe hypoglycemia, especially in pregnant patients. Monitor blood glucose using dextrostix depending on the patient condition.
- The dose of quinine should be reduced by 30% in renal failure.

3. General Management.

- Overdose of quinine causes a prolonged QT interval on ECG and may predispose to severe arrhythmias.
- Patients who are clinically dehydrated or who excrete <50 ml/hour of urine need to be rehydrated with 1-2 liters of Normal Saline/Ringers Lactate or Plasmalyte B.
- Convulsions should be treated with diazepam 10mg slow IV injection followed by Epanutin-loading dose 18mg/kg and then 100 mg daily.
- The following blood tests should be performed to monitor progress:
 - FBC
 - Peripheral blood smears (parasite count)
 - U&E
 - LFT
 - Blood glucose.
- Patient with severe disease require regular monitoring of pulse, blood pressure, urine output, respiratory rate, oxygen saturation, level of consciousness and temperature.

4. Referral to tertiary care institutions.

Patients manifesting signs of severe falciparum malaria should be referred to a hospital with ICU facilities. These include clinical conditions that cannot be managed at district hospital level such as:

- Impaired consciousness or convulsions
- Respiratory distress, signs of pulmonary oedema on chest X-ray
- Oliguria or dark coca-cola coloured urine
- Shock, blood pressure < 90 systolic and poor peripheral perfusion
- Bleeding tendency

TERTIARY LEVEL.

1. Diagnosis.

All the clinical and laboratory criteria for diagnosis listed above are applicable at this level. In addition patients need screening for signs of severe malaria, complications and for other incidental or concurrent diseases. A full clinical examination is mandatory at all levels.

- CXR, ECG, biochemical and haematological testing must be done.
- Biochemical investigations should include U&E, LFT, glucose, blood gases.
- A lumbar puncture should be considered if consciousness is impaired to exclude raised intracranial pressure.
- Haematological investigations should include FBC, peripheral blood smear, PI, APTT. Thrombocytopenia is extremely common and usually does not cause clinical bleeding.
- Blood cultures should be considered if the diagnosis is in doubt.
- Patients in renal failure need to be worked up for dialysis. This requires screening for hepatitis screen and HIV in addition to renal sonar.
- Patients with arrhythmias need an ECG and a corrected QT interval to be calculated. $QTc = QT$ divided by the square root of the RR interval. $QTc > 0.55ms$ may indicate quinine toxicity and puts the patient at risk for severe arrhythmias and sudden death. Quinine should be temporarily discontinued until the QTc is normal. The QT interval is measured from the beginning of the QRS complex to the end of the T wave. Each small block = 0.04 second.

2. Treatment.

- Treatment follows the guidelines given under primary and secondary facilities.
- Severe falciparum malaria should be treated with iv quinine. Doxycycline or Clindamycin may be added after 2 days.
- Patients on iv quinine should have dextrostix done every 4 hours.
- Fluid management should be re-assessed frequently (hourly if possible). Input/output should be charted hourly. Auscultation of lung bases for incipient pulmonary oedema should be done at regular intervals and respiratory rate recorded. A rising respiratory rate and basal crackles is a far more useful sign of early pulmonary oedema than the CVP. In an oliguric patient, the absolute level of the CVP is an inaccurate index of fluid balance. Rather measure the response of the CVP to a fluid challenge of 200ml saline. A sustained rise of 3 cm indicates normovolaemia.
- Fluid resuscitation should be done with isotonic fluid such as Normal Saline, Plasmalyte or Ringers Lactate. Fifty percent dextrose may be added to these fluids if indicated.
- The use of diurectics in an oliguric patient is risky and should be done under ICU monitoring. Packed red blood cells should be given if $Hb < 7g/dl$.

- Platelet concentrates are unnecessary unless the patient is clinically bleeding in the presence of thrombocytopenia.
- Other important measures include optimal nursing care, feeding, physiotherapy, hourly haemoglucotest for unconscious patients, monitoring and record keeping.

3. Indications for admission to ICU.

- 3.1. Inability to maintain airway.
Patients in deep coma who do not cough or spit out are at risk of aspiration and need to be intubated.
- 3.2. Respiratory failure.
This is due to pulmonary oedema from fluid overload, ARDS or secondary pneumonia. Indications for ventilation are: $PO_2 < 50$, $PCO_2 > 50$, O_2 Saturation < 90 , exhaustion and /or aggressive behaviour from incipient hypoxia.
- 3.3. Renal failure requiring dialysis.
Both peritoneal and haemodialysis are appropriate, depending on availability of facilities for haemodialysis.

Indications for immediate dialysis are:

- i. Serum $K > 6$ mmols/l not responding to medical treatment. (Glucose + insulin, Sodium bicarbonate, Calcium gluconate & Kayexolate).
- ii. Frank pulmonary oedema not responding to diuretics.
- iii. Convulsions in a patient with a serum $Na < 120$ mmols/l.
- iv. Severe metabolic acidosis.
- v. Uraemic encephalopathy.
- vi. Pericarditis.

Indications for elective dialysis: Serum urea > 35 mmols/l.

- i. Shock. $BP < 90$ systolic in a cold clammy patient with poor peripheral perfusion not responding to 1-2 liters of iv fluid.
- ii. Spontaneous bleeding in a patient with abnormal coagulation profile.

ANNEX 2: CHEMOPROPHYLAXIS AND INTERMITTENT PRESUMPTIVE TREATMENT.

Recommended chemoprophylaxis or intermittent preventive treatment for non-immune travelers and women in their first and second pregnancies is shown in the following table.

Table 2. Schedule for chemoprophylaxis and intermittent preventive treatment.

Target group	Sulphadoxine pyrimethamine	Mefloquine	Doxycycline
Immune residents	No	No	No
Non-immune travelers	No	Yes	Yes
Pregnant women 1 st and 2 nd pregnancies	Yes	No	No

Chemoprophylaxis forms only one component of malaria prevention. Therefore the use of other preventive measures such as insecticide treated nets and mosquito repellents are highly recommended.

Sulphadoxine pyrimethamine

Give 3 tablets of sulphadoxine/pyrimethamine during the 2nd trimester followed by same dosage in the 3rd trimester of pregnancy. Allow a minimum of 4 weeks interval between the two doses.

Mefloquine

Give mefloquine 250mg (1 tablet) every week. Children must receive 5mg/kg of mefloquine. Chemoprophylaxis must be started one week before travel and must be taken every week continuously up to a minimum of four weeks and a maximum of six weeks after leaving the malaria endemic area.

Doxycycline

Give doxycycline 100mg daily, starting 1-2 days before travel and continue same dose once daily up to four weeks after leaving the malaria endemic area. Doxycycline is contraindicated in children younger than 8years old and in pregnant women.

ANNEX 3: SIDE EFFECTS OF ANTIMALARIA MEDICINES.

Artemether-lumefantrine

Side-effects

The following adverse effects as a result of artemether/lumefantrine administration have been reported:

- dizziness and fatigue,
- anorexia,
- nausea and vomiting,
- abdominal pain,
- palpitations,
- myalgia,
- sleep disorders,
- arthralgia,
- headache and
- skin rashes.

In children and adults treated with this combination, the frequency and degree of QTc prolongations was lower than with chloroquine, mefloquine or halofantrine. Extreme care should be exercised in patients who were on quinine.

Contraindications:

Artemether/lumefantrine should not be prescribed in 1st trimester of pregnancy. It is also contraindicated in individuals with known hypersensitivity to either artemether or lumefantrine.

Quinine

Side-effects

The following adverse effects were observed following administration of artemether/lumefantrine:

- cinchonism (tinnitus, headache, blurred vision, altered auditory acuity, nausea, diarrhoea, hot and flushed skin, rashes, confusion);
- hypersensitivity reactions including angioedema; rarely haemorrhage and asthma;
- hypoglycaemia (especially after parenteral administration);
- blood disorders and
- cardiovascular disorders (prolonged QT and arrhythmias, gastrointestinal and CNS effects).

Contraindications

Quinine is contraindicated in individuals with haemoglobinuria; optic neuritis and tinnitus.

Sulfadoxine/pyrimethamine

Side-effects

Combinations of sulpha preparations and pyrimethamine are generally well tolerated when used at the recommended doses for malaria treatment. The most serious events are associated with hypersensitivity to the sulfa component, involving the skin and mucous membranes and normally occurring after repeated administration. Serious cutaneous

reactions following single-dose treatment with sulfadoxine/pyrimethamine are rare. Cutaneous drug reactions are more common in patients who are HIV positive. Haematological changes including thrombocytopenia, megaloblastic anaemia and leukopenia have also been observed. These conditions have usually been asymptomatic but, in very rare cases, agranulocytosis and purpura have occurred. As a rule, these changes regress after withdrawal of the medicine.

Contraindications

Sulphadoxine/pyrimethamine is contraindicated in patients with hepatic and renal impairment.

Mefloquine

Side-effects

Mefloquine may cause nausea, strange dreams, dizziness, mood changes, insomnia, headaches, and diarrhoea.

Contraindications

Mefloquine is contraindicated in first trimester of pregnancy. It is also contraindicated in individuals with history of neuropsychiatric disorders, convulsions; and hypersensitivity to quinine. It should not be used in patients requiring fine motor co-ordination, for example pilots.

Doxycycline

Side-effects

Doxycycline may cause skin photosensitivity, esophageal ulceration, gastrointestinal symptoms, candida super-infection, and interference with oral contraceptives.

Contraindications

Doxycycline is contraindicated in pregnancy and in children under the age of 8 years as well as in individuals with porphyria and systemic lupus erythematosus.

Clindamycin

Side-effects

Clindamycin may cause diarrhoea; nausea, vomiting, abdominal discomfort, antibiotic-induced colitis; rashes, urticaria, erythema multiforme, exfoliative and vesiculobullous dermatitis; jaundice and altered liver function; neutropenia, eosinophilia, agranulocytosis, and thrombocytopenia; induration, post intramuscular injection abscess and post intravenous injection thrombophlebitis.

Contraindications

Clindamycin is contraindicated in individuals who are suffering from diarrhea.

ANNEX 4: FORMULATION OF ANTIMALARIA MEDICINES.

Artemether/Lumefantrine

Tablets: Artemether 20 mg with lumefantrine 120 mg.

Quinine

Tablets: Quinine sulfate 300 mg; quinine bisulfate 300 mg.

Injection: Quinine dihydrochloride 300 mg/ml, 2ml ampoule.

Sulphadoxine/pyrimethamine

Tablets: Sulphadoxine 500mg + pyrimethamine 25 mg.

Mefloquine

Mefloquine (as hydrochloride) 250 mg tablets.

Doxycycline

Capsules: Doxycycline (as hydrochloride) 100 mg.

Clindamycin

Capsules: Clindamycin (as hydrochloride) 75mg, 150mg, 300mg.

ANNEX 5: LIST OF PARTICIPANTS OF THE CONSENSUS WORKSHOP ON THE REVISED MALARIA CONTROL POLICY

03-05 NOVEMBER 2004, PANDU LODGE, ONDANGWA

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